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For more information about K-INBRE, contact your campus coordinator.



Spring 2006 Volume 4 Issue 4

KSU, Langston forums showcase student work



KSU student Kate Swain explains her project to a visitor to the Undergraduate Research Scholars Forum.

KSU

On Thursday, April 20, KSU held its 2006 Division of Biology Undergraduate Research Scholars Forum.

The poster session was held in the Chalmers Hall Atrium from 2:30-4:45. The event featured the research of 55 students. Visitors were encouraged to come

anytime during the event and visit with presenters.

K-INBRE-sponsored students at the forum included Nathan Bammes, Lindsay Bertels, Sarah Devlin, Laura Grauer, Erica Hutfless, Patrick Mollett, Jessica Rowland, Katherine Swain and Liang Zhang. (See Page 3 for more.)

LANGSTON UNIVERSITY

Langston University held its 7th annual Research Day Symposium on April 21, 2006. The event featured students presenting research in oral and poster form. This year, over 70 students, faculty and staff attended the event. Dr. Frank Waxman, Oklahoma EPSCoR

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LU's Research Day Symposium. (Photo Submitted)

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Funded by NIH
RR16475

The K-INBRIEF Newsletter is published four times a year and distributed electronically. All pictures and picture illustrations, unless otherwise noted, are by Joseph Chapes.

Questions and comments can be sent to jchapes@ksu.edu.

LU Research Day Symposium



LU K-INBRE student Shannon Gipson prepares to deliver her oral presentation. (Photo Submitted)

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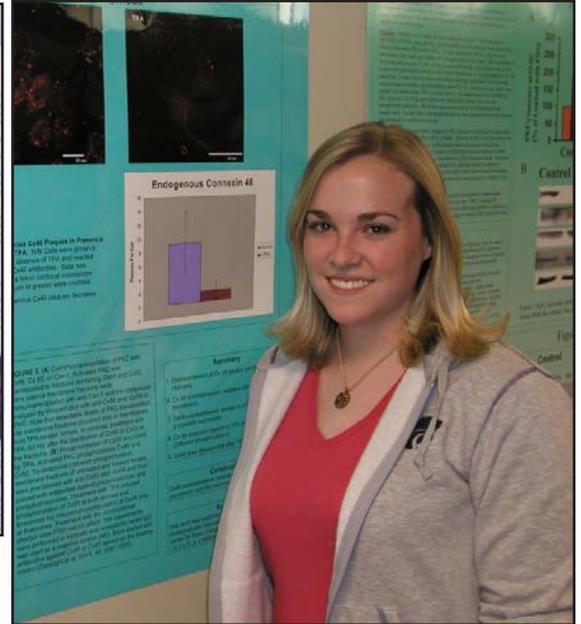
Director, and Dr. James Wyche, Vice Provost for Academic Affairs at the Oklahoma University Health Science Center, were invited guests.

K-INBRE sponsored students who presented research at the event included Tomica Blocker, Ashley Burdex, Christal R. Carpenter, Argenia Doss, Shannon Gipson, Elise Griffin, Steven Harris, Desmond Harvey, Davia Holland, George Kpeli, Marquita Rowland, Syndia Todd and Aaron Washington.

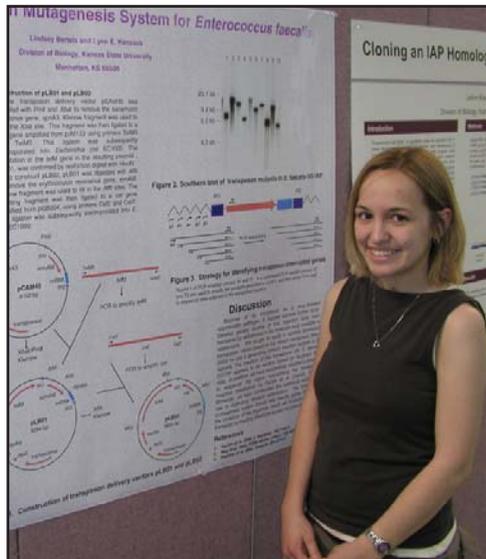
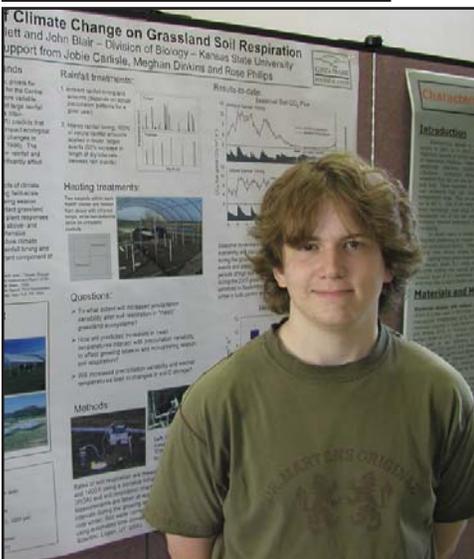


LU student Tomica Blocker shows off her first place winning poster project. (Photo Submitted)

KSU Division of Biology Undergraduate Research Scholars Forum



Clockwise from top left: Sarah Devlin answers a question about her project, Laura Grauer, Nathan Bammes and his mentor, Dr. Mark Weiss, Liang Zhang, Lindsay Bertels, Patrick Mollett, and Jessica Rowland.





Washburn University

The "Focus on" section is made up of features on students and/or faculty at different K-INBRE Universities and how they see the K-INBRE Organization. This issue looks at Washburn University students. (Photo submitted)

Jon Kee

Mentor: Dr. John Mullican

Major: Biology



What is your project and its goals?

Cloning and characterizing a previously undescribed plasmid from *Naegleria minor*. "My goals are to successfully clone, sequence, and characterize a 6 kilobase pair plasmid from *Naegleria minor*. This will include comparing the sequence with known genes for related sequences in an attempt to understand the function of the plasmid and experiments to determine the origin of replication."

What got you interested in scientific research?

"Initially, it was the faculty at Washburn that got me interested in scientific research. They were enthusiastic in pushing me to start doing research as soon as possible. I was also lucky enough to be accepted for an Research Experience for Undergraduates program last summer at Humboldt State University in California, where I was able to get my first real research experience and really enjoyed it."

What kind of research would you like to get training in?

Molecular genetics and microbiology. Thus far, I have been able to learn an array of molecular techniques for manipulating DNA, as well as learning skills for culturing and identifying microorganisms. I really want

to learn and be exposed to as many research techniques in these fields as possible while at Washburn.

How does your mentor help you?

"Dr. Mullican is a great mentor. He not only teaches how to do techniques correctly, but challenges me to think about what is happening during the process. I am allowed to work independently when capable, but he is also willing to give feedback, troubleshoot, and discuss future directions at any time."

What is the best thing about learning about science at your institution?

"Washburn provides an environment where research is encouraged by both the school and faculty. Students are able to gain hands-on experience in research while working directly with their mentor. Faculty members are enthusiastic about working with students, and the small size of the school allows students a great chance to get to know their professors."

How has K-INBRE helped you to expand your scientific knowledge and experience?

"K-INBRE has allowed me to learn so much through its funding of my project, both in techniques and understanding how to think as a researcher. Working with my mentor, Dr. Mullican, and interacting with other students and faculty who are doing their own research has been invaluable to me."

In what ways do you think this experience will help you

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Jon Kee, Continued*in the future?*

"I feel like I will be at an advantage when entering graduate school as a result. Students who may not have had extensive research experience at the undergraduate level will spend the first year learning what I have been able to do at Washburn with the help of K-INBRE."

What do you plan to do after you graduate? Does it include a possible career choice in biomedical research?

"I am entering my final semester here at Washburn. My plans are to attend graduate school, probably in microbiology and/or genetics. Right now, I am leaning towards teaching at the college level for my career."

Ami Rughani

Mentor: Dr. Sam Leung**Major: Biochemistry***What got you interested in scientific research?*

"Science has always fascinated me, and my scientific education from high school seemed to emphasize the burgeoning nature of science in this day and age, and the explosive nature of how much we are learning today. Science seems to hold answers to life's mysteries and whether we like it or not, the least we can do is admire the power of science and the power of the human mind to understand the world around us in the detail with which we do. I'm not sure if there is any specific thing that got me interested in science as much as the awe that I remember always feeling when I got answers to questions 'about the world.'"

What was your project and its goals?

"My project is focused on using a reagent not usually used as an oxidizing agent, to oxidize a methyl substituent on a pyrrole molecule to an aldehyde group. This is an interesting organic chemistry reaction because it is quite unusual, especially, like I said, because the reagent we are using is not typically used for this type of transformation. My goals are not only to complete the project with satisfiable closure for this investigation, but to also gain the ability to be able to do more scientific research that is beneficial in the future."

How does your mentor help you?

"He helps me and everyone he seems to come in contact with, so that we can understand and appreciate his field of interest (organic chemistry, particularly synthetic porphyrin chemistry). I have certainly learned and continue to learn a lot from him each and every day."

What is the best thing about learning about science at your institution?

"The friendly nature of the faculty and the feeling of being part of a tightly knit family."

How has K-INBRE helped you to expand your scientific knowledge and experience?

"K-INBRE has obviously made it financially possible for us to conduct the research, along with allowing us to present our research and learn from others' research at its annual conference."

*In what ways do you think this experience will help you in the**future?*

"I think it will help steer my future life decisions to see if I am ready to challenge myself to dig deeper into questions that are critical for the scientific and nonscientific community to answer."

What do you plan to do after you graduate? Does it include a possible career choice in biomedical research?

"I would like to apply to medical school and I am strongly considering biomedical research; whether or not that translates towards applying for an M.D./Ph.D. program is yet undecided."



Ami Rughani

Developmental biology lab receives K-INBRE assistance

Joseph Chapes
Editor

Three years ago, KSU Biology professor Dr. Gary Conrad changed the way his students learned about developmental biology.

Even though he had been teaching developmental biology for 30 years, he had a chance to change how KSU's Developmental Biology Lab was conducted. A number of programs decided not to require the course and this resulted in smaller numbers of students in the lab.

With fewer students in the lab, Conrad changed the curriculum to include a wider range of living organisms, not on fixed samples or dead embryos.

"It's specifically focused on looking at the embryos of living organisms and it allows students to experience the beauty of seeing living things," Conrad said. "That's why most of us became developmental biologists, because we saw living embryos, not just dead, fixed, embedded things, we saw living ones!"

The lab examines the developments of lower plants, such as moss and ferns, to the embryos of chickens and quail. Not only is normal development of organisms explored, but Conrad designed experiments for students to analyze the effects of run-off of chemicals used to fertilize lawns and farmers' fields on development.

The only problem with running the lab this way was the cost and the KSU Division of Biology budget did not cover everything.

"The division gives us a budget of a few hundred

dollars and that's enough to buy a couple things," Conrad said. "So we buy that and then we try to make do with the rest."

Everything he could not buy, Conrad found elsewhere. He salvaged supplies such as old glassware, old peanut butter jars and coffee containers from the trash and closing labs. He received help from other investigators, such as when the KSU Entomology Department provided aphids for the lab to study. Conrad even paid for supplies out of his own pocket for the first year.

Unfortunately, not everything can be salvaged for the lab, such as chemicals and the living embryos. This is where K-INBRE was able to help.

"Three years ago, Dr. Conrad asked if there was any

way the K INBRE could help sponsor the class because the Division of Biology did not have funds to fully fund the class," KSU Campus Coordinator Dr. Stephen Chapes said. "Because one of the themes of the KINBRE is developmental biology (co-coordinator) Dr. Larry Williams and I thought that this class would help students in that area."

K-INBRE was able to provide the class \$1,000 over a period of two years

starting in spring 2004.

"It was great to have the funding supplement what the Division was going to be able to provide so it allowed us to be able to order more organisms, in greater varieties and types than we had been able to previously," Conrad said. "The quality of the class went up as a result."

Despite the cost of using living organisms, Conrad believes it is the best way to teach students about

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Biology students Sarah Dotson and Shawna Mailman prepare a sample during the developmental biology lab.

Catalysts for change: Important benefits of undergraduate research

Nancy Hensel

Contributing Writer

Faculty and students who collaborate on undergraduate research are well aware of the benefits. David Lopatto, Professor of Psychology at Grinnell University, has identified several important benefits to students from undergraduate research. Critical thinking skills become more effective and students learn to ask better questions and anticipate possible solutions. As students participate in the research process, they learn how to interpret the literature on the topic and how to use the research methodology of their discipline. When they present the results of their research, they improve their oral and written communication skills. These are all significant areas of learning and will contribute to success as students enter graduate school and/or their future careers.

I believe that undergraduate research has an important benefit to our larger society as well and that students who engage in undergraduate research may become catalysts for change in their professions and communities. My own professional field was early childhood education and I was always captivated by the



Nancy Hensel is the third executive officer of the Council on Undergraduate Research. Prior to becoming CUR's National Executive Officer, she was the sixth president of the University of Maine at Presque Isle from 1999 until 2004. During her presidency, the University adopted a theme of adventurous learning which encompassed intellectual, cultural, and

outdoor adventures. Previously she served as Provost and Vice President for Academic Affairs at the University of Maine at Farmington where she also served as Dean of the College of Education. Before moving to Maine in 1992, she was Department Chair and Professor of Education at the University of Redlands in Redlands, California. She holds a doctorate degree in early childhood education from the University of Georgia, masters' degrees in theater and early childhood education and a bachelor of arts degree in theater from San Francisco State University.

innate curiosity of the young child. Every parent is well acquainted with the many "why" questions that children ask in the early years of their development. They look at the world with a sense of wonder and a desire to understand. Undergraduate research is a way to maintain that sense of wonder, the desire to understand, and to continue asking the "why" questions. Whether a student will become a researcher, physician, teacher, social worker, or any other professional, their undergraduate research experience may lead them to ask the "why" questions about their chosen profession. Undergraduate research can foster openness to new ideas that may lead to beneficial changes in the profession.

Students majoring in science fields may become medical researchers, physicians, and pharmacists. They also might become science writers, public policy experts in science areas, or become involved in a science related business. Openness to new ideas and the ability formulate good questions are skills that can expand the work of the profession as well as lead to new ways of engagement in the profession. For example, Stephen J. O'Brien, head of the Laboratory of Genomic Diversity at the National Cancer Institute, National Institutes of Health, tells about a call he received from a Canadian Chief of Police who was trying to solve a murder on Prince Edward Island. They had no body and no real evidence to connect a suspect to the crime. They found cat hairs in the victim's jacket that they thought might match the cat of the suspect. The police chief contacted Dr. O'Brien to see if he could make a genetic match that might be used as legal evidence. Other forensic clinicians had said that animal DNA had not been used as evidence in criminal proceedings and they could not do the lab work. Dr. O'Brien was intrigued and took on the assignment. His work

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Another View

Another View: Benefits of undergraduate research, continued

led to the use of animal DNA in future crime investigations, thus expanding the reach of the profession of forensic science.

Rita Arditti, author of *Searching for Life: The grandmothers of the Plaza de Mayo and the disappeared children of Argentina*, describes how DNA testing was used to reunite grandmothers with children who had been adopted in Argentina. In the 1970's many people disappeared by the actions of a repressive government. If they had children, the children were given up for adoption to people who were considered more sympathetic to the government. The grandmothers protested the disappearances and the adoptions. After a change in the government, the grandmothers tried to find their grandchildren.

Once they found their grandchildren, they were asked how could they prove that the children belonged to them? One of the grandmothers read about a blood test that could prove a biological link between children and their parents. She wondered if the same blood test could be used to determine familial identity when the parents were no longer living.

Eventually, she was able to contact researchers in the United States who were intrigued by the question and began to explore it. They found that DNA could determine with 99.9% accuracy whether a child belonged to a particular grandparent. The grandmother's question led to an expansion of current research and, with the research results, laws and social policy were changed.

Now Argentina has a National Genetic Data Bank so that the children of the disappeared can eventually reunite with their families of origin. This movement has also significantly changed the adoption policies in Argentina and changed our understanding of the importance of familial identity. In addition, the grandmothers were instrumental in encouraging the use of forensic science in human rights investigations.

The Chief of Police in Canada and the Argentine grandmothers had important questions that mattered to them either professionally or personally. They sought out researchers who had a strong sense of curiosity and were open to using their professional expertise in new ways. The results of their efforts led to significant changes in forensics and the use of DNA. The undergraduate research experience has the potential to prepare researchers in all fields who will influence the direction of their profession when students have the opportunities to explore new ideas, ask important and researchable questions, and have the confidence to risk failure.

The wider civic benefits of undergraduate research may be considerable. Our college graduates are likely to serve on school boards or other citizen advisory boards, perhaps to run for local or state offices, or serve as trustees for non-profit organizations. It is possible that students who have had an undergraduate research experience will be more likely to examine evidence and consider variables before forming their opinions and taking a position on the many challenging and controversial issues they will face in their civic lives. This outcome, if it proves to be true, will be of significant benefit as we continue to grapple with the complex, often confusing and difficult domestic and international issues we face as a nation. When I have an opportunity to see the results of student undergraduate research at celebration days and research symposia, I am encouraged and optimistic about the upcoming generation and the contributions they will make to their professions and communities because of the education they are receiving at our colleges and universities.

References:

Arditti, R. 1999, *Searching for Life: The grandmothers of Plaza de Mayo and the disappeared children of Argentina*. Los Angeles and Berkley: University of California Press.

Lopatto, D. 2003, The Essential Features of Undergraduate Research, *Council on Undergraduate Research Quarterly*, 24 (March); 129-142.

O'Brien, S. 2003, *Tears of the Cheetah: And other tales from the genetic frontier*. New York: St. Martin's Press.

Pilot, Bridging projects

The following K-INBRE Pilot and Bridging projects were awarded for year 6, May 1, 2006 April 30, 2007.

Primary

<i>Investigator</i>	<i>University</i>	<i>Title</i>
Andrews, Glen	KUMC	Functions of zinc transporters in the pancreaticBcell
Berman, Nancy	KUMC	Estrogen & ERK activation in tigeminal neurons
Bousfield, George	WSU	Glycan Inhibition of Gonadotropin Receptor Activation
Chebloune, Yahia	KUMC	Modification of CAEV to enhance induction of encephalopathy, modeling HIV disease
Fields, Patrick	KUMC	Sprouty1 and Sprouty2 in AutoimmuneDiseases
Mitchell, Kathy	KUL	The Role of K Channels in Neuronal Differentiation of Umbilical Cord Stem Cells
Mitchell, Kathy	KUL	Regulation of Oct4 an nonog Expression by Hypoxia in Umbilical Cord Stem Cells
Peterson, Kenneth R.	KUMC	Molecular Control of Fetal ygloblin Gene Expression Selection of Transactivators
Takemoto, Larry	KSU	Passage of Ocular Proteins into the Lens
Wang, Li	KUMC	Crosstalk of Nuclear Receptor Signaling in Regulating Fatty Liver
Welti, Ruth	KSU	Comprehensible analysis of human plasma lipids as potential markers of disease
Zhu, Kun Yan	KSU	Characterization of Two Distinct Chitin Synthases in Mosquitoes
Zolkiewski, Michal	KSU	Molecular Switches: a novel subfamily of AAA+ ATPases
Zufferey, Rachel	KSU	The role of secreted lipases in the pathogenesis of the human parasite Leishmania

K-INBRE

Annual Symposium

8:30 Saturday, January 13 to

Noon Sunday, January 14, 2007

**Intercontinental Kansas City on the Plaza
(401 Ward Parkway, Kansas City, Missouri 64112)**

Symposium will feature Nationally known Plenary speakers, regional speakers and K-INBRE student presentations.

More to be announced . . .

Announcements

Kansas State University

Two KSU K-INBRE Students were honored at the Division of Biology 2005/2006 Undergraduate Awards banquet on April 22. Zachary Brown was named one of nine of the year's Most Promising Students. Also Caleb Knepper was one of two students who won the H.H. Haymaker Award for Excellence.

Another KSU K-INBRE student, Erica L. Hutfless, an undergraduate in the laboratory of Dr. Lorena Passarelli, was awarded two national competitive fellowships. She was the recipient of the Latino Institute Program Fellowship, awarded to only 100 students in the USA every year, and the prestigious Microbiology



Zachary Brown receives his Most Promising Student award from Dr. Ruth Welti.

Undergraduate Research Fellowship Program from the American Society for Microbiology.

Also, Hutfless and Dan Madgwick were both awarded Star Trainee awards for 2006-2007. Madgwick's mentor is Dr. Dolores Takemoto.



Washburn University

Kevin Kent, a recent Washburn University graduate, was named National Fellow of the Phi Kappa Phi National Honor Society. The recognition includes a substantial monetary award. Phi Kappa Phi recognizes only one graduating senior a year for this award.



Caleb Knepper is given his H.H. Haymaker Award by Dr. Jyoti Shah.

Developmental Biology Lab

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developmental biology.

"It's the way I got interested in developmental biology, where I was taking classes where investigators actually went to the trouble of showing us living organisms and letting us do experiments on living embryos and emphasized that you don't learn anything about mechanisms if you cannot do experiments," he said.

Conrad hopes to pass on this interest in developmental biology and teach them about scientific research.

"We try to regard each of these students as potential

young scientists of the future. It's important that they understand the philosophy of doing research, and that not everything works, you've got to make do with what you got, you never have enough money to do things exactly as you want and there are always unexpected positive things to see if you keep your eyes open."

Chapes notes that K-INBRE does not usually fund classes, but there are always possibilities.

"There is no formal mechanism. The K-INBRE is not there to fund teaching. That is the State of Kansas' responsibility," he said. "However, I think that in unique situations, the K-INBRE can enhance a lab situation to make it more attractive to students that are interested in research."