

# EPSCoR

N E B R A S K A

Experimental Program to Stimulate Competitive Research



**Annual Report**

*August 2004*

## Greetings From the Chair

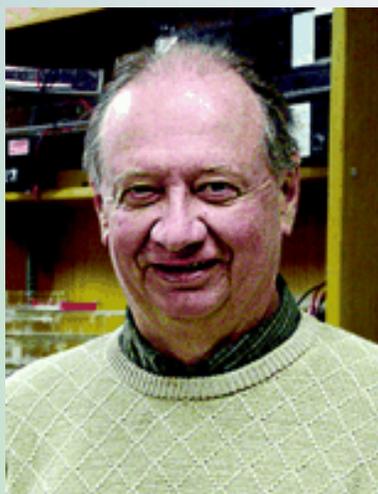
Nebraska EPSCoR's twelfth full year was completed at the end of June 2004. Over \$138 million in grants have been obtained from federal agencies through EPSCoR programs by Nebraska researchers in the twelve years since 1991. These funds have supported infrastructure and research projects as well as education and outreach programs. This year, Nebraska EPSCoR has made a transition with the advent of a new director, Dr. Fred Choobineh, and the retirement of Dr. Royce Ballinger. I welcome Dr. Choobineh and am very glad to have had the opportunity to work with Dr. Ballinger in his capacity as director for nearly twelve years. I extend warm best wishes to him as he enjoys retirement. As chair of the State EPSCoR Committee, I thank Dr. Ballinger and Dr. Choobineh for their work on behalf of Nebraska EPSCoR.



*Robert W. Allington, Sc.D.  
Senior VP & Chief Scientific Officer,  
Teledyne Isco, Inc.*

## The Eventful Career of a Passionate Scientist

### James Van Etten Recently Elected to National Academy of Sciences



In a distinguished career, EPSCoR State Committee member and former cluster leader James Van Etten has had an especially eventful 18 months. The University Professor of Plant Pathology at UNL received one of the highest honors a U.S. scientist can achieve with his spring 2003 election to the National Academy of Sciences. Subsequently, he addressed the summer 2003 UNL graduates, and gave a fall lecture "The Unusual Lifestyle of Giant Algal Viruses" as part of the UNL Chancellor's Distinguished Lecture Series.

Dr. Van Etten received his Ph.D. from the University of Illinois at Champaign-Urbana in 1965. He obtained a postdoctoral fellowship from

the National Science Foundation, which enabled him to study with plant molecular biologist Orio Ciferri in the Department of Genetics at the University of Pavia in Italy. A UNL faculty member since 1966, Dr. Van Etten in collaboration with a colleague Russ Meints (now retired) discovered the first of what is now a new family of viruses, called Phycodnaviridae. The new family is one of about 60 recognized families of viruses. Genetically these are the most complicated viruses found to date. The discovery has resulted in the formation of many collaborative research projects with scientists at other institutions.

In 1986, Dr. Van Etten was named William Allington Distinguished Professor of Plant Pathology, and in 1992, he received the Outstanding Research and Creativity Award, the University of Nebraska system's highest research award. His research has received continuous NIH support. However, he says, "I am not a long-range planner. Doing creative research, you can find the totally unexpected and consequently you change research goals. Finding something totally unexpected is the ultimate thrill for a scientist." An example shows Dr. Van Etten's ability to explain scientific concepts. "Topoisom-

merases are enzymes that are a major target of anti-cancer drugs. Topoisomerases keep DNA from getting tangled up when it replicates. When a tumor grows, cells grow fast, and the DNA in the cell has to replicate quickly. However, if you inhibit topoisomerase activity, the DNA gets tangled up, and the tumor cells, essentially, stop growing. The viruses we work with encode the smallest known topoisomerase enzyme, yet the virus enzyme has all the properties of larger topoisomerases so drugs that inhibit this enzyme may keep tumors from growing."

He adds, "I find going to work every day a joy, even though others do most of the lab work now. I have very good people in the lab and nothing would happen without the graduate and undergraduate students, postdocs, technicians, and visiting scientists. I would like to be in the lab more, but now I spend most of my time talking about experiments, writing manuscripts and grant proposals. I have good colleagues, and I have no regrets about making my career in Nebraska. Nebraska has been good to me." Dr. Van Etten became a State Committee member in 1995. "I have a passion for science and believe that EPSCoR can continue to be a big help to develop science in Nebraska."

# Economic Development and Technology Transfer

## I. Nebraska Internship Program

During its third year, the Nebraska Engineering, Science and Technology Internship Program (NESTIP) had continued success linking students with private sector companies. The science, engineering, math, and technology students who serve as interns provide technical expertise to Nebraska companies. Thirteen students from UNK, UNL, UNO, Wayne State, and Nebraska Wesleyan participated in the program last year. Participating businesses included LI-COR Biosciences; Transcrypt International; Olsson Associates; i2rd; Natura Manu-

facturing, Inc.; Megabase Research Products; Goodyear Tire & Rubber Co.; Service and Product.Net, Inc.; Cash-Wa Dist. Co.; Kelly Industries, Inc.; Quality Practitioners, Inc.; Nebraska Turkey Growers Cooperative; and Lamp, Rynearson & Associates, Inc. The most recent Nebraska EPSCoR NSF grant continues NESTIP funding to benefit Nebraska students and businesses (see story below).

## II. R&D Partnerships

In addition to continuing NESTIP funding, the most recent NSF EPSCoR grant (see story below) initiates a new program to help solve a

specific problem identified by a Nebraska company where no scientific/academic solution is currently available, thus encouraging faculty from Nebraska's major research universities to work on industry R&D projects. EPSCoR anticipates awarding four competitive R&D partnership grants annually in the amount of \$25,000 each (to be matched by the industry partner). Nebraska businesses and tenured faculty at Nebraska research universities are eligible to compete for the grants. Proposals will be reviewed and ranked by a committee of industry and academic experts.

## EPSCoR Grants Received

### NSF

UNL, UNMC, UNO, and Creighton University (CU) will share a three-year \$9 million NSF Research Infrastructure Improvement (RII) grant. \$4.7 million will create the Metabolite Signaling Center at UNL. Center scientists from UNL and UNMC will study nutritional genomics to better understand the influence of chemicals in food on human growth and development. The scientists hope to discover ways of genetically enhancing crops for the benefit of humans and animals. \$1.6 million will establish the Nebraska Center for

Cell Biology at CU where researchers will investigate the dynamic behavior of cells using optical imaging technologies to develop expertise in applications of physics to cell biology and neuroscience. In collaboration with researchers at the UNL College of Engineering & Technology in Omaha, the project will make center instruments available to remote users. \$500,000 supports a planning grant for large-scale projects in nanomaterial science. Another \$500,000 funds a planning grant for a center at UNO where scientists from UNL and UNO will develop more secure mobile/wireless computing networks. In

### New Awards in 2003-04

DOE \$1M

NASA \$1.4M

NSF \$9M

NIH COBRE \$20.5M

NIH INBRE \$16M

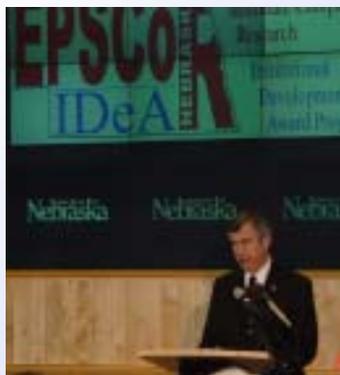
addition to supporting R&D Partnerships, the grant continues support for NESTIP as well as for outreach, minority, and women's programs (see story on pp.5-6).

### NIH

UNMC has received its largest award to date, a five-year \$16.9 million NIH Institutional Development Award (IDeA) program grant. This IDeA Networks of Biomedical Research Excellence (INBRE) grant promotes biomedical research in Nebraska by encouraging students to pursue biomedical research careers. UNMC was also awarded a five-year \$10.6 million NIH Centers of Biomedical Research Excellence (COBRE) grant to



Fred Choobineh, Prem Paul, Governor Johanns, and Richard Murphy at NSF grant press conference

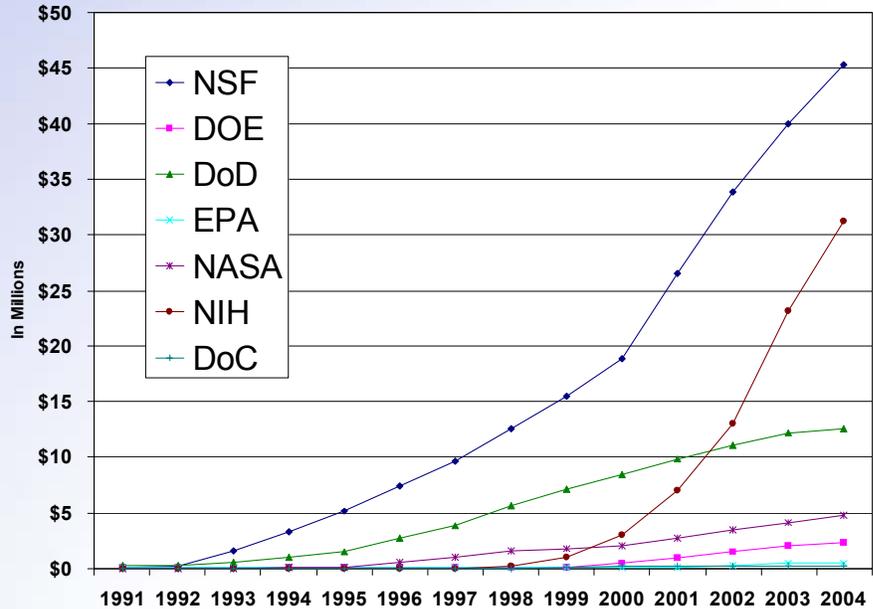


Governor Johanns congratulates EPSCoR on NSF grant

research neurosensory systems. Studying the relationship between neurosensory conditions and genes or their pathways, scientists at UNMC, CU, and Boys Town National Research Hospital will work toward treatment for vision, hearing, touch, and balance disorders. Additionally, UNMC received a five-year \$9.9 million NIH COBRE cancer research grant to improve understanding of cell signaling, the biochemical response of cells to their environments. The Nebraska Center for Cellular Signaling, created under the grant, supports five projects led by UNMC, UNL, and CU.

### DOE

A DOE EPSCoR grant, renewed last year, provides \$1 million over three years. The funds allow UNL scientists to continue working toward increased economic return and soil resource conservation through better understanding of carbon sequestration and crop productivity. Scientists use progressive farming practices that maximize nitrogen and water use efficiency. Their goals include increasing crop productivity and mitigating greenhouse gas concentrations.



Cumulative Federal R&D funds expended by Nebraska EPSCoR

### NASA

The Nebraska NASA EPSCoR program has been awarded a two-year continuation grant. The core funding for research infrastructure development and three projects including matching funds will total over \$2,838,000. The projects are: Airborne Remote Sensing (ARS), including study of cropland to define ways that remote sensing can contribute

to precision agriculture; Validated Numerical Models for the Convective Extinction of Fuel Droplets (CEFD), helping researchers contribute to clean, safe use of fossil fuels; and the Small Aircraft Transportation System (SATS), aiming to increase connectivity between remote communities and urban transportation centers by using general aviation airports to improve air access.

## Access Grid Nodes and PrairieFire Updates

Through the previous EPSCoR NSF RII grant, the University of Nebraska has implemented three access grid nodes at the UNL campuses in Lin-

coln and Omaha - one at the Walter Scott Engineering Building, one at the Kauffman Center and one at Peter Kiewit Institute in Omaha. A fourth

node (resulting from a current NSF Major Research Instrumentation (MRI) project) has been implemented at the Computer Science and Engi-



Access Grid Node at UNL Kauffman Center



Prairie Fire Supercomputer

neering Research Facility in downtown Lincoln. The Access Grid is a group-to-group interaction system to bring groups together simultaneously for large-scale scientific and technical collaborations, lectures,

and training. It is used at over 150 worldwide institutions.

At the Research Computing Facility (RCF), the PrairieFire Supercomputer ranks as the 291<sup>st</sup> most powerful supercomputer in the world

and the 28<sup>th</sup> in American academia according to the June 2004 TOP500 list. PrairieFire has been used to model mesoscale meteorological data and vehicle crashworthiness as well as to simulate molecular dynamics of fundamental chemistry and atomic

physics. The RCF is available to Nebraska researchers. The Access Grid Nodes, Prairie View, and PrairieFire hosted events including the Access Grid/Riled Wall Display Open House and PrairieFire tour and the UNL Summer Research Program.

## State EPSCoR Conference

The 2004 Nebraska EPSCoR Conference on Bioinformatics and Biomedical Computing was held in conjunction with Infotec 2004 on April 21 at Qwest Convention Center in Omaha. Organizers included the Nebraska Informatics Center for the Life Sciences (NICLS), Nebraska Biomedical Research Infrastructure Network (BRIN), and UNMC Eppley Cancer Center. Eugene Koonin of the National Center for Biotechnology Information (NCBI) gave the keynote speech. His speech, along with other conference talks, addressed achievements in bioinformatics, biomedical computing, and infrastructure development. By providing opportunities for communication and dissemination of current research results, the conference facilitated collaboration among researchers, educators, students, and entrepreneurs. Students

attended from Bellevue East High School, College of St. Mary, Creighton University, Dana College, Midland Lutheran College, Mount Mary College, Nebraska Wesleyan University, University of Kansas Medical Center, UNL, UNO, UNMC, and the University of South Dakota. The following organizations

were represented at the conference: Bass & Associates, Inc.; Commscope, Inc.; Gallup; LLCOR, Inc.; National Library of Medicine, NIH;

Nebraska EPSCoR; Nebraska Furniture Mart; Omaha Public Power Dis-



*Fred Choobineh,  
Lyle Middendorf,  
and Simon Sherman*



*Anguraj Sadanandam,  
Ph.D. student at  
UNMC and Haizhen  
Zhu, programmer  
analyst of the  
Bioinformatics Facility*

trict; Qwest; and Woodmen of the World Life Insurance Society.

## Outreach and Educational Activities

**Minority Research Programs** – Nebraska EPSCoR continued its commitment to recruit students from underrepresented groups by co-sponsoring the following programs for ethnic minority students in 2003 and 2004. The Summer Enrichment Program for Minority Undergraduate Students at UNMC had twenty-one students in 2003. Participants presented their research findings at various conferences. Two of the students were listed as co-authors on research publications. Of the three who have graduated, one was admitted to the UNMC Biomedical Research Training Doctoral Program, one to the UNMC Medical Technology Program, and another to the Meharry College of Dentistry Program. UNMC had 26 program participants in summer 2004. Of the two who have graduated, one has been entered the UNMC Medical Technology Program, and the other has entered the Biological Research Training doc-

toral program. In 2003, 10 high school students and six college students participated in the Summer Research Program for minority students at the Bioinformatics Facility at Creighton University where they learned about structural bioinformatics. Five high school students and six college students participated in 2004. The 2004 UNL Summer Research Program had 35 undergraduate participants in 2003. 2004 brought 32 participants from 14 colleges and universities across the nation. A kick-off weekend orientation familiarized this year's students with the university and Lincoln communities, introduced them to their mentors, encouraged them to pursue doctoral degrees, and introduced them to research methods. Also, 2004 participants gave oral and poster presentations at a research conference at Indiana State University.

**Women in Science Programs** – The second annual Women in Information Technology and Engineering program held April 16-17, 2004, offered interactive hands-on technological activities to high school students and faculty. The program, co-sponsored by EPSCoR, the Peter Kiewit Institute (PKI), and Union Pacific was a great success both this year and last. It gave high school girls a sense of excitement and engagement in technology-related fields while providing a continuing network for communication among students, teachers, and PKI personnel. Schools from throughout the state were represented by 24 students and 24 teachers. Additional summer camps in Information Technology focused on Women in IT as well as Diversity in IT and IT for Hearing Impaired.



*Little Priest Tribal College Geospatial Boot Camp 2004*

**EPSCoR Outreach to Tribal College** – EPSCoR continued its support in travel, technical assistance, and faculty development. NASA EPSCoR collaborated with

UNO in development of the Institute for Managing Applications in Geospatial Extension (Native IMAGE) at Little Priest Tribal College to help provide training in Geographic Information Systems and Remote Sensing, supply informational resources for well-mapping, land use, and precision agriculture, and support outreach efforts. Outreach activities included a Family Geoscience Program at Winnebago Public Schools, a community Geospatial Boot Camp, and a plan for integrating geosciences into the LPTC curriculum.

**Other Outreach Activities** – Nebraska EPSCoR provided partial or full support for the following activities: EPSCoR GK-12 Assistance Workshop; NASA EPSCoR Small Aircraft Transportation System (SATS) presentation at the National Business Aviation Association's conference workshop on Aviation Insurance; Math/science camps for Native American students; ACM Programming Contest; Build a Human project for Omaha area junior high school students and their teachers; and faculty attendance at conferences and workshops.



*Summer research participant Yana Legrand*

## Nebraska EPSCoR: Changes

Former Nebraska EPSCoR director Royce Ballinger writes from the 12<sup>th</sup> hole at Heritage Highlands golf course in Tucson, Arizona, "My house is back toward the mountains about three blocks from the houses you see above the waterfall."

Fred Choobineh, former assistant director, assumed the duties of Nebraska EPSCoR director in January 2004. Dr. Choobineh is a professor of Industrial and Management Systems Engineering at UNL where he also holds a courtesy appointment as a professor of Management. His teaching awards include the Nebraska Legislator Award for Distinguished Teaching in the College of Engineering. Dr. Choobineh received his B.S. in Electrical Engineering, Masters of Engineering, and Ph.D. in Industrial Engineering from Iowa State Univer-

sity, Ames, Iowa. A registered Professional Engineer in Nebraska, who serves on the state Board of Engineers and Architects, he is also a Fellow of the Institute of Industrial Engineers and former president of the UNL Academic Senate.

Gaynell Gavin has joined EPSCoR to fill the position of communication specialist. Dr. Gavin obtained her Ph.D. in English from UNL in 2003. She was a visiting assistant professor of writing at Grand Valley State University in southwest Michigan until joining EPSCoR.



*Royce Ballinger enjoying retirement*



*Ballinger, Roth, Simmitt, Choobineh*



*Gaynell Gavin*

**Summer research. . .connecting students and mentors  
...who have a passion for science.**



*Caronda Moore with mentor Dr. Becker*



*Craig Daly recently transferred to UNL*



*Richard Ancheta in research lab*

## Nebraska EPSCoR Newsmakers

**Stephanie Adams** (EPSCoR Minority Coordinator) received the Janice A. Lumpkin Educator of the Year Award from the National Society of Black Engineers. Dr. Adams also received a UNL Chancellor's "Fulfilling the Dream" Award.

**Richard Baier** (State Committee member) accepted the position of director for the Nebraska Department of Economic Development.

**Judith Christman** (Metabolite Signaling Center area co-leader and State Committee member) and Timothy Greiner, will head a UNMC project funded by an \$890,000 three-year grant from the Lymphoma Research Foundation.

**Yuris A. Dzenis** (past DEPSCoR grantee) was awarded the first R. Vernon McBroom College of Engineering and Technology Professorship at UNL, providing him a \$20,000 annual research and salary stipend for five years with possible renewal.

**Sebastian Elbaum** (ERP group) received a prestigious NSF CAREER Award for \$399,994 over the next five years.

**Priscilla Grew** (former NSF Co-Project Director and former State Committee member) was named director of the University of Nebraska State Museum and still holds an appointment as a professor of geosciences at UNL.

**Natale "Ned" Ianno** (nano-material science area leader) received the Blackmann-Lederer College Professorship at UNL in recognition of his principled research and teaching.

**Alan Kamil** (past NSF EPSCoR cluster leader) was recognized with a UN Outstanding Research and Creative Activity Award. His work focuses on birds' cognitive abilities.

**Lyle Middendorf** (State Committee member) was one of five alumni chosen as UNL Masters in recognition of passion for their work.

**Al Wenstrand** (former State Committee member) left his position as director of the Nebraska Department of Economic Development to become executive director of Florida's Great Northwest, Inc.

**Charles Wood** (director of the NIH COBRE Nebraska Center for Virology at UNL) earned the distinction of University Professor and received a \$2.6 million NIH grant for continued HIV and herpes-related research at the center.

**Xi Yang** (former Ph.D. student with SDI group) received the 2004 Outstanding Graduate Research Assistant Award from the UNL Dept. of Computer Science and Engineering.

**Xiao Cheng Zeng** (nano-materials scientist) received a Guggenheim Fellowship for his research in novel nano-structures of silicon.

# State EPSCoR Committee Members

Dr. Robert Allington, Chair, Senior VP & Chief Scientific Officer, Teledyne Isco, Inc., Lincoln

Dr. Lee Jones, Vice Chair, Executive Vice President and Provost Emeritus, University of Nebraska

Dr. Dennis Alexander, Director, Center for Electro-Optics & Kingery College Professor of Electrical Engineering, UNL

Mr. Richard Baier, Director, Nebraska Department of Economic Development

Dr. Thomas Bragg, Associate Vice Chancellor for Research & Dean of Graduate Studies, UNO

Dr. Michael Cherney, Professor of Physics, Creighton University

Dr. Judith Christman, Stokes-Shackelford Professor & Chair, Department of Biochemistry & Molecular Biology, UNMC

Dr. F. Joseph Daugherty, Management Consultant, Omaha

Mr. Lyle Middendorf, Sr. Vice President & Chief Technical Officer, Advanced Research & Development, LI-COR, Inc., Lincoln

Dr. Richard Murphy, Chairman, Biomedical Sciences, Creighton University

Dr. Jay Noren, Executive Vice President and Provost, University of Nebraska

Dr. Prem Paul, Vice Chancellor for Research & Dean of Graduate Studies, UNL

Mr. Herman Person, Director, Corporate Product Development, Vishay Dale, retired, Columbus

Dr. Ron Raikes, State Senator, State of Nebraska

Dr. Thomas Rosenquist, Vice Chancellor for Research, UNMC

Dr. David Sellmyer, Director, Center for Materials Research & Analysis and George Holmes Distinguished Professor, Physics & Astronomy, UNL

Dr. James Van Etten, William Allington Distinguished Professor of Plant Pathology, UNL

Dr. Ilze Zigurs, Mutual of Omaha Distinguished Chair of Information Science & Technology, UNO



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**Ms. Karla Roth,** Administrative Assistant

**Ms. Nancy Simnitt,** Administrative Technician