Kentucky Academy of Science

NEWSLETTER

www.kyscience.org | Susan Templeton, Editor | May 2013

The Voice of Science in Kentucky

Enhanced Affiliates
- Bellarmine University
- Berea College
- Brescia University
- Centre College
- Eastern Kentucky University
- Georgetown College
- Kentucky Community & Technical College System
- Kentucky State University
- Midway College
- Morehead State University
- Murray State University
- Northern Kentucky University
- Spalding University
- Transylvania University
- University of Kentucky
- University of Louisville
- University of Pikeville
- Western Kentucky University

Honorary Patron
- Lumins Associates

Sustaining Member - $500 level
- Campbellsville University

Member - $250 level
- Asbury University
- Kentucky Wesleyan College
- Lindsey Wilson College
- Thomas More College
- University of the Cumberlands
- Wood Hudson Cancer Research Laboratory

Associate Member - $100 level
- WKU Crawford Hydrology Lab
- WKU Hoffman Environmental Research Institute

Faculty, staff and students at Enhanced Affiliate member organizations receive:

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

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

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!

Mark your calendars: The 2013 KAS Annual Meeting will be held November 8-9 on the campus of Morehead State University. Deadlines for Pre-registration and Abstract submissions will be October 11. See you in Morehead!

From the President…

We are rapidly approaching the conclusion of a busy 2012-2013 academic year. It has certainly been a year of change and transition for the KAS. In the previous newsletter we announced the departure of Robert Creek from the position of Program Coordinator after 16 years of outstanding service in that role. We wish him the very best. Since that time, one of our members has stepped up to volunteer to serve in this position. Join me in welcoming Melony Stambaugh (Northern Kentucky University) as our new Program Coordinator. This is a key position within the KAS, and is vital to the success of our annual meeting. We are very grateful for Melony's willingness to serve the KAS in this role.

I am also very excited to report that we have been successful in our search for a new editor of the Journal of the KAS. It is with great pleasure that I announce that Dr. Jerzy Jaromczyk (Computer Science, the University of Kentucky) will be serving as the new editor of the JKAS. Jerzy has been an active member of the KAS, and in fact, is the most recent recipient of the superlative award for "Outstanding Academy Service". Throughout his career, Jerzy has served as a reviewer for numerous professional journals and conferences, has served as guest editor for a special issue of *Acta Informatica*, and is currently a member of the editorial board of the International Journal of Intelligent Games and Simulation. Jerzy also has a great deal of expertise as well as interest in working on web-based projects, and plans to develop an on-line, Web-based format for paper submission and paper review for the JKAS. We are so fortunate to have an individual with such outstanding experience and expertise in this position. Congratulations and best of luck to Jerzy as the new editor of the JKAS!

Continued on page 3

Inside this issue

Parting Note from the Executive Director

I wanted to take a moment to inform our membership that I am leaving my position as the Executive Director of the Kentucky Academy of Science on May 10.

I have enjoyed my tenure with KAS and I appreciate having had the opportunity to work with many of you. Since joining KAS in 2005, it has been fulfilling to see the membership of KAS grow from 450 to 2300 and watch as KAS has evolved from completing all tasks in a paper copy format to completing most functions electronically as well as having a strong web presence. In the coming years, I hope KAS will become an even louder "Voice of Science in Kentucky"!

Thank you for the support and encouragement you have provided me during the past eight years.

Best wishes,

Jeanne Harris

New Annual Meeting Program Coordinator Appointed

Melony Stambaugh has been named the new KAS Program Coordinator By the KAS Governing Board at their February meeting. Melony has been a KAS member since 2008. She has attended numerous KAS Annual Meetings; initially participating in the research competitions as a student and more recently serving as a judge for the anthropology section.

Melony holds a Bachelor of Science from Northern Kentucky University (NKU) and a Masters of Arts from the University of Cincinnati. She is an adjunct professor at NKU and also works for Cengage Learning. She is a member of number professor organizations and has extensive experience in conference organization.

Please join the KAS Governing Board in welcoming Melony Stambaugh (stambaughm1@nku.edu) to her new and very important position in KAS!

Author Information Wanted!

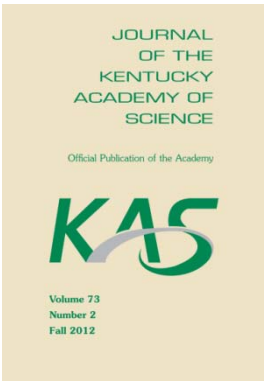
If you are a KAS member and have recently published a science focused book please forward this information to the KAS newsletter editor (susan.templeton@kysu.edu) so that your accomplishment can be shared with other scientists in Kentucky. Please include the title of the book, your name/other authors and affiliation, and a brief synopsis regarding the subject matter of the book. KAS promotes the dissemination of the scientific interests of the Commonwealth of Kentucky. We look forward to hearing from you!

Thanks to Jeanne Harris from the KAS Board

The Kentucky Academy of Science Governing Board extends its gratitude to Jeanne Harris, who is leaving her post as Executive Director of KAS to take a full-time position at the University of Kentucky. Jeanne became our Executive Director in 2005, and it is no coincidence that the Academy has advanced and grown in remarkable ways during her eight year tenure with us. Jeanne has been the gracious voice on our phone, a welcoming presence at our registration desk, institutional memory for our meetings, organizer of our records, troubleshooter for our expanding operations, and a creative and consistently helpful contributor to our planning. We extend our best wishes to Jeanne in her new professional role, and celebrate her many contributions to the Academy's long-term success.

Submitted by Rob Kingsolver

Updates on the KAS Journal



Below is information received from 112 hard copy and online responses to the *Journal of the Kentucky Academy of Science* (JKAS) Survey conducted at the KAS Annual Meeting and via Survey Monkey. Over three-fourths of survey respondents (78%) agreed that the JKAS fills a need unmet by any other publications. More than half (55%) feel there should be changes in the JKAS. Among the 55% of survey respondents who indicated they read the JKAS, most access it online (49% via the KAS website and 4%via another online source). Nearly half of survey respondents (47%) plan to publish in the JKAS in the future. Our thanks go to those members who responded to the survey. This information should be helpful to our new editor.

The KAS Governing Board is pleased to announce the selection of Dr. Jerzy Jaromczyk as the JKAS Editor. Dr. Jaromczyk is an Associate Professor in the Department of Computer Sciences in the College of Engineering at the University of Kentucky. Dr. Jaromczyk has taught graduate and undergraduate courses. His research is focused on algorithms with a particular interest in developing methods and software in an interdisciplinary context. He is currently a reviewer for Computer Reviews, is a member of the editorial board of IJIGS, and has served as a guest editor for *Acta Informatica*. Dr. Jaromczyk is interested in updating the JKAS paper submission and review processes to an on-line, Web-based format.

Please join us in welcoming Jerzy to his new position with KAS. He can be reached at jurek@cs.uky.edu.

Submitted by Jeanne Harris, Executive Director and Cheryl Davis, KAS President

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 2014. 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
- Biological Sciences Representative
- At large Representative

Any member may nominate another member for Vice President. However, for Physical Sciences and Social & Behavioral Sciences/Science Education representatives, the nominators must identify with the Division for which they are nominating. Please send nominations by August 1, 2013 to:

Dawn Anderson
Dawn_Anderson@berea.edu

KAS Chemistry Section Changes

In response to a proposal brought before the KAS Governing Board by the faculty and chairs of chemistry departments at seven Kentucky Colleges and Universities on behalf of the KAS Chemistry Section, the Board recently approved the division of the KAS Chemistry section into two new sections: Chemistry Analytical/Physical and Chemistry Organic/Inorganic. In recent years the KAS Chemistry section has greatly expanded resulting in chemistry poster and oral presentation numbers at the annual meetings being more than double the number of the any other KAS section. The change should address the problems and concerns of this sectional imbalance and allow for the KAS chemistry section to better accommodate the needs of their presenters.

The update will be in place for the 2013 KAS Annual Meeting so that researchers will be able to submit abstracts to either the Chemistry: Organic/Inorganic section or Chemistry: Analytical/Physical section.

New sectional officers have been selected and are indicated below, along with an update to offices for the Physics and Astronomy section.

KAS is in the process of updating our website to incorporate this amendment to the KAS sections. Members of the chemistry section will be notified as soon as the changes are complete.

Thank you to all the individuals who facilitated this change thereby improving KAS for all of our membership.

2013 KAS Sectional Officer Updates

Section	Chair	Secretary
Analytical/Physical Chemistry	David Cunningham david.cunningham@eku.edu	Jennifer Muzyka jennifer.muzyka@centre.edu
Organic/Inorganic Chemistry Section	Chris Mullins csmullins@campbellsville.edu	Keith Walters walterske@nku.edu
Physics and Astronomy	Keith Andrew Keith.Andrew@wku.edu	Robert Arts RobertArts@upike.edu

Submitted by Jeanne Harris, Executive Director

From the President...*continued*

The most recent change in the leadership of the KAS is the resignation of Jeanne Harris from her position as our Executive Director. Jeanne has served the KAS splendidly over the past eight years and we are so sad to have to tell her good bye. Those of you who have had the privilege of working with Jeanne know that it is difficult to adequately convey the overall impact that she has had on our academy. Jeanne will be beginning a full-time position at the University of Kentucky on May 13th. On behalf of the entire membership of the KAS, I would like to extend to Jeanne our sincerest gratitude and best wishes. A search committee has been formed and we will be circulating an advertisement for the Executive Director's position very soon. If you are interested in learning more about this position, please do not hesitate to contact me at Cheryl.davis@wku.edu.

Have a wonderful summer!
Sincerely,
Cheryl D. Davis

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.

Outstanding Academy Service Award nomination packets should include documentation of special contribution to the Academy.

Outstanding Secondary School and *College/University Teacher* awards nomination packets should include documentation of special accomplishment as a teacher of science, especially measures of student success, participation in student development beyond the classroom, and science curriculum development. Letters of recommendation for secondary school teachers may also come from an administrator or supervisor, a teaching colleague, a student, or a parent.

September 1, 2013, 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:

David White
561 Emma Drive
Hancock Biological Station
Murray, KY 42071
270-474-2272
dwhite@murraystate.edu

KAS Grant Awards

The Kentucky Academy of Science is pleased to announce the recipients of the 2013 Marcia Athey, Botany Fund, Special Research Program, and Undergraduate Research Program Award winners.

MARCIA ATHEY GRANT AWARDS:

$400 - Matthew Davidson/Dr. Christopher Pool-University of Kentucky: World System Incorporation on the 17th Century Periphery: Protohistoric Craft Production in the Med-Ohio Valley

$675 - Nick Levis/Dr. Jarrett Johnson-Western Kentucky University: Consequences of two environmental stressors (UV-B radiation and glyphosate-based herbicide) on mortality, immune function, and phenotypic plasticity in two populations of wood frogs (Rana sylvatica)

$992 - Schyler Nunziata/Dr. David Weisrock- University of Kentucky: Microevolutionary response of two salamander species to climate change in an isolated season wetland

BOTANY FUND AWARDS:

$887 - Heidi Braunreiter/Dr. Ron Jones- Eastern Kentucky University: A Vascular Flora of Boyle County, Kentucky

SPECIAL RESEARCH PROGRAM AWARD:

$5,000 - Dr. Claire Fuller-Murray State University: Genetic Diversity and the Ability to Ward off Pathogens in a Changing Environment in the Tropical Termite, "Nasutitermes acajutlae"

UNDERGRADUATE RESEARCH PROGRAM AWARDS:

$500 - Samantha Caldwell/Dr. Janet Bertog-Northern Kentucky University: Performing Stable isotope Analysis on Turtle Shells Collected from the Aaron Scott Site, Utah

$3000 - Samantha Smith/Dr. Jeffrey Bewley-University of Kentucky: Assessment of Heat Stress in Kentucky Dairy Cows

The Academy would like to thank the KAS Distribution of Research Funds Committee Chair, Dr. George Antonious-Kentucky State University, and committee members Dr. Gary Ritchison-Eastern Kentucky University, Dr. KC Russell-Northern Kentucky University, and Dr. Ilsun White-Morehead State University, for all of their time and effort on this important KAS project.

Archaeological Research Locates George Rogers Clark's Fort Jefferson

The Fort Jefferson archaeological and archival project began in 1979 at Murray State University with the intent of beginning a long-term research endeavor that would benefit university faculty, staff, students, and the public. Research continues through Dr. Carstens' newly formed Institute of Frontier History. Since the inception of this research study, many major discoveries and milestones have been made that have contributed to a better, and more complete, understanding of the American Revolution in the West. Archaeological and archival studies accomplished throughout the last 30+ years, culminated in 2011 with the discovery of the intact Fort Jefferson site complex in Ballard County, Kentucky.

Fort Jefferson was constructed by then Lt. Col. George Rogers Clark and more than 550 early Kentucky pioneers consisting of Virginia State line troops, various companies of Kentucky militia, and 40 families of men, women, and children. The population demographics were made up also of enslaved and free African Americans, French civilian troops from Kaskaskia, and various Native American people including several Illini groups, but especially Kaskaskia Indians. Settlement at the site officially began on April 19, 1780, and the garrison and associated town of Clarksville were maintained through June 8, 1781 when both were abandoned having served their purpose successfully, although the fort was under almost constant siege by British-led Chickasaw Indians. Three major battles took place at the fort, and three additional successful battles were launched from the fort, including coming to the defense of Cahokia and St. Louis in May, 1780, against the Shawnee in August, 1780, and against the Chickasaw in January, 1781. Civilian settlers cleared and farmed 47 acres of land to help support the garrison. Malaria, in addition to assaults by the Chickasaw, was a constant problem at the fort. Fort Commandant, Captain Robert George remarked in October, 1780 that, "number [of persons] were daily dying."

Prior to constructing Fort Jefferson, Clark and his followers successfully had taken control of the Illinois country by surprising and defeating the towns of Kaskaskia, Ste. Philippe, and Cahokia in July 1778, then taking Vincennes, Indiana and capturing "hair-buyer" Lt. Governor Henry Hamilton at Fort Sackville (later renamed Fort Patrick Henry). Benjamin Franklin and other U.S. peace negotiators were well aware of Clark's successes while conducting early negotiations for the Treaty of Paris. The short-lived, but successful duration of Clark's Fort Jefferson added to the young U.S. being award the Old Northwest Territories.

George Rogers Clark

Archival research early into the Fort Jefferson study resulted with the location of more than 20,000 lost documents belonging to Clark, including more than 4,000 vouchers, quartermaster papers and books, ledgers, surgeon's medicinal inventory, musical scores, court of inquiry and court martial minutes, a fort map, and drawings from Fort Jefferson. The archival records associated with the Fort Jefferson project is unprecedented and has led to the publication of more than 40 peer-reviewed journal articles and four books. Other publications are in various levels of completion as the Fort Jefferson project research continues.

Buttons found at Fort Jefferson site.

Thus far, archaeological research has isolated two of the fort's three blockhouses (redoubts), two civilian cabins, the fort's main cemetery, and the fort itself. Archaeological research at this National Register quality site continues through the direction of Dr. Carstens and his Institute of Frontier History.

Ken Carstens, Ph.D., Professor Emeritus/Adjunct Professor,
Anthropology & Archaeology, Murray State University
Director, Institute of Frontier History

Kentucky Space in the News

Kentucky Space LLC recently announced the creation of Space Tango, one of the nation's first business accelerators specifically for space enterprises and entrepreneurs. Space Tango is an early-stage venture fund, business accelerator and community of entrepreneurs for space-driven startups, with the goal of assisting businesses in developing innovations, novel applications and diverse markets.

In the initial round, Space Tango will invest in up to six companies from across the U.S. These enterprises will participate in an intensive twelve week on-site program, centered in Lexington, Kentucky, that will provide a complete constellation of services, advisors and networks necessary to successfully start and grow a space-driven business. Companies will be selected primarily on the basis of their idea, science, technology, market fit, customer understanding, management team, and readiness level.

Selected companies will have access to a full team of advisors (scientists, engineers, entrepreneurs, sales and marketing professionals, investors, etc.) and facilities. These other assets include the Exomedicine Institute, technical and ground operations centers at Morehead State University Space Science Center (21 meter tracking station) and the University of Kentucky Space Systems Lab and offices at the Kennedy Space Center in Florida and NASA Ames Research Center in Silicon Valley (Mountain View, California).

The marketing and due diligence process to select the initial companies will begin immediately. Further details and contact information be found at www.spacetango.com.

Kentucky Space LLC is an ambitious enterprise focused on R&D, talent development, commercial and entrepreneurial space solutions. (www.kentuckyspace.com)

Submitted by John Mateja, PhD, Director,
McNair Scholars Program, Murray State University

Early Bird Registration for SBIR/STTR Phase I Proposal Preparation Workshop – NIH FOCUS

The Event
This Phase I Proposal Preparation Workshop helps attendees learn how to prepare high-quality, competitive proposals especially for the National Institutes of Health – from fundamentals and strategic planning, to proposal development and submission, to commercialization plan and post-submission issues. The workshop also provides an opportunity to learn about Kentucky SBIR/STTR assistance programs (up to $4,000 in Phase Zero and Phase Double Zero grants) as well as the Kentucky SBIR-STTR Matching Funds Grant Program.

Who
This event is designed for anyone from universities, the business community, state and local leaders, and students and PostDocs. Anyone interested in small business innovation research (SBIR) and small business technology transfer (STTR) projects and proposal preparation will benefit.

When and Where
Tuesday, June 11 (8:00 AM – 4:45 PM) and Wednesday, June 12 (8:00 AM – 11:45 AM)
Marriott Louisville East, 1903 Embassy Square Blvd, Louisville, KY 40299

Registration
REGISTER NOW or see "News & Announcements" at http://ksef.kstc.com for event schedule, speaker bio, site details, and more.

Take advantage of extra DISCOUNTS with Early Bird registration! The deadline for KY EARLY BIRD online registration and KY GROUP DISCOUNTS is midnight May 20, 2013. Registration fees include presentation materials, light continental breakfast, lunch (day one), and refreshment breaks.

General Registration: Kentucky Residents
- KY Early Bird, first registration (until midnight May 20, 2013) = $125.00. Take advantage of the KY Group Discount that's available with KY Early Bird until midnight May 20: $25 off each additional registrant, registered at the same time as the first KY Early Bird online registration, up to four discounts. (Note: Group registrants do not have to be from the same company.)
- KY Regular Registration (after May 20 until midnight June 1) = $175.00
- KY Late Registration (after June 1) = $225.00

General Registration: Non-KY Residents (out-of-state)
- Online through midnight June 1, 2013 = $225.00
- Late Registration (after June 1) = $275.00

Organizers
Kentucky Science and Engineering Foundation (KSEF)
Kentucky Science and Technology Corporation (KSTC)

Partners
U.S. Small Business Administration
CED – Office of Commercialization and Innovation
Commerce Lexington, Inc.
University of Louisville
University of Kentucky

Submitted by John Mateja, PhD, Director,
McNair Scholars Program, Murray State University

Kentucky Student Investment Fund and Entrepreneurial Assistance Program Announced

The Kentucky Science and Technology Corporation (KSTC) today announced the creation of the Kentucky FoundersLab to provide seed funding and high-value assistance to startups founded by Kentucky students. The FoundersLab will primarily support companies' products and customer development activities as they test, iterate, and validate assumptions. At least one of the company founders must either be a full-time student (high school/undergraduate/graduate) attending an educational institution in Kentucky, or a resident of Kentucky attending school full-time out-of-state. To apply, companies do not have to be organized as a C-Corp or LLC.

The FoundersLab will take a small equity stake in each company, providing student entrepreneurs the experience of "negotiating" an investment in their company. Selected companies will be funded with up-to $11,000.

The FoundersLab curriculum will be based largely on Steve Blank's Lean LaunchPad methodology. The program will conclude with an informal presentation to members of the startup community, giving the participants a chance to both present their concepts to leaders in the space as well as network with potential advisors, investors and partners. The initiative will support and work in collaboration with other entrepreneurial assistance programs in the state including the Kentucky Enterprise fund, the Kentucky Innovation Network, Idea State U and the Governors School for Entrepreneurs.

"Our primary goal with the Kentucky FoundersLab is to help the next generation of entrepreneurs focus in on the most fundamental issue of starting a company: making sure that their concept solves a meaningful problem for a customer" said Meagan Hennig, Fund Manager at KSTC.

The FoundersLab application is open and all applications must be submitted by Friday, May 17th. Awards will be announced on May 31st. The application can be found at kfounderslab.com/app. For more information, please visit our website - kfounderslab.com.
This new initiative is launched in partnership with the Kentucky Council on Postsecondary Education.

Contact:

Meagan Hennig
Fund Manager
Kentucky Science and Technology Corporation
startups.kstc.com
O: 859.246.3240
M: 859.619.0084
mhennig@kstc.com

Submitted by John Mateja, PhD, Director, McNair Scholars Program, Murray State University

Four Billion Years in Sixty Minutes: A Crash Course in Evolution

Dr. Lee Dugatkin will focus on major transitions in his "crash course" in evolution, a lecture and discussion to be offered in July at the University of Louisville. These evolutionary transitions were the origin of self-replicating molecules capable of passing on genetic material and the transition from RNA world to DNA world, the origin of the first cells, the emergence of different types of cells, and the evolution of multi-cellular organisms. The discovery of sexual reproduction resulted in the evolution of individuality with a specialized line of cells that became gametes (sperm and eggs). Finally, the evolution of groups, including complex societies, made culture possible.

Dr. Lee Dugatkin is Distinguished University Scholar at the University of Louisville, and an expert in the evolution of social behavior.

The lecture and discussion will take place on Friday, July 12, from 6:30 pm - 8:00pm EDT at the Gheens Science Hall and Rausch Planetarium of the University of Louisville, on West Brandeis Avenue, Louisville. It is sponsored by Idea Festival (IF) University and the University of Louisville. Even though there is no charge for attendance, interested people are invited to register to be sure a seat is available. Please register online at http://www.eventbrite.com/event/5706299696.

Immediately following this presentation, participants are invited to stay for the monthly "Skies Over Louisville" program and telescope viewing party at the Planetarium.

Cost of tickets for "Skies Over Louisville" are:

- $8.00 adults,
- $6.00 children 12 and under, Seniors 65+, and individuals with a valid U of L ID card.

IF University participants must purchase tickets separately to stay for the "Skies Over Louisville" events. For more information about these programs and to purchase tickets for "Skies Over Louisville", please visit http://louisville.edu/planetarium/sky.html.

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

Posters-at-the-Capitol 2013

Posters-at-the-Capitol (P@C), the annual exhibition of undergraduate research from all Kentucky state-supported colleges and universities, took place in February 2013 in Frankfort. The abstract booklet and a high resolution copy of the official photo below may be downloaded from the website at http://campus.murraystate.edu/services/URSA/.

Among the areas of research interest were the development of new drugs and drug delivery systems, detection of disease through analyses of molecular processes, and genomic studies based on the animal models lamprey, *Escherichia coli* and *Caenorhabditis elegans*. Ecological topics often centered on the burden of parasites, or toxic additions to the environment. Evolutionary themes included analyses of dentition and modeling theoretical interactions in evolutionary history. Agricultural studies had applications for improved crop maintenance and predicting future harvests. Research projects in physics and engineering projected applied uses of their results, from solar radiation to friction on commercial finishes. In areas of biomedical technology, diseases such as HIV, cancer, and vascular disorders were themes of several projects.

Dexter James and faculty sponsors Adrienne Bratcher and Irving G. Joshua, of the University of Louisville, examined the neutralization of harmful reactive oxygen by the antioxidant tempol in the endothelium of vascular tissue, to develop a protocol for examination of oxidative stress of the aorta using a mouse model. Mice were exposed to vasoactive agents such as acetylcholine and endothelial-mediated responses to the antioxidant tempol were measured. Sabrina Schatzman with faculty directors Teresa Fan, Pankaj Seth, Pawel Lorkiewicz, and Katherine Sellers, of the University of Louisville, investigated cancer call metabolism and characterized metabolic effects of the suppression of a monomer of lactacte dehydrogenase, LDH-A in non-small cell lung cancer. They proposed a cascade effect in which increased tricarboxylic acid (TCA)-cycle activity after the suppression of LDH-A might lead to reactive oxygen species (ROS)-mediated cell death. Douglas Saforo, with faculty director J. Christopher State, of the University of Louisville, studied the resistance of some cancer cells to taxanes, a class of chemotherapeutic drugs. They observed the morphology of ovarian cancer cells treated with compounds targeting the anaphase-promoting complex/cyclosome (APC/C), a ligase that acts as a regulator of cell cycle activity. They found beneficial dose-dependent effects of those compounds that cause mitotic arrest of cancer cells.

Dillon Pender, Lakshmi Vangala, Vivek Badwaik, Helen Thompson, and faculty mentor Rajalingam Dakshinamurthy from Western Kentucky University, reported on the development of antibiotic-encapsulated gold nanoparticles (Amp-GNPs) in answer to the need for new ways of delivering antibiotics. They found a synthesis of Amp-GNPs effective for Gram-positive and Gram-negative bacteria.

Environmentally safe practices were analyzed in studies having applications for agriculture. Sarah Barney, with faculty mentors Jason Schmidt, James Harwood, and Mark Williams, of the University of Kentucky, compared techniques of pest control by conventional insecticides to control using row covers and organic insecticides on arthropods by characterizing the functional diversity of natural enemies of key pest species. Both the diversity of natural enemies and of pests increased in plots with no management. Pests responded differently to treatments. The researchers suggested that a complex arthropod ecology may be managed by including natural enemies of pests in agricultural systems. Arthropods were trapped, classed, and their numbers compared in native perennial and pasture border rows by Kyle Kratzer and faculty directors John D. Sedlacek and Karen Friley, of Kentucky State University, to determine ecological contexts of ground covers in Franklin County, Kentucky.

McKenzie Johnson, with faculty mentor George Antonious, of Kentucky State University, examined potentially dangerous concentrations of heavy metals from soils containing sewer sludge, a growing use of sewage and municipal waste. Measures of heavy metals and antioxidant content were taken from bell peppers and melons grown in soil with added sewage sludge, or soil with yard waste compost. Results showed higher concentrations of some of the heavy metals tested in crops grown in soils with added sludge or yard waste compost. Assessment of heavy metals in potatoes, sweet potatoes, broccoli, and peppers was carried out by Ilea Grant-Simmons, with faculty mentor George Antonious, of Kentucky State University.

Soil contaminants by leaching copper in two prehistoric archaeological sites in Thailand were studied by Alexandra Ivers, with faculty mentors Judy Voelker and Grant Edwards, of Northern Kentucky University, who analyzed the amount, and the toxicity levels of the copper from slag samples.

Effects of parasites were themes in the assessment of ecosystems in conservation biology research. Morgan Geile, with faculty mentor Howard H. Whiteman, of Murray State University, captured and swabbed tiger salamanders in Colorado for the presence of the chytrid fungus *Batrachochytrium dendrobatidis*, a dermal fungus that salamanders are resistant to but that threatens the boreal toad (*Anaxyrus boreas*). In order to re-introduce the boreal toad into its once-native Rocky Mountain habitat, potential restoration sites must be determined to be chytrid-free. Samples collected from salamanders contributed to the chytrid distribution data of the region.

Derrick Jent, with faculty mentor Claire Fuller, of Murray State University, determined whether several species of fungi were pathogenic to the cellar spider, *Pholcus phalangioides*, which inhabits human dwellings world-wide.

Investigations of environmental toxins included an analysis of a considerable amount of mercury coming from anthropogenic and atmospheric sources including coal-burning power plants in hair samples of Rafinesque big-eared bats in Mammoth Cave National Park by Lara van der Heiden, with faculty director Cathleen J. Webb, of Western Kentucky University.

Evolutionary themes were represented by several projects. Lindsey Hays, with faculty director Andrew Deane, of Eastern Kentucky University, reported quantitative anatomical data on the muscle-tendon architecture of forelimbs of three brachiating monkey families to explain differences in "tail-assisted" brachiators such as Humboldt's woolly monkey (*Lagothrix lagotricha*) and "true" brachiators (*Hylobates, Symphalangus*). They found similar distribution of muscle mass and force in *Lagothrix* and "true" brachiators, which suggests a response to the functional demands of brachiation. Comparison of incisor allometry in frugivorous and folivorous anthropoids and dietary grouping of these groups was the focus of research by Marquiana Jusma and faculty director Andrew Deane, of the University of Kentucky. Results of their re-examination of prior analyses and their analysis of individual hominoid incisors indicated that length of the incisor row was a better predictor of diet than summed width of individual incisors. Sam Pellock and faculty mentor Kate He, of Murray State University, applied a model to a Kentucky plant database to test Darwin's hypothesis that non-native species introduced into an environment are more likely to become naturalized if there are few, rather than many, native species already present.

A model was applied in the field of economics by Keaton Brownstead with faculty mentor Catherine Carey, of Western Kentucky University, who investigated correlations between federal policies of the use of systematic methods, or "quantitative easing," and uncertainty.

Engineering research was reported by Michael Bradshaw, William Storrs, William Johnson, and Andrew Keltner, with faculty mentor Joel Lenoir, of Western Kentucky University, who designed an unmanned aerial four-rotored radio-control helicopter to carry and remotely operate photography equipment. Available flight software and vehicle plans were modified and improved, and methods of prototyping and automated milling were investigated. Ryan Gott with faculty director Chris Byrne, of Western Kentucky University, reported tests of the frictional properties of skin on different wood textures and on shellac, laquer, and polyurethane wood finishes, to show that satin finishes had less friction than gloss finishes on all types of wood tested.

Vincent Campbell and faculty directors Wayne Bresser and Chari Ramkumar, of Northern Kentucky University, grew carbon nanotubes (CNTs) on a silicon wafer by controlling the flow rates of the gases, temperatures, and pressures involved in the process. Wayne Lancaster and Damian Oden, under the direction of the same faculty members, identified some characteristics of commercial toroids, and reproduced and altered some inductance values for specific applications. Both these projects had the goal of producing ferrite toroids to be used as pressure sensors and in other applications. Adam Stewart with faculty mentor Sergio Mendes, of the University of Louisville, carried out research aimed at developing new fabrication methods for integrated diffraction gratings by creating a new method of producing a waveguide coupler. Waveguide couplers transfer light beams into and out of devices used in optical communications, optical computing, and bio-sensors.

Jonathan Fitzpatrick and faculty mentors Benjamin K. Malphrus and Kevin Z. Brown, of Morehead State University, reported on the Cosmic X-Ray Background Nanosat (CXBN) spacecraft mission to measure cosmic diffuse X-ray background radiation. The science programs and spacecraft engineering are developed to provide launch trajectories that allow four passes per day over the Morehead campus to transmit data. Scotty White and faculty mentor Hans Chapman, of Morehead State University, reported research intended to characterize measurements of solar radiation in the local region, using live meteorological data and a solar irradiance meter to collect data on the campus. Analysis of data showed effects of cloud cover, humidity, and temperature, but not of location, on solar intensity.

These projects, in life sciences, micro-particle engineering, flight engineering, and solar and cosmic data transmission, are carried out by young researchers, some of whom will become scientists and engineers at the end of their university careers. Many of their results have practical applications in product development in fields of medicine, electronics, and space engineering. Their work displayed at P@C gives the opportunity to view current research developments that will be important in the future of the Commonwealth of Kentucky and its residents.

Submitted by Mary Janssen, Ph.D., Member-at-Large, Governing Board of the Kentucky Academy of Science

2013 Kentucky Science and Engineering Fair (KY-SEF)

The Eleventh Annual Kentucky Science and Engineering Fair (KYSEF) was held in Richmond, Kentucky, on Saturday, March 30, 2013. Congratulations to all of this year's winners listed below. You may check out the photo gallery of this year's winners at http://www.kysciencefair.eku.edu/photo_gallery/2013%20Kentucky%20Science%20Fair/index.html.

INDIVIDUAL CATEGORY WINNERS

	Middle School	High School
Animal Science		
1st	Alexis Corbin, Lexington Christian Acad.	Leo DeCastro, Henry Clay H.S.
2nd	Tory Stephenson, SCAPA Bluegrass	Elizabeth Schwarcz, Sayre High School
Behavioral & Social Science		
1st	Sophia Korner &Diya Mathur, Myzeek Middle School	Petra Ronald, P. L. Dunbar High Sch.
2nd	Holly Zoeller, St. Francis of Assisi	Olivia Garlt, Ballard High School
Biochemistry		
1st	Megan Slusarewicz, Winburn Middle School	Jessie Li, P.L. Dunbar High School
2nd	Elizabeth Schrenger, St. Francis of Assisi	Jingjing Xiao, duPont Manual High School
Cell and Molecular Biology		
1st	Cassie Drury, St. Francis of Assisi	Trevor Krolak, P.L. Dunbar High School
2nd	Jiazhen Yang, Meyzeek Middle School	Maria Wang, P.L. Dunbar High School
Chemistry		
1st	Thirushan Wignakumar, Winburn Middle School	Corrine Elliott, P.L Dunbar High School
2nd	Abigail Kessler & Keeley Justice , Christ the King	Chitra Kumar, Ballard High School
Computer Science		
1st	Riti Pathak, Meyzeek Middle School	Allen Jiang, duPont Manual High School
2nd	Sarah Doherty& Sean DiMotta, North Oldham M. S.	Samantha Moorin, duPont Manual High School
Earth Science		
1st	Lauryn Grady, St. Francis of Assisi	Emily Bautista, Notre Dame Academy
2nd	Micah Eiden, Mars Mill Academy	Lianna Spurrier, Ballard High School
Energy and Transportation		
1st	Kevin Biecker, St. Pius X	Valerie Sarge, P.L. Dunbar High School
2nd	Kenneth Gillman, Mary, Queen of Heaven	Giannina Rokvic, Notre Dame Academy
Engineering (Electrical and Mechanical)		
1st	Tyler MacKnight, St. Pius X	Nivedita Khandkar, duPont Manual High School
2nd	Jonathan Fletcher, Meyzeek Middle School	Matthew Russell, Home Schooled
Engineering (Materials and Bioengineering)		
1st	Helena Kiesel, Meyzeek Middle School	Richard Gunasena, duPont Manual High School
2nd	Ishaan Jindal, Meyzeek Middle School	Caroline Harrison, North Oldham High School
Environmental Management		
1st	Lucy Wieland, St. Francis of Assisi	Monica McFadden, Notre Dame Academy
2nd	John Barton, Morton Middle School	Kevin Jacob, duPont Manual High School
Environmental Science		
1st	Brenna Wallin, L. T. M. S.	Sanjana Rane, duPont Manual High School
2nd	Will Drury, St. Francis of Assisi	Cassidy Ryan, Notre Dame Academy
Mathematical Science		
1st	David Vulakh, Meadow Thorpe	Iok Yan, Ballard High School
2nd	Vaannila Annadurai, Meyzeek Middle School	Ankit Patel, duPont Manual High Sch.
Medicine & Health		
1st	Sanjana Kothari, Meyzeek Middle School	Nicole Zatorski, Villa Madonna Academy
2nd	Analisa Conway, St. Francis of Assisi M.S.	Max Zhan, P.L. Dunbar High School
Microbiology		
1st	Aran Crain, St. Francis of Assisi	Ellen Kendall, Notre Dame Academy
2nd	Charlie Frederick , Ashland Elementary	Samantha Grace-Mudd, duPont Manual High School
Plant Sciences		
1st	Isabel Wartenberg, St. Pius X	Deborah Ferguson, P.L. Dunbar High School
2nd	Lindsay Haffner, St.Franscis of Assisi M. S	Jay Kumar, duPont Manual High School
Physics & Astronomy		
1st	Thomas Coomes, St. Fraancis of Assisi	Vincent Cao, P.L. Dunbar High School
2nd	Ronit Kar, Winburn Middle School	Sasank Vishnubhatla, duPont Manual High Sch.

BEST OF FAIR WINNERS

	Middle School	High School
Life Science		
1st	Megan Slusarewicz, Winburn Middle School	Jessie Li, P.L. Dunbar High School
2nd	Sophia Korner & Diya Mathur, Myzeek Middle School	Trevor Krolak, P.L. Dunbar High School
3rd	--	Monica McFadden, Notre Dame Academy
Physical Science		
1st	Brenna Wallin, L.. T. M. S.	Corrine Elliott, P.L Dunbar High School
2nd	Tyler MacKnight, St. Pius X	Valerie Sarge, P.L. Dunbar High School
3rd	--	Nivedita Khandkar, duPont Manual High School

2013 KYSEF Best-of-Fair winners in Physical and Life Sciences at the High School level (left to right) Jessie Li, Nivedita Khandkar, Trevor Krolak, Monica McFadden and Corrine Elliot.

Many thanks to the 130 individuals who volunteered to judge the student projects. These judges included the following KAS members: Dr. Ruth Beattie, Dr. Ben Brammell, Dr. Bruce Branan, Dr. Suzanne Byrd, Dr. Doug Chatham, Dr. Mark Christensen, Dr. Rafael Cuevas Uribe, Dr. David Cunningham, Dr. Paul Cupp, Dr. Bruce Davis, Dr. John Delfino, Dr. Leonard Demoranville, Dr. Timothy Dowling, Dr. Charles Elliott, Mr. Jason Forson, Dr. Benjamin Freed, Dr. Malcolm Frisbie, Dr. Linda Girouard, Dr. Wilson Gonzalez-Espada, Dr. Tim Griffith, Dr. John Hoppe, Dr. Jerzy Jaromczyk, Dr. Pierce Johnson, Dr. Ronald Jones, Dr. Md Jahurul Karim, Dr. Karan Kaul, Dr. Sherie Kendall, Mrs. Shanin Lodhi, Dr. Kathryn Lowrey, Dr. Alexandre Martin, Dr. Raymond McDonnell, Dr. Bill McGowan, Mary McKenna, Dr. Marie Nydam, Dr. Danda Rawat, Mr. Richard L. Record, Dr. Tanea Reed, Dr. Robert E. Rosenberg, Dr. Bill Staddon, Miss Melony Stambaugh, Mr. J. Scott Stauble, Dr. Donald Varakin, Dr. James Wagner, Mr. Todd Weinkam, Dr. Ilsun White, Dr. Lori Wilson, Dr. Carol Wymer, and Dr. Demetrio Zourarakis.

Submitted by Barbara Ramey,
State Fair Co- Director, Kentucky Science & Engineering Fair

Kentucky Junior Academy of Science

The 2013 meeting of the Kentucky Junior Academy of Science took place on Saturday April 27, 2013 on the campus of the University of Kentucky. A total of 96 middle and high school students participated in the event. The winners were:

Middle School

1st Place	Elizabeth Schrenger
2nd Place	Arah Crain
3rd Place	William Kaelin

Behavioral and Social Science

1st Place	Abida Halilovic
2nd Place	Nadia Almasalkhi
3rd Place	Neha Srinivasan

Biological Sciences and Zoology I

1st Place	Jingjing Xiao
2nd Place	Neela Saha
3rd Place	Ruhi Kulkarni

Biological Sciences and Zoology II

1st Place	Leo deCastro
2nd Place	Clara deCastro
3rd Place	Andrew Bratton

Botany and Microbiology

1st Place	Jay Kumar
2nd Place	Nicole Zatorski
3rd Place	Nicholas Kyriacou

Computer Science and Mathematics

1st Place	Jonathan Yi
2nd Place	Jacob Pawlak
3rd Place	Thomas Neuteufel

Chemistry, Earth and Space

1st Place	Uma Subrayan
2nd Place	Kelsey Sucher
3rd Place	Bueniel Kim and Shriya Ganti

Engineering and Physics I

1st Place	Karan Babbarwal
2nd Place	Sam DuPlessis
3rd Place	Ben Johnsrude

Engineering and Physics II

1st Place	Szofia Komaromy-Hiller
2nd Place	Cassandra Schoborg
3rd Place	Abhyudit Lohe

Environmental Science

1st Place	Rane Sanjana
2nd Place	Rokvic Giannia
3rd Place	Scott Gupton

Grand Prize I

1st Place	Jay Kumar
2nd Place	Jingjing Xiao
3rd Place	Abida Halilovic

Grand Prize II

1st Place	Sanjana Rane
2nd Place	Karan Babbarwal
3rd Place	Szofia Komaromy-Hiller

Left to right: KAS President Cheryl Davis, KJAS Grand Prize Winners Jay Kumar, Sanjana Rane, Jingjing Xiao, Karan Babbarwal.

Many thanks to all of the Kentucky Academy of Science members who served as judges for this event.

Submitted by Ruth E Beattie
KJAS Director

2013 KJAS officers (left to right): President Jingjing Xiao, Secretary Kelsey Sucher, KAS President Cheryl Davis, and Vice-President Elizabeth Schrenger.

Remember Us?

In a follow up to the January 2013 Newsletter article *Themes in Evolution III: Primate Diet & Anatomy*, Magdalena Muchlinski of the University of Kentucky Department of Anatomy and Neurobiology tells us, "The clock is ticking for us to uncover the secrets of Madagascar."

Going to Madagascar is like taking a time machine back to the Eocene (56-33mya). It was during this epoch that our order, Primates, truly began to diversify and adaptively radiate. The lemurs of Madagascar can provide a window into the evolution of our order. The living lemurs can help answer questions: Why do primates have big brains, grasping hands, and increased visual acuity? Did primates and flowering plant co-evolve? Why are females lemurs dominant to males? Some of the most interesting questions focus on what happened to the lemurs of the recent past. In the last two thousand years, we have lost approximately 25 species of giant lemurs (those weighing 20-350 lbs). What happened two thousand years ago to cause this? Humans arrived on the island of Madagascar.

Humans brought slash-and-burn agriculture, which is particularly destructive. Plant diversity is closely tied to lemur biodiversity. With increased forest fragments, lemur and primate populations across the globe have steadily declined.

In the late 1960s, the International Union for the Conservation of Nature created a "Red List" that identified extinction risks. Nearly half of all primate species are currently on this list (~700 species). In Madagascar, the proportion is not much different. Over 40% of all Malagasy lemurs are under threat of extinction (IUCN, 2012). Madagascar, along with seven other countries, has been targeted as a conservation priority because of the high rates of extinction.

Madagascar had lost 90% of its original forests by 1990. The rate of deforestation has recently slowed in many regions because of countrywide policies, such as the Durban Vision, a program begun in the late nineties by the President of Madagascar, who promised to triple the land area where lemur species are protected. Informing and implementing conservation policies are difficult, but over the last two decade researchers like Eastern Kentucky University professor Dr. Benjamin Freed have gathered information from unexplored and remote regions of Madagascar. What Dr. Freed and others have discovered is that we need to work with local communities surrounding all forests and to educate the population on the importance of the forest around them. Through science we can identify how best to preserve the land and allow human populations to sustain themselves. Local human populations are our best hope for the forests and living lemurs. Dr. Freed has found that primates can co-exist peacefully with local human populations. The biggest threats to lemur populations today are outside forces, such as logging.

The commercial threats are from the mining, timber, oil, and beef industries. Today, mining of titanium, cobalt, nickel, rubies, sapphires, and gold have become widespread in Madagascar. Mining destroys or introduces pollutants and poisons such as mercury into the environment. In Ambatovy, Madagascar, for example, mining companies have built an open pit nickel mine and a pipeline for ore slurry in a pristine, primary forest. Governmental policies have established forests in Madagascar, and scientists have worked with local communities, but it is difficult to keep commercial threats out of Madagascar.

So what can we do here in Kentucky, to help conserve the forests and lemurs of Madagascar? We can become informed about the foods we eat, the jewelry we buy and wear, and homes we build. We can find sustainable ways of living, so that others, like the people and lemurs of Madagascar, can live too.

Entrance sign to a protected area in southeast Madagascar. For nearly thirty years scientists from the US, Europe, and Madagascar have worked with local populations and government officials to protect Madagascar's natural resources.

Submitted by Magdalena N Muchlinski
University of Kentucky, Lexington,
magdalena.muchlinski@uky.edu

The *Lexington Herald-Leader* reported on May 2nd the U.S. Forest Service has announced surveys of 38 bat-hibernation caves in Daniel Boone National Forest found bats with the white-nose syndrome in six caves in Pulaski, Rockcastle and Jackson counties.

White-nose syndrome was included in the January 2013 Newsletter article *Kentucky Heritage Land Conservation Fund article on Invasive Species (Part III): Fungi.* For more information on this recent development, see the online article at http://www.kentucky.com/2013/05/02/2624340/white-nose-syndrome-found-in-daniel.html.

Kentucky Heritage Land Conservation Fund

A LAND CONSERVATION MEASURE IS ADOPTED IN THE 2013 LEGISLATIVE SESSION

Drs. William H. Martin and Richard K. Kessler

Conserve Kentucky, the effort to conserve and preserve land in Kentucky, successfully promoted a step forward in the 2013 legislation session. No additional revenue is going to be available, but the passage of HB 281 allows private, non-profit land conservation organizations to apply for grants from the Kentucky Heritage Land Conservation Fund (KHLCF) via the same pool of money available to local governments and colleges and universities. These organizations will have to be recognized as tax-exempt by the Internal Revenue Service. Further, they will have to provide a 50 percent match of cash to accompany their application to the Fund; local governments and colleges and universities do not have to provide a match although the use of matching funds is encouraged. For example, if the application to the Fund is for $300,000 to acquire a particular tract of land, the non-profit organizations must provide $150,000.

The ability of these organizations to apply in competition with local governments and colleges and universities should result in the conservation of more land across the state. The matching dollars will come from private sources and funds that these private organizations can obtain from various conservation programs of federal land resource agencies such as the U.S. Fish and Wildlife Service.

This legislation should also encourage the formation of private land trusts and other non-profit organizations and groups that are interested in preserving natural lands of interest to them. However, these lands must meet the priorities of the KHLCF:

(1) preserving unique and valuable natural areas that harbor rare, endangered or threatened species or that represent significant and valuable ecosystems;

(2) areas that are important to migratory wildlife;

(3) lands such as wetlands, watersheds, and other landscapes that have important functional features and values to one or more communities; and

(4) natural lands that are important for recreational and outdoor educational purposes.

Regulations are now being developed to accommodate this additional eligibility to the Fund and to assure that the matching dollars are provided to supplement the Fund as intended.

Conserve Kentucky will continue to seek additional means of land conservation in 2014 through efforts to obtain substantial, sustained sources of revenue for the KHLCF and by preservation incentives such as providing property tax credits to landowners who agree to preserve more of Kentucky's forests and fields.

Hiking, biking, rock climbing, canoeing and whitewater rafting are among the adventure tourism opportunities offered on the Kentucky Recreational Trails Authority website available at http://kyadventures.com/offerings.html.

EEinkentucky, a one stop resource for Kentuckians to find environmental education opportunities in the state, is available online at http://eeinkentucky.org/.