W. M. Keck Foundation Invests in Biotechnology at ISU

The W. M. Keck Foundation of Los Angeles has awarded two major grants totaling $2.2 million to Iowa State University. The Foundation was established in 1954 by William Myron Keck, founder of the Superior Oil Company. It is one of the nation's largest philanthropic organizations, with assets of more than $1 billion.

Mr. Keck envisioned a philanthropic institution that would provide far-reaching benefits for humanity. By taking a bold, creative approach to grantmaking, he created a legacy that the Foundation upholds today.

The Foundation has focused on five broad areas: science and engineering research, undergraduate science and engineering, medical research, liberal arts, and southern California.

Laboratory for the Fabrication of Microminiaturized Instrumentation

The first Keck grant of 1.2 million was awarded to ISU for the establishment of the Laboratory for the Fabrication of Microminiaturized Analytical Instrumentation, part of Iowa State's Microanalytical Instrumentation Center (MIC).

The lab allows the miniaturization of analytical instruments, such as table-top sized chemical separation devices like a chromatograph. Miniatuirizing this equipment will allow researchers to explore environments not easily accessible to humans, such as space travel. A micro-miniaturized chromatograph system could play a vital role in the recycling of water from cabin humidity and bodily wastes, an essential step to any long-term space flight.

Marc Porter, an ISU professor of chemistry and director of the MIC, said additional projects for the new lab include further development of an atomic force microscope that one day could require only a single molecule for disease detection, facilitate research into how cells communicate with each other, and aid in the development of new methods for determining the relative health of a person from a single blood cell.

“Reflecting W. M. Keck's life as a pioneer, innovator, and risk taker, the Keck Foundation seeks out research, such as Iowa State's Laboratory for the Fabrication of Microminiaturized Analytical Instrumentation, because it is opening new directions in science,” said Maria Pellegrini, Keck program director. “The Foundation is happy to participate in these efforts at Iowa State.”

Metabolomics Research Laboratory

More recently, a $1 million dollar grant from the W. M. Keck Foundation to the Center for Designer Crops helped to create the Metabolomics Research Laboratory, which was dedicated June 3, 2004. Iowa State University provided another $1.3 million in support of the project.

The Keck Foundation funds have been used to purchase equipment, hire a laboratory supervisor, and provide seed money to foster collaborative, multidisciplinary research activities among chemists, engineers, and biologists.

The Iowa State contribution was used to renovate a 900-square-foot space in the Molecular Biology Building for the laboratory and will make it possible to hire two faculty members with expertise in metabolomics.

The W. M. Keck Metabolomics Research Laboratory is designed to provide biologists state-of-the-art analytical capabilities for deciphering the underlying molecular processes that determine how organisms grow and develop.

Metabolomics uses sophisticated analytical instruments to accurately measure, en masse, the molecules (metabolites) that make up an organism. Metabolites are the building blocks of all biological products, including those important to agriculture like oils and sugars. Metabolomics has the potential of revealing how the genome of an organism controls and regulates the metabolism that maintains biological form and function.

“This grant is very significant to the university because it enables us to launch a new program in metabolomics research. It's an exciting area and we're very pleased that the Keck Foundation recognizes its potential to impact the production of high quality food and feed in Iowa agriculture,” said Stephen Howell, director of the Plant Sciences Institute.
The Metabolomics Research Laboratory will bring together three groups of Iowa State researchers: chemists with expertise in microchemical analysis, engineers with expertise in the development of microelectromechanical systems (MEMS) devices, and plant biologists with expertise in functional genomics of plant metabolism.

“The chemists and engineers will develop enabling technologies that will be used by the plant biologists in functional genomics research,” said Basil Nikolau, Professor-in-Charge of the W. M. Keck Metabolomics Laboratory. “Initially, 17 faculty from eight departments will use the laboratory and collaborate on interdisciplinary research.”

The Keck Foundation has a history of supporting projects that lead to scientific advances and new technology development. Since its founding in 1954, the Foundation has awarded more than $550 million in grants. More information is available at http://www.wmkeck.org.

ISU Office of Biotechnology Awards 21 New Graduate Fellowships

The Office of Biotechnology at Iowa State University has awarded fellowships to 21 incoming graduate students working toward careers in biotechnology research. The fellowships, totaling $253,000, help the university attract outstanding graduate students by providing financial support to departments and interdisciplinary programs. The Office of Biotechnology has awarded 176 graduate fellowships since 1994.

The fellowships are awarded to exceptional students nominated by 30 Iowa State academic departments or interdisciplinary programs involved in biotechnology research. Fellowship recipients are selected by faculty serving on the university’s Biotechnology Council.

Student nominees are rated on a number of factors, including grade point average, Graduate Record Exam scores, letters of recommendation, science background, research experience and scholarly publications. Students awarded fellowships perform research on a biotechnology-related project while working towards M.S. or Ph.D. degrees. To help them discover their research interests, students can rotate among several projects during the first year of the fellowship.

The following 21 incoming graduate students were awarded biotechnology fellowships:

**Biochemistry, biophysics and molecular biology**
Biswa Joy Chaudhuri  
Chenguang Fan  
Shouqiang Cheng  
Jianson Tong

**Bioinformatics and computational biology**
Choongseo Chung  
Huang Yong  
Matthew Studham  
Peter Zabeck

**Chemical engineering**
Matthew Aspelund

**Ecology and evolutionary biology**
Christopher Chandler  
Amanda Sparkman

**Horticulture**
Chuanhe Yu

**Immunobiology**
Yu Liu  
Lijie Zhai

**Interdepartmental genetics**
Xiaoling Song  
Chengliang Zhang

**Microbiology**
Lindsay Nielsen  
April Rohlik

**Molecular, cellular and developmental biology**
Jing Jin

**Toxicology**
Hailin Tang

**Veterinary pathology**
Rachel Derscheid

By Glenda Webber, Office of Biotechnology, Communications

Iowa State’s Biotechnology Start-up Awards Top 100

Iowa State University’s Office of Biotechnology awarded 11 start-up fund packages this year, bringing the total number of start-up awards to 100. The funds are used by newly-hired scientists to establish their research programs at Iowa State.

The 11 awards, totaling $1.1 million, were made through the faculty recruitment program begun by the Office of Biotechnology in 1986. To date, the office has provided more than $11.5 million to 100 new scientists in 21 academic departments. These scientists have brought millions of dollars to Iowa State by obtaining additional funds from external granting agencies.

“Iowa State has built a core of faculty who value an interdisciplinary approach to biotechnology research for Iowa and the world,” said Walter R. Fehr, Charles F. Curtiss Distinguished Professor in Agriculture and director of the Office of Biotechnology. “The start-up funding program has made it possible for the university to attract outstanding individuals.”

The research projects of this year’s 11 new faculty recipients are described below.

- **Thomas Bobik**, biochemistry, biophysics and molecular biology; focuses on how vitamin B12 is metabolized in humans and in *Salmonella* bacteria. His research has contributed to diagnostic genetic tests for human metabolic diseases. His research may be applied in the field of biorenewable resources to modify microbes for the production of economically valuable compounds. He has a joint appointment in the College of Agriculture and the College of Liberal Arts and Sciences.

- **Byron Brehm-Stecher**, food science and human nutrition, has a strong background in the molecular detection of food pathogens. His research interests include developing new approaches for detecting *Salmonella*, *Campylobacter*, and *Yersinia* bacteria on surfaces and in food. Brehm-Stecher is conducting his research in the College of Family and Consumer Sciences.
By Glenda Webber, Office of Biotechnology, Communications

• **Anne Bronikowski**, ecology, evolution and organismal biology; is investigating the molecular basis of variation in animal species. Her current research focuses on genes related to aging. Bronikowski is affiliated with the College of Liberal Arts and Sciences.

• **Clark Coffman**, genetics, development and cell biology; studies embryo development in Drosophila fruit flies. The fruit fly is used as a model system in many biological laboratories. Coffman’s research interests include how genes regulate germ cell migration in the early stages of fruit fly development. He is affiliated with the College of Agriculture and the College of Liberal Arts and Sciences.

• **Matthew Ellinwood**, animal science, conducts research in companion animal genomics. He is studying the molecular techniques needed in gene therapy. One research interest is how to apply these techniques to studying genetic diseases in dogs. Ellinwood is in the College of Agriculture.

• **Dennis Lavrov**, ecology, evolution and organismal biology; specializes in understanding molecular variation in the mitochondrial genomes of animals and applying what he learns to many different species. Lavrov conducts his research in the College of Liberal Arts and Sciences.

• **Diane Moody**, animal science, is working to identify the location of genes important to animal agriculture. Her current research involves genes associated with bone mineralization and muscle in chickens. She is affiliated with the College of Agriculture.

• **Christine Petersen**, veterinary microbiology and preventive medicine, studies diseases caused by parasites around the world. As part of her position at Iowa State, she serves as a liaison between the university and other organizations interested in public health, emerging diseases and the study of global parasites. Peterson is in the College of Veterinary Medicine.

• **Nicole Valenzuela**, ecology, evolution and organismal biology; is an evolutionary biologist specializing in the molecular basis of variation among species. Her research focus is the phenomenon of how temperature can determine whether some amphibians become males or females. Valenzuela conducts her research in the College of Liberal Arts and Sciences.

• **Yanhai Yin**, genetics, development and cell biology; is studying how steroid hormones called brassinosteroids control plant development. What he learns could contribute to understanding how plants respond to environmental stress. Yin is in the College of Liberal Arts and Sciences.

• **Edward Yu**, physics, is an expert on membrane proteins. He uses crystallographic techniques to study biological structures, such as those involved in how drugs bind to cell membranes. Yu is a new faculty member in the College of Liberal Arts and Sciences.

**Sixth Annual Career Day Scheduled**

Biotechnology Career Day has been bringing Iowa State students and the state’s top biotechnology companies together for five years, and this October 20 will make six.

Held in the atrium of the Molecular Biology Building, one of the central research and teaching hubs for biotechnology on campus, Biotechnology Career Day is a unique opportunity for companies to focus specifically on the audience they look to hire, from undergraduates to post-doctoral students.

Since the first Biotechnology Career Day in 1999, more than 1,500 students have brought their resumes to the event, looking for positions with attending companies. Each year, they represent more than 30 majors in five colleges. Majors include agronomy, chemical engineering, and molecular biology.

“Biotechnology companies in Iowa are among the best in the nation, and Iowa State students are among the best prepared for working in the industry. Biotechnology Career Day is an important link between companies and the students who may become their employees,” said Lisa Lorenzen, ISU Biotechnology Industrial Liaison and coordinator of the event.

Doug Getter, president of the Iowa Biotechnology Association, which co-sponsors the event, said it is important for Iowa’s biotechnology companies to connect to students through events like Career Day. “In order for students to know what Iowa has to offer in the field of biotechnology, companies need to showcase their strengths in research and development,” he said. “Biotechnology Career Day is a simple and effective way to bring the message that Iowa is the place for biologists.”

There is no fee for companies to participate in the 2004 Biotechnology Career Day. Companies are provided booth and storage space, electricity access upon request, and free lunch. The event is held from 9:00 a.m. to 3:30 p.m.

For more information about Biotechnology Career Day, contact Lisa Lorenzen at 515-294-0926, llorenze@iastate.edu or Lora Bierbaum at 294-8700, lora@iastate.edu. Companies can register online at www.industry.iastate.edu/biotechcareerday/.

**Upcoming Events**


**October 20** — 6th Annual Biotechnology Career Day. Molecular Biology Building on the ISU campus, Ames, IA. A unique opportunity for companies to focus specifically on the audience they look to hire, from undergraduates to post-doctoral students. More information: above or online at www.industry.iastate.edu/biotechcareerday/.

(Cont., page 4)
October 22-23 — Third Biennial All-Iowa Virology Symposium at ISU’s Reiman Gardens. The symposium provides a forum to highlight virology research in Iowa and to enhance links between virologists. Research in Iowa virology labs will be featured with special emphasis on graduate student and postdoctoral study. Deadline for on-line registration is Sept. 24. More information: www.ent.iastate.edu/iowavirology/


Research Update

The following are a subset of the grants recently awarded for biotechnology-related research at ISU. For more information about establishing research relationships with ISU biotechnology researchers, contact Lisa Lorenzen at llorenze@iastate.edu.

Buss, J. and Gilbert, J. Biochemistry, Biophysics and Molecular Biology and IPRT. Smart Probes for Imaging Cancer. Molecular Express

Hargrove, M. Biochemistry, Biophysics and Molecular Biology. Structure and Function of Human Hexacoordinate Hemoglobin. National Institutes of Health

Johnson, L. and Wang, K. Food Science and Human Nutrition and Agronomy. Plant Biotechnology—Iowa: Technologies to Recover Recombinant Proteins from Plants for Use as Therapeutics and Industrial Enzymes. Department of Agriculture

Nikolau, B. Biochemistry, Biophysics and Molecular Biology. Functional Genomics of Soybean Seed Composition. Pioneer Hi-Bred International

Nilsen-Hamilton, M. Biochemistry, Biophysics and Molecular Biology. LPS-Specific Aptimers for Microbial Detection. National Institutes of Health

Shin, Y. Biochemistry, Biophysics and Molecular Biology. Yeast Snare Assembly and Membrane Fusion. National Institutes of Health

Gene Delivery Mechanisms Using Methacrylic Copolymers

Researchers have developed methods and materials for delivery of genetic material using synthetic copolymers. The copolymers are water soluble, pH-sensitive and capable of thermoreversible gelation. The copolymers are constructed by polymerization of tertiary amine methacrylate with either a (poly(ethylene oxide)-b-poly(propylene oxide)-b-poly(ethylene oxide) polymer, such as the commercially available Pluronica polymers, or a poly(ethylene glycol) methyl ether polymer, or a poly(ethylene glycol) containing methacrylate. Delivery of genetic materials is achieved by contacting cells to be transformed with a vector including the genetic material and the copolymers. ISURF #2953

Available Technologies

Iowa State University is seeking industrial partners to develop and/or commercialize the following technologies. For more information and for a complete listing of all available technologies, contact the Office of Intellectual Property and Technology Transfer at 515-294-3893 or www.iastate.edu/~isurf .

Gene Delivery Mechanisms Using Methacrylic Copolymers

Researchers have developed methods and materials for delivery of genetic material using synthetic copolymers. The copolymers are water soluble, pH-sensitive and capable of thermoreversible gelation. The copolymers are constructed by polymerization of tertiary amine methacrylate with either a (poly(ethylene oxide)-b-poly(propylene oxide)-b-poly(ethylene oxide) polymer, such as the commercially available Pluronica polymers, or a poly(ethylene glycol) methyl ether polymer, or a poly(ethylene glycol) containing methacrylate. Delivery of genetic materials is achieved by contacting cells to be transformed with a vector including the genetic material and the copolymers. ISURF #2953

Iowa State University Biotechnology Update
Volume XVIII, Issue 5 October 2004

Published six times a year by the ISU Office of Biotechnology, 1210 Molecular Biology Building, Ames, Iowa 50011-3260. To subscribe, telephone 515-294-9818, fax 515-294-4629, or send an e-mail to biotech@iastate.edu. Homepage at www.biotech.iastate.edu

Charles F. Curtiss Distinguished Professor of Agriculture and Director of the Office of Biotechnology
Walter R. Fehr

Director of Industry Relations and Biotechnology Liaison
Lisa Lorenzen

Editor and Designer
Camie J. Stockhausen

Iowa State University does not discriminate on the basis of race, color, age, religion, national origin, sexual orientation, sex, marital status, disability, or status as a U.S. Vietnam Era Veteran. Any persons having inquiries concerning this may contact the Director of Affirmative Action, 318 Beardshear Hall, 515-294-7612.