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EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH



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ANNUAL
REPORT
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**MESSAGE FROM THE DIRECTOR
F. FRED CHOOBINEH**

Science and innovation are a priority for our state and are integral to its economy. Nebraska EPSCoR continues to play a key role in investing in collaborative science and technology programs and research infrastructure that make a difference in Nebraska.

Our current National Science Foundation (NSF) Research Infrastructure Improvement (RII) grant, Nano-Enhanced Epigenetics Research (NE²R) in Nebraska, is wrapping up and continues its focus on building Nebraska's university-based infrastructure and research competitiveness in epigenetics research. Through this grant Nebraska EPSCoR has been instrumental in moving Nebraska toward more collaborative initiatives in the biological sciences and engineering. We are planning to invest in new research directions important to Nebraska through a new \$20 million NSF RII grant, Nanohybrid Materials and Algal Biology, which was submitted in October 2009. We should know its status by June 2010.

Our strategic efforts to promote and facilitate collaboration among the state's top researchers are positively impacting Nebraska's research capacity and enhancing the preparedness of the state's future workforce for innovative technological and economic development. These efforts include events such as the 2009 Research and Innovation Conference, which showcased the latest developments in health science and technology and provided a venue for business leaders, policy makers, and researchers to network and exchange ideas. Our R&D Partnership program continues to support scientific and technological collaborations among Nebraska industry and universities through grant opportunities, and the Nebraska Engineering, Science and Technology Internship Program (NESTIP) helps support the placement of interns with Nebraska businesses to promote knowledge transfer and encourage applied research that is beneficial to Nebraska industry. We continually strive to enhance these and other initiatives to strengthen our state's future research enterprise and innovation economy.

Nebraska EPSCoR's education and outreach activities complement our research investments. Now in its fifth year, our Young Nebraska Scientist Initiative provided expanded summer STEM experiences for junior high, high school and undergraduate students in 2009. Through NSF funding, Nebraska EPSCoR also continued its support of other outreach activities and scholarship programs designed to integrate and embed diversity, broaden opportunities, and enable the participation of all citizens. These efforts are vital to engaging a robust research community in a portfolio of programs that span the STEM pipeline, facilitating the participation of diverse groups and increasing the diversity of Nebraska's STEM students.

Our researchers, staff and industry partners are unified in their commitment to enhancing Nebraska's science and technology research and competitiveness and fostering economic development through the support of technology transfer. Together, we look forward to partnership opportunities that will propel Nebraska toward significant national competitiveness in the year ahead.



Experimental Program to Stimulate Competitive Research
Institutional Development Award Program

NEBRASKA EPSCoR

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TABLE OF CONTENTS

From the Director..... 2
EPSCoR News..... 3
Grant Awards 4
Economic Development..... 5
Research 6
Education and Outreach..... 8

STATE EPSCoR OFFICE STAFF

F. Fred Choobineh, P.E., Ph.D., Director
Sarah Zulkoski-Benson, Outreach Coordinator
Karla Roth, Administrative Assistant
Nancy Simnitt, Administrative Technician

COVER PHOTO:The Environmental Scanning Electron Microscope (ESEM), a new instrument in the Nanofiber Facility supervised by Dr. Yuris Dzenis at the University of Nebraska-Lincoln (UNL), was acquired and activated with funding from Nebraska EPSCoR. The ESEM produces high resolution imaging of various biological and other materials and structures, including hydrated and non-conductive samples. It allows researchers to observe processes in a controlled environment. The background images shown are hydrated cells of three types: mammalian (mouse sperm), yeast, and plant (leaf).

2009 CONFERENCE HIGHLIGHTS ADVANCEMENTS IN RESEARCH, INNOVATIVE APPROACHES TO HEALTH ISSUES



New developments in medical research and technology and their impact on the state's health care capabilities and policies were featured at the 2009 Nebraska Research and Innovation Conference at the Qwest Center in Omaha on September 29.

Gov. Dave Heineman and University of Nebraska President James Milliken welcomed more than 200 educators, researchers, business leaders, policy makers and entrepreneurs to the fifth annual conference. Presenters included Dr. Elaine Mardis, The Genome Center at Washington University; Dr. Bradley Ozenberger, The National Human Genome Research Institute; Dr. Gail Naughton, Histogen, Inc.; Dr. Roger Geiger, Penn State University; Dr. Jim Linder, UNMC; and Constance Ryan, Streck Laboratories.

Afternoon concurrent sessions focused on advances in cancer biology in Nebraska, the Center for Advanced Surgical Technology (CAST), the Nebraska Biomechanics Core Facility, regulatory challenges in drug development, and developing innovation through public policy. Student research poster presentations and high-tech business displays were also featured at the conference.



Above, conference participants connect at poster sessions. At right, Prem Paul, UNL vice chancellor for research and economic development (center) greets attendees. Lower right, Creighton students assist at the event.



STATE COMMITTEE GAINS NEW MEMBERS

Nebraska EPSCoR/IDeA said farewell to two State Committee members in 2009. We are grateful to **Ronald Raikes**, who died September 5, and **Finnie Murray** for their commitment and service.

The following two individuals joined the State Committee and were appointed by Gov. Heineman.

Greg L. Adams is a state senator representing the 24th legislative district in the Nebraska Unicameral. Elected in 2006, he chairs the legislature's Education Committee and serves on a number of other committees. For 30 years he taught American government and economics at York High School and also served as K-12 Social Studies Department chair. He continues to administer the school's Washington, D.C. Close Up program. Adams' civic leadership includes 10 years as a



Greg L. Adams

member of the York City Council and 10 years as mayor of York. He received a master's degree in history from Wayne State College.

Charles J. Bicak is senior vice chancellor for academic and student affairs at the University of Nebraska at Kearney (UNK). He has served as chair of the Department of Biology at both California State University Bakersfield (CSUB) and UNK and as dean of Natural Sciences at St. Edward's University in Austin, Texas. His research has focused on plant/ecosystem response to environmental stress, as well as enhancing student participation in scientific inquiry. His teaching interests include freshman biology to graduate courses in plant physiology, plant ecology and rangeland and wildlife management. He holds a Ph.D. in Range Science from Colorado State University.



Charles J. Bicak

GRANTS AWARDED IN 2009

NASA EPSCoR

- Miniature In Vivo Surgical Robotics for Long-Term Space Flight; Pls: Shane Farritor, UNL and Dmitry Oleynikov, UNMC; \$750,000.
- RFID and RTLS Enhancement for Inventory Management and Logistics of Space Transportation Systems; Pls: Erick Jones, UNL and Lance Pérez, UNL; \$750,000.

DOE EPSCoR Laboratory Partnership Grants

- Dynamic Optimized Advanced Scheduling of Bandwidth Demands for Large-Scale Science Applications; PI: Byravamurthy Ramamurthy, UNL; \$449,976.



UNL/CSE graduate student, Praga Angu (supervised by Prof. Byrav Ramamurthy, UNL/CSE) posing in front of the Ciena CoreDirector (CDCI) optical switch deployed at UNL campus. The CDCI switch enables high-speed bandwidth-on-demand services which are vital for emerging eScience applications of interest to DOE scientists and university collaborators.

NIH Center of Biomedical Research Excellence (COBRE)

- The Molecular Biology of Neurosurgery Systems; Pls: Shelley Smith, UNMC; Kirk Beisel, Creighton University; Edward Walsh, Boys Town National Research Hospital; \$10,196,409.

NIH Institutional Development Awards (IDeA) Networks of Biomedical Research Excellence (INBRE)

- Nebraska Research Network in Functional Genomics; PI: James Turpen, UNMC; \$16,560,339.
- Recovery Act Administrative Supplements Providing Summer Research Experiences for Students and Science Educators; \$640,079.
- Recovery Act Funds for Administrative Supplements for Administrative Supplements for Research Workforce Development and Dissemination; \$398,855.
- Recovery Act Funds for Administrative Supplements for Enhancing NCRP Pilot Project Mechanism; \$413,452.

Nebraska researchers benefit from NSF EPSCoR Co-Funding program

The NSF EPSCoR Co-funding program enables funding of proposals from EPSCoR jurisdictions submitted to non-EPSCoR NSF programs that have received meritorious review but lie at or near the cutoff for funding by the NSF program. The co-funding amount ranges from 30 to 50 percent of the total award. In 2009, the following Nebraska proposals received NSF EPSCoR Co-funding. Total award is in parentheses.

- Collaborative Research: Feammox-a new pathway for nitrogen loss from terrestrial ecosystems; PI: Karrie Weber, UNL; (\$188,676).
- EMSW21-MCTP: Nebraska Mentoring through Critical Transition Points; PI: Thomas Marley, UNL; (\$2,225,689).
- II-NEW: Collaborative Research: COMET-COMMunity Event-based Testing; PI: Myra Cohen, UNL; (\$100,000).
- Wave Propagation in Nonlinear Acoustics, Viscoelasticity, and Heat Transfer; PI: Petronela Radu, UNL; (\$137,054).
- Collaborative Research: HECURA: A New Semantic-Aware Metadata Organization for Improved File-System Performance and Functionality in High-End Computing; PI: Hong Jiang, UNL; (\$344,552).

R&D PARTNERSHIP PROGRAM BOOSTS THIN FILMS WORK OF UNL FACULTY AND NEBRASKA FIRM

In 1987, John Woollam, George Holmes Distinguished Professor in the Department of Electrical Engineering, converted his UNL research to form the J.A. Woollam Co., Inc., a Lincoln firm that now leads the industry in manufacturing automated spectroscopic ellipsometers.



John Woollam

Ellipsometry, which measures a change in polarization as light reflects or transmits from a material structure, is helpful in semiconductor and data storage solutions, flat panel displays, communication, biosensors, and optical coatings.

Fast-forward 20 years to Mathias Schubert, an associate professor of electrical engineering at

UNL, whose research includes quartz crystal microbalance measurement to innovate chemical and biochemical sensing in spectroscopic ellipsometry.

Together, the expertise of Woollam and Schubert aims to create a new generation of ellipsometers, potentially a new scientific instrument offering insight into the properties and growth kinetics of thin organic films, specifically their nano-structured surfaces. This faculty-industry collaboration is expected to greatly enhance the



Mathias Schubert

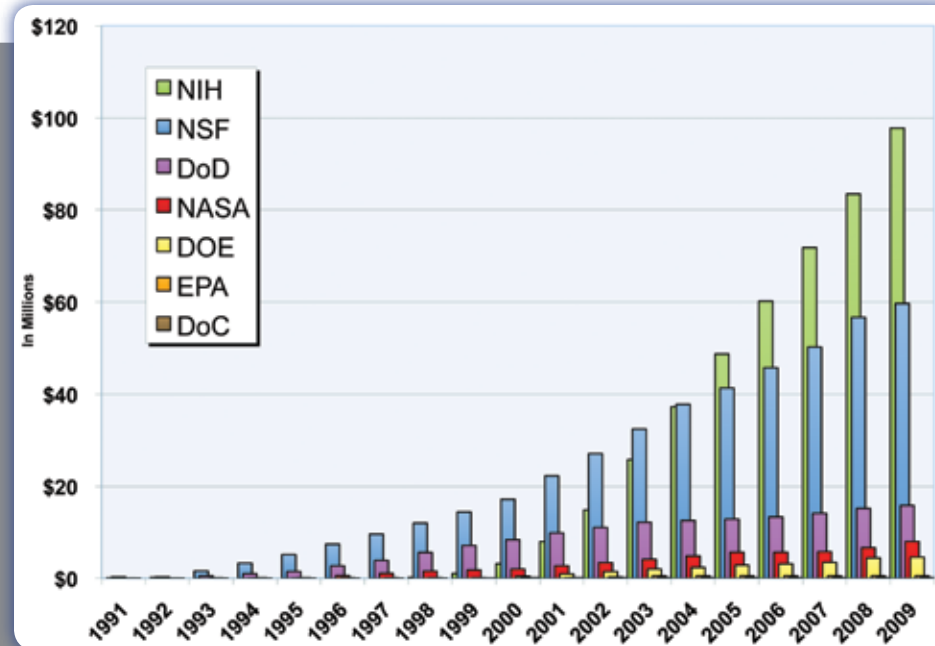
field's capabilities, from energy materials development to environmental and homeland security monitoring.

Nebraska EPSCoR is making sure their teaming gets support through its University-Industry R&D Partnership Program: a cost-share program intended to foster new or strengthen existing partnerships between faculty of Nebraska research universities and state industries. The one-year grant for this endeavor provides \$25,000 in funding from EPSCoR, matched with \$25,000 from J.A. Woollam Co. Schubert and Woollam's work is also funded by the Army Research Office's STTR program for the development of Terahertz Ellipsometry Instrumentation.

Augmenting traditional analytical modes, these new ellipsometry techniques align to not only advance scientific knowledge but also grow economic opportunities for local suppliers. The project's enhanced focus and facilities benefit UNL faculty in departments ranging from Chemistry and Physics to Astronomy, who can leverage new research insights for further study and competitive research proposals, as well as UNL students, who gain skills while working on the development of commercial technologies.

In his proposal for Nebraska EPSCoR funding, Schubert cited the "long history of successful collaborative efforts" by Woollam and university partners, when "the Woollam company has developed new approaches ... to address specific customer applications." Schubert said a new product combining spectroscopic ellipsometry and quartz crystal microbalance measurements would offer significant advantages over either of the techniques alone.

CUMULATIVE FEDERAL R&D FUNDS EXPENDED BY NEBRASKA EPSCoR



NESTIP

Nebraska's economic development is also enhanced when new ideas and innovations are integrated into a business. One way Nebraska EPSCoR is supporting this effort is by providing a cost share opportunity for businesses wanting to hire a student intern. Nebraska EPSCoR provides up to a 50 percent match to businesses who hire an engineering, science, or technology student through the Nebraska Engineering, Science, and Technology Internship Program (NESTIP). This opportunity is available

to any business operating in Nebraska that wants to work with a student from any of Nebraska's four-year colleges or universities. Visit the Nebraska EPSCoR website, <http://epscor.unl.edu>, for specific requirements and necessary applications. Participating businesses during the past year included: Morrissey Engineering, Omaha; Boyd Jones Construction, Omaha; Xpanxion, Kearney; Farmland Foods, Crete; IntelliCom Computer Consulting, Kearney; Kohl's Pharmacy & Homecare, Omaha; and UNeMed Corporation, Omaha.

EXTENDING THE REACH OF NEBRASKA RESEARCH

Two University of Nebraska-Lincoln scientists are working to benefit NASA, with federal funding through the Nebraska NASA EPSCoR Program:

- Shane Farritor, associate professor of mechanical engineering, conducts design, simulation and testing of Miniature In Vivo Surgical Robotics for Long-Term Space Flight.
- Erick C. Jones, associate professor in the Industrial and Management Systems Engineering Department, applies Radio Frequency Identification (RFID) to streamline astronauts' inventory and logistics tracking onboard the International Space Station and other missions.

The grants are intended to promote university research in the areas of aeronautics, exploration systems, science and space operations, with results that can also benefit the general public.

Farritor, who advanced surgical robotics with NASA's Extreme Environment Mission Operations (NEEMO), currently collaborates with Dr. Dmitry Oleynikov, associate professor in the Department of Surgery at the University of Nebraska Medical Center. They engage graduate and undergraduate students in exploring a technique called Natural Orifice Transluminal Endoscopic Surgery (NOTES). Their research shows that miniature robots can be introduced into a patient's abdominal cavity through the mouth and esophagus for minimally-invasive surgery.

"This grant will allow us to build important prototypes to demonstrate our concept," said Farritor, who hopes that in addition to aiding NASA missions, "our robots will reduce hospital stays and improve surgical outcomes" throughout the world.



At left, a Radio Frequency Identification (RFID) tag could help NASA mission inventories.



Miniature robots, such as this one developed by UNL's Shane Farritor, can help make surgeries minimally-invasive and more successful on long-duration NASA missions as well as in hospitals near you.

Jones' research works to develop a "real-time location system" to minimize time spent by astronauts finding important inventory, such as food, and managing stowage logistics, such as the tracking of experiments, onboard the International Space Station and with future NASA space operations.

"We are truly honored to introduce our cutting edge research into the NASA space community," said Jones, who focuses on increased efficiencies for astronauts and NASA, as well as for on-ground operations through automated asset tracking.

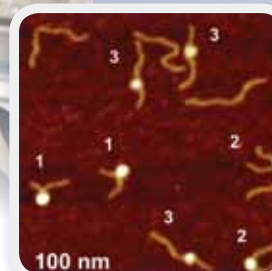
These proposals rose through state and national review processes among 26 eligible NASA EPSCoR jurisdictions. Each jurisdiction could submit two proposals within research areas that address specific, high-priority NASA technology and research development needs. NASA EPSCoR received 50 proposals from around the country and awarded 27 grants. Nebraska was one of only six jurisdictions to receive two research awards. Each award is \$750,000 for three years.

"Nebraska has been incredibly successful in the national NASA EPSCoR competition in recent years," said Scott E. Tarry, director of the NASA Nebraska Space Grant and EPSCoR. Tarry said four NASA EPSCoR-funded projects are at work in Nebraska, with all four NU campuses participating. "These projects are critical to the development of the state's research capacity and our ability to retain the best and brightest scholars and students in science and technology fields."

LYUBCHENKO'S RESEARCH FEATURED IN FACULTY OF 1000 BIOLOGY



Faculty of 1000 Biology (F1000) has selected a paper by Dr. Yuri Lyubchenko, Department of Pharmaceutical Sciences, University of Nebraska Medical Center, for inclusion in its online research service.



The paper relates that a fundamental challenge of regulation of gene activity is the accessibility of DNA within nucleosomes because the DNA is tightly wrapped around the histone core. Studies performed over the past decade led to the discovery of a class of proteins that

unwrap the DNA from the histone core to provide the access to the DNA regions inside the nucleosome. This led to the view in which nucleosomes themselves are considered rather stable particles with limited dynamics.

Recent studies performed with the use of various techniques, including single molecule approaches, led to the realization that nucleosomes are quite dynamic rather than static systems. The AFM images of nucleosomes (above) illustrate high dynamics of this fundamental unit of chromatin. DNA on these images makes various turns around the histone core. For example, nucleosomes marked 1, 2 and 3 have 1.7, 1.4 and 1.0 turns of DNA wrapped around the core particle. High-resolution AFM imaging of nucleosomes in air revealed the structural heterogeneity of the particles, and Dr. Lyubchenko and his team hypothesized that this heterogeneity reflects inherent dynamics of nucleosome. To test this hypothesis and look directly at the dynamics of nucleosome in solution, they employed the AFM capability to perform imaging in aqueous

solutions using time-lapse imaging of non-dried nucleosome samples.

Using time-lapse AFM imaging, researchers were able—for the first time—to observe spontaneous, protein-free unwrapping of the nucleosomes. The unwrapping occurs from the ends of the nucleosomes, allowing for exposure of DNA regions as large as dozens of base pairs and leading to a complete unfolding of nucleosomes.

These studies highlighted the role of electrostatic interactions on the unwrapping process. The electrostatic interactions between positively charged histone octamer and negatively charged DNA are major contributors to the stability of the structure of nucleosomes. However, transiently unwrapped DNA segments can be trapped by electrostatic interactions with the positively charged surface outside the nucleosome. These trapped states increase the probability for the next unwrapping step, shifting the equilibrium of the unwrapping/wrapping dynamics towards unwrapping that eventually may lead to full unwrapping of the nucleosome. The described scenario has been realized in the AFM experiments in which a positively charged surface was created. Based on this data the researchers hypothesize that interaction of chromatin with surfaces within the cell, including the surfaces of remodeling proteins, can contribute to the chromatin dynamics providing the accessibility to the DNA regions.

FIRST AWARDS HELP LAUNCH EARLY FACULTY RESEARCH

Nebraska EPSCoR selected six Nebraska researchers to receive its First Award grants in 2009.

Funded by the National Science Foundation's (NSF) infrastructure grant to Nebraska EPSCoR, the competitive First Award grants program provides assistance to tenure-track faculty in the first four years of their initial academic appointment. The grants are designed to help early career faculty initiate their research programs and compete more effectively for NSF CAREER grants.

First Awards are limited to \$20,000 and require a one-on-one match. Grantees must submit a CAREER Award proposal to NSF or a similar grant to another agency within the grant period.

The 2009 First Award grantees and their projects are:

Ming Han, Electrical Engineering, University of Nebraska-Lincoln (UNL), High-sensitivity, low-cost optical biosensor based on photonic crystal fiber.

Stephen Hartke, Mathematics, UNL, Computerized Search for Combinatorial Objects.

Christine Kelley, Mathematics, UNL, Algebraic design and analysis of graph-based codes using voltage graphs.

Rebecca Lai, Chemistry, UNL, Disposable Peptide-based Electrochemical Biosensor for HIV Detection.

Senem Velipasalar, Electrical Engineering, UNL, Peer-to-peer detection of user-defined and semantically high-level events spanning multiple camera views.

Bin Yu, Biological Sciences, UNL, Dissecting miRNA metabolism in *Arabidopsis thaliana*.

For additional information on the program, please visit epscor.unl.edu/programs/firstaward.shtml



From left: Ming Han, Senem Velipasalar, Bin Yu, and Stephen Hartke



YOUNG NEBRASKA SCIENTIST PROGRAMS EXPAND SUMMER OPPORTUNITIES

YNS CAMPS

Building wind turbines and solar cars, exploring natural wetlands and checking water quality, learning how water and energy use affect the environment, and exploring solutions to some of the biggest challenges facing the planet are what more than 60 Young Nebraska Scientists experienced at 2009 summer camps.

Nebraska EPSCoR expanded its summer camp offerings in 2009, seeking to provide students from across the state opportunities to learn science through doing science and to explore the intersection of science, technology and society with the guidance of scientific and education experts.

The University of Nebraska at Omaha (UNO) hosted the water and water systems themed camp. Participants benefited from the expertise of Dr. Dana Richter-Egger, director of UNO's Math-Science Learning Center and assistant professor in the Chemistry Department. Dr. Richter-Egger led a tour of the wetlands at Allwine Prairie Preserve, a 160-acre re-established grassland research area, and took participants back to the lab where they participated in quality tests and analysis. Tawnya Blades, Giltner; Terri Greenleaf, Winnebago; and Sara Yendra, UNL, facilitated the camp's instructional activities, including tours of waste water and drinking water facilities, a water filter challenge, exploring personal water use and conservation, and building water rockets.

UNL was host to camps based on renewable and non-renewable energy resources. Chad Johnson, an education specialist with the Nebraska Public Power District, introduced students to energy concepts and how energy is delivered to homes. He also led design challenge activities requiring participants to think about energy conservation. Jerry Arnold, Valentine; Tawnya Blades, Giltner; Sara Yendra and Nicholas Deffer, UNL; and Terri Greenleaf, Winnebago, facilitated instructional activities aimed at educating participants about current energy use and resources and allowing them to explore alternative energy resources. Activities included visiting the Energy Farm near Lyons, an off-grid farm operated by Nebraska Renewable Energy Systems (NRES); building Mars rover robots, wind turbines, solar cars, and energy-efficient model homes; and exploring and debating energy resources for electricity and transportation.

Nebraska students entering the eighth through eleventh grades are eligible to apply for the one-week program. Applicants must be recommended by a science teacher. A nominal program fee pays for housing and meals only. All other costs, including instruction and laboratory

fees, are provided by Nebraska EPSCoR and participating institutions. A limited number of needs-based scholarships are available.

For more information on the program, visit <http://yns.nebraska.edu> or contact Sarah Zulkoski-Benson at szulkoski-benson2@unl.edu or (402) 472-8946.

SUMMER RESEARCHERS

As a part of Nebraska EPSCoR's statewide Young Nebraska Scientist Initiative (YNSI), six Nebraska high school students experienced what it's like to be a STEM researcher and participated in research labs at UNL and Creighton University for eight weeks during the summer of 2009. These students received stipends as working members of a research lab where they contributed to research projects and participated in additional lab activities. The 2009 participants included:

- **Duc-Cuong Bui** - senior, Lincoln Pius X High School (Janos Zempleni, UNL)
- **Spencer Farley** - senior, Lincoln Lutheran (Bin Yu, UNL)
- **Katelyn Koll** - senior, Wilber-Clatonia High School (Jung Yul Lim and James Alfano, UNL)
- **Forrest Paulissian** - freshman, UNL (Tom Clemente*, UNL)
- **Chelsea Rasing** - senior, Omaha North High Magnet School (Garrett Soukup, Creighton)
- **Blake Vajgrt** - senior, Seward High School (Tom Clemente*, UNL)

Applicants must be at least 16 years old by the start of their research experience and must not have graduated from high school. All stipends and lab costs are provided by Nebraska EPSCoR, participating institutions, and faculty grants.

* Funds provided by a NSF Plant Genome grant.



NEBRASKA COLLEGE PREPARATORY ACADEMY

UNL's Nebraska College Preparatory Academy (NCPA) partnered with Nebraska EPSCoR to provide summer science activities for the Academy's scholars. More than 80 Nebraska students from Grand Island Senior High and the Omaha North Magnet High School participated in two days of activities, including a bacterial transformation resulting in green, glowing bacteria; analysis of student DNA using PCR; and tours of UNL STEM departments and facilities. Instructional activities were facilitated by Jackie Clifford, Lincoln Northeast; Katy Dornbos, Millard West; Rolando Negron, UNL; Patrick Poskochil, Wahoo; Josh Schlautman, UNL; Nathan Seggerman, Millard West; and Alexandra Sorman, Lincoln Southeast. NCPA targets academically promising scholars (students) who come from first-generation and low-income backgrounds and prepares them to enroll in college. NCPA scholars receive support on various levels to adequately prepare them to be successful in high school and college.

EXXONMOBIL BERNARD HARRIS SUMMER SCIENCE CAMP INSPIRES STUDENTS' MATH AND SCIENCE INTERESTS, DREAMS

Nearly 50 middle school students from Lincoln and Omaha participated in the ExxonMobil Bernard Harris Summer Science Camp at the University of Nebraska-Lincoln in July.

Nebraska EPSCoR's experience with Young Nebraska Scientist summer camps enabled UNL to receive an \$80,000 award from ExxonMobil and the Harris Foundation. UNL's College of Education and Human Sciences partnered with Nebraska EPSCoR to obtain more funding for Nebraska students to take part in summer science activities.

Named for Dr. Bernard Harris, a former astronaut who became the first African-American to walk in space, the free two-week camp targets groups of students traditionally underrepresented in math and science fields. Qualified students must earn A's and B's in math and science classes, score well on standardized tests and be recommended by their teachers.

"We are pleased and honored to receive this award, and we sincerely hope this experience spurs these students to pursue classes in science, technology, engineering and math, and to consider a career in a STEM field," said Sarah Zulkoski-Benson, EPSCoR Outreach Coordinator.

Nebraska's camp was one of 30 ExxonMobil Bernard Harris camps offered across the nation in 2009. The camp's goal is to help the United States address a critical shortage of scientists and engineers by providing a fun forum to teach kids about space, robotics, energy, and the environment.

"We want to inspire students to keep pursuing their interest in math and science in school," Harris noted. "The more education you have, the more opportunities you will have."

Harris said that nationally, about 70 percent of students finish high school, and that figure drops sharply for black, Hispanic and Native students. Studies also show blacks hold just 4.4 percent of science and engineering jobs, and Hispanics hold 3.4 percent.

"We want to ensure students have the tools (education) to pursue their dreams. That's what this camp is all about," Harris said.

One of the highlights of the camp was a raft experiment in which students competed to see whose aluminum-foil creation could hold the most pennies. The winning team's square raft carried 227 pennies.

"I told the students at our opening ceremony that they were going to get to meet Dr. Bernard Harris and hear from him what it was like to walk in space," Zulkoski-Benson said. "I've always thought that a person couldn't possibly be the same after being out in space, looking back at the Earth. I hope these students have a similar experience after this camp."

Harris told students that although video games or sports camps may seem "cool" and some of their classmates may even call them geeks for being good in math and science, some day the campers will probably have their teasing classmates on their payrolls.

"Guess what?" Harris said. "Geeks rule the world. Be proud to be a geek."



From Left: Sen. Beau McCoy, Dr. Bernard Harris, Sen. Tony Fulton, Dr. Jon Pedersen





UNMC's Dr. David Crouse and Victoria Kohout of the Nebraska Coalition for Lifesaving Cures (fourth and fifth from left, respectively) presented 2009 Richard Holland Future Scientist Awards to Brandon Mizner, UNK; Andrea Gilkey, UNL; Catherine Sargus, UNL; D.J. Nawandar, UNO; Julia Warnke, UNO; and Kyla Ronhovde, Doane College.

INBRE GRANT RENEWAL TO CONTINUE BUILDING NEBRASKA'S RESEARCH STRENGTHS AND INFRASTRUCTURE

The Nebraska Institutional Development Award (IDeA) Networks of Biomedical Research Excellence (INBRE) program marked a milestone in May, receiving a competitive renewal that will extend the project for another five years, through 2014. The \$16.5 million grant renewal award will enable INBRE to continue to build the research capacity on the undergraduate campuses throughout the state.

The Nebraska INBRE network consists of seven undergraduate institutions, three outreach institutions including two community colleges serving underrepresented minorities, and three Ph.D. granting institutions that serve the network as training and mentoring institutions. Participating undergraduate campuses and community colleges are Creighton University College of Arts and Sciences, Doane College, Nebraska Wesleyan University, the University of Nebraska at Kearney, the University of Nebraska at Omaha, Wayne State College, Little Priest Tribal College and Western Nebraska Community College. Additional outreach efforts to support promising students are in place at Chadron State College and the University of Nebraska-Lincoln. The Ph.D. granting institutions are the University of Nebraska Medical Center (lead institution), Creighton University Medical Center and the University of Nebraska-Lincoln.

Faculty and students at participating institutions receive support to develop and perform undergraduate-appropriate research projects. The goal of the project is to develop research capacity on the undergraduate campuses and to enhance research opportunities for undergraduate students at these baccalaureate institutions.

The scientific focuses of INBRE are based on the strengths and scientific expertise on the research campuses and the alignment of research projects developed by undergraduate faculty with these areas on the research campuses. The scientific themes that bring the network together are cell signaling, infectious disease, and neuroscience. Collaborative arrangements between undergraduate faculty and research mentors are integral to the development of these focus areas and to increasing the research base and capacity for Nebraska.

INBRE outreach activities are aimed at increasing the participation of underrepresented minorities in the research enterprise and supporting disease specific initiatives related to these unique populations. The Nebraska Department of Economic

The goal of the project is to develop research capacity on the undergraduate campuses and to enhance research opportunities for undergraduate students at these baccalaureate institutions.

Development is also closely involved with INBRE, specifically with respect to the state's emerging biotechnology industry.

An integral component of INBRE is the BRIN Scholars Program. The Scholars Program provides summer fellowships for advanced research training at one of the Ph.D. granting institutions, as well as research assistantships during the academic year. Scholars are provided with numerous opportunities to present work at regional, national and international scientific meetings. Once admitted to a Ph.D. program, scholars receive support from INBRE for the first year of graduate studies. In 2009, Marko Jovic became the first BRIN Scholar to graduate from the Ph.D. program at UNMC.



(right) Marko Jovic, the first BRIN scholar to complete the Ph.D. program at UNMC, celebrates the completion of his dissertation defense with his father, who traveled from Serbia to attend. Jovic is working on his post-doc at the National Institutes of Health in Washington, D.C.

Six INBRE undergraduate students from four Nebraska colleges and universities received the 2009 Richard Holland Future Scientist Award from the Nebraska Coalition for Lifesaving Cures (NCLC). Selected by INBRE faculty associates, the students received monetary awards from the NCLC totaling \$2,700. The awards are named in honor of Richard Holland, an Omaha philanthropist and longtime supporter of biomedical research in Nebraska.

EPSCoR SPONSORS NEBRASKA'S CONFERENCE FOR UNDERGRADUATE WOMEN IN PHYSICS

Hundreds of undergraduate women (and men) from across the nation traveled to Lincoln in late October for the first Conference for Undergraduate Women in Physics, co-sponsored by Nebraska EPSCoR. Guests enjoyed talks by faculty and attended poster sessions with research presentations. Event organizers said the long-term goal is to recruit and retain more women students, improve their opportunities for success, and boost the percentage of women studying physics at UNL.

Axel Enders, UNL assistant professor of physics and astronomy who led the event, said the occasion was open to men and women, but intended to encourage more female participation "to help balance the ratio." He acknowledged that males typically outnumber females among students and faculty in most university science departments. He added that his goal is for 30 or 40 percent females in the sciences, for a less male-dominated field.

Enders' wife, Susan, is a UNL assistant professor of engineering mechanics who presented a session titled "Get Attached."

She described attachment systems in nature (how can a fly walk on the ceiling, how can a gecko walk on the walls) and expanded the concept to connect her audience to new ways of thinking.

UNL senior Maria Becker presented her research on measuring atmospheric conditions with laser radar systems. Becker, who grew up on a farm in Hartington, said in an interview with the *Daily Nebraskan* during the conference that she has always enjoyed science, starting with astronomy.

She said she hasn't noticed discrimination within her program, but "outside of physics, I get a lot of shocked reactions," she said, with her choice being unexpected "mainly because I am female."

Susan Enders praised the interaction of men and women in physics because their problem-solving techniques vary and add different elements to research. She added that women who study science should be encouraged, in schools and at home.



NEBRASKA'S 2009 OUTSTANDING BIOLOGY TEACHER USES EPSCoR SCIENCE OUTREACH PROGRAM

Lincoln North Star High School teacher Tracie Chapo has been named the recipient of the 2009 Outstanding Biology Teacher Award (OBTA) for Nebraska.



Tracie Chapo of Lincoln North Star High School accepts the 2009 Outstanding Biology Teacher Award (OBTA) for Nebraska.

Chapo, a biology and science instructor at North Star, was chosen as this year's award recipient for her exemplary career in life science education. She has been using Nebraska EPSCoR's science outreach program, Molecular Biology for Secondary Classrooms, every year in her biology and environmental biology classes.

An independent committee of college biologists, industry scientists, school administrators and fellow teachers selected Chapo for the award.

The Nebraska OBTA program is part of a nationwide award program coordinated by the National Association of Biology Teachers (NABT). Each year NABT seeks to recognize an outstanding biology educator (grades 7-12) in each of the 50 states; Washington, D.C.; Canada; Puerto Rico; and overseas territories.

EPSCoR HELPS ACM HOST REGIONAL COMPUTER COMPETITION

Nebraska EPSCoR again supported the University of Nebraska-Lincoln (UNL) in hosting one of the country's largest Association for Computing Machinery (ACM) regional programming contests in 2009.

UNL was the site for the North Central North America Regional competition of the IBM-sponsored ACM International Collegiate Programming Contest. The event featured 37 teams from 14 schools in Iowa, Kansas, South Dakota, Minnesota, Nebraska and Kansas.

The competition has grown to be the largest of the approximately dozen sites that run the contest simultaneously, connected by computer networks. In all, about 200 teams of three students each compete nationwide.

Three UNL teams placed in the top 10 in the regional competition. One of the teams, the Incendiary Pigs, earned the right to compete at the world finals in February in Harbin, China.



UNL's Incendiary Pigs team—Tim Echtenkamp, Tyler Lemburg and Steve Trout (with UNL team coach Charles Riedesel)—will travel to Harbin, China for the world ACM International Collegiate Programming Contest finals.

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