

Plant Sciences Institute UPDATE

Business set to bloom in new building

The ground has been prepared to grow new business at Iowa State.

The Roy J. Carver Co-Laboratory, centerpiece of the Plant Sciences Institute's drive to develop plant-based technology and products, will be dedicated October 18.

It's called a co-laboratory because it encourages academic and industry researchers to collaborate, said Stephen Howell, the institute's director.

Much of that will take place at the Innovations Development Facility housed in the \$17 million building. "It's a place to promote business development for faculty, staff and students, and to bring scientists in the public and private sectors together," Howell said.

Cheryl Kamman will direct the facility. She previously was a program coordinator for the Office of Intellectual Property and Technology Transfer.

The institute's headquarters moved to the building in July. Several researchers also had moved into laboratories by the end of the month.

The Innovations Development Facility is ready and waiting. Howell happily shows off six business incubators that include laboratories, offices and conference rooms. The incubators are adjacent to academic labs and the two share an "interaction area"

where researchers can gather.

Start-up businesses also will have access to common facilities, such as analytical equipment, the Pioneer Hi-Bred International Genomics Laboratory, and environmentally controlled plant growth chambers.

"Because it is a publicly supported facility, the space will be made available competitively," Howell said. Faculty, staff and students will submit proposals and Kamman and an advisory committee will select the most promising ones.

"The facility will allow faculty and students to commercialize their research in a transitional setting—much like a standard university laboratory," Howell said. It will work with Iowa State's Pappajohn Center for Entrepreneurship to help faculty develop business plans and launch new enterprises.

The Public/Private Partnership Program is the other part of the Innovations Development Facility. It will attract scientists from established Iowa industries to conduct collaborative research on site with Iowa State scientists.

"The mix of scientists from academe and Iowa industry should make an exciting climate for stimulating scientific exchange and nurturing start-up businesses," Howell said.

The Co-Laboratory also will house a

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Art grows at Roy J. Carver Co-Lab

Art at the Roy J. Carver Co-Lab will mix the contemporary and historic.

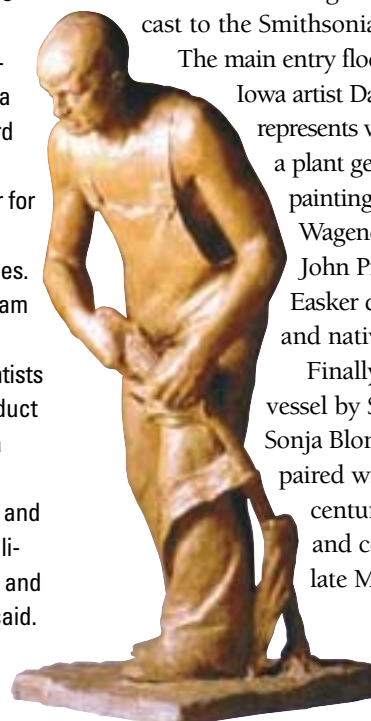
At the north and west entrances, sculptures by University of Northern Iowa Professor Thomas Stancliffe will suggest germinating seedlings, said Lynette L. Pohlman, director, University Museums at Iowa State.

Inside, visitors will see *Cornhusker*, a bronze casting of a statue by Christian Petersen. Iowa State gave the first bronze cast to the Smithsonian Institution.

The main entry floor mosaic by

Iowa artist David Dahlquist represents ways of illustrating a plant genome. Landscape paintings by Iowans Ellen Wagener, Gary Bowling, John Preston and Fred Easker depict row crops and native grasses.

Finally, a modern glass vessel by Seattle artist Sonja Blomdahl will be paired with a 19th century Pueblo water and corn jar by the late Maria Martinez.



Cornhusker, 2001 casting of 1941 original bronze.



Feeding the world

In our world of easy living, it seems incomprehensible that 24,000 people in developing countries die every day of malnutrition. The situation will worsen as the earth's population grows by a quarter million people each day.



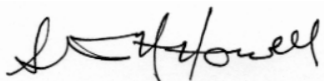
Feeding the growing world presents enormous challenges and many new practices, including those

derived from agricultural biotechnology, will be needed to ensure food security. Ag biotechnology can develop new crops for better nutrition, including higher protein and better mineral and vitamin content. "Biotech" crops also can better resist disease, ward off predators, withstand drought and produce on poorer soils while using less fertilizer and pesticides.

Some American scientists are concerned that developing countries may be unable to reap the benefits of ag biotechnology because of constraints arising from freedom-to-operate (FTO) and intellectual property (IP) issues. A well-publicized example is "golden rice," a biotech grain with enhanced provitamin A content made to ameliorate vitamin A deficiencies that cause blindness and birth defects in developing countries. More than 40 patents or contractual obligations had to be negotiated to develop golden rice for commercialization in the Third World.

To address this problem, a consortium of public research institutions, aided by the Rockefeller and McKnight Foundations, have established an initiative called the Public-Sector Intellectual Property Resource for Agriculture (PIPRA). Iowa State has signed a memorandum of understanding supporting PIPRA, which pledges to help make university inventions and germplasm available to developing countries for humanitarian purposes.

PIPRA is a noble cause and has the support of the Plant Sciences Institute.



Stephen Howell
Director

Symposium draws diverse crowd

Almost 300 scientists from 55 countries discussed the relationship of plant breeding and biotechnology at an August symposium honoring a foremost plant-breeding expert.

Using biotechnology in traditional plant breeding was one of the central themes at the Arnel R. Hallauer International Symposium on Plant Breeding in Mexico City, Iowa State Agronomy Professor Kendall Lamkey said.

"We're starting to see the first data to show how biotech can improve the effectiveness of plant breeding programs," he added.

The International Maize and Wheat Improvement Center (CIMMYT), the Iowa State College of Agriculture and several private companies hosted the program. Lamkey is one of six Iowa State faculty members who participated, including Hallauer, a retired Charles F. Curtiss Distinguished Professor in Agriculture and former director of the Raymond F. Baker Center for Plant Breeding at Iowa State.



Arnel Hallauer, symposium honoree, in a test plot near CIMMYT, Mexico City.

Hallauer's influence on plant breeding, particularly through education, was a focal point throughout the five-day meeting, Lamkey said. Hallauer, a member of the National Academy of Sciences, trained nearly 100 graduate students from around the globe.

New faculty member's research makes everyday enzyme exciting

Gustavo MacIntosh is finding new functions for old enzymes. MacIntosh, who joined the biochemistry, biophysics and molecular biology faculty at Iowa State this August, focuses on secreted ribonucleases (RNases). RNases are enzymes that cleave RNA, one of the molecules vital to gene expression. Secreted RNases

often have been overlooked because they're not found where RNA usually is thought to be.

"They were considered kind of boring," with a routine function as nutrient recyclers, MacIntosh said. His research, however, has shown that besides nutrient recycling, secreted RNases also are involved in cell growth and response to stress. More importantly for agriculture, they also could be part of the defense response against pathogens.

MacIntosh will work in the Center for Designer Crops.



Secreted RNases in plants intrigued Gustavo MacIntosh because they're found in every organism from bacteria to humans. The enzymes were believed to have unimportant roles in cell function, but his research has found they're involved in many processes.

Students test bioinformatics in summer institute

Matthew Wilkerson came to Ames thinking he would move home to Bethesda, Maryland, or to South Bend, Indiana, where he'd just earned a bachelor's degree from Notre Dame University, come fall.

Instead, he's staying. After attending the 10-week Summer Institute in Bioinformatics and Computational Biology, he'll work with Volker Brendel for at least a year.

It's the effect Brendel hoped the institute would have.

"The charge of this program is to get young people interested in bioinformatics as a career," said Brendel, a professor in the Department of Genetics, Development and Cell Biology and the Department of Statistics.

The Laurence H. Baker Center of Bioinformatics and Biological Statistics, a center of the Plant Sciences Institute, received \$645,000 from the National Science Foundation and National Institutes of Health to conduct the institute for four years.

Bioinformatics analyzes mountains of information coming out of genetic analyses, such as DNA sequencing and gene expression testing.

Students in the workshop, which ended August 7, began with a course on fundamental methods in bioinformatics and computational biology, applications to prominent research problems and recent accomplishments in genomics and



The Summer Institute in Bioinformatics and Computational Biology concluded with a poster presentation on August 7. From left, Amy Nienaber, Riverdale, Iowa; Robert Jernigan, Director, Laurence H. Baker Center for Bioinformatics and Biological Statistics, Iowa State; and Matthew Beard, Stevens Point, Wisconsin.

bioinformatics.

The 10 students also worked with Iowa State faculty and their research groups on specific projects. They presented posters detailing their results on the institute's last day.

Wilkerson graduated in biological science, but he'll work as a programmer. He said the institute helped him connect classroom learning with real-life problems.

"The most important pieces of information I learned are the latest and the greatest" research and techniques. He worked with Brendel to compare the genomes for rice and Arabidopsis, a model plant, and find a specific kind of

intron. Introns are non-coding sections of DNA that may have a role in protein evolution. Wilkerson wrote computer scripts that compared sequence information.

The workshop also had an impact on Ellen Wei, a recent graduate of the California Institute of Technology in Pasadena.

"I was going to a biology program. After being here, I decided I liked it," said Wei, who worked with Iowa State Computer Engineering Professor Srinivas Aluru. She's changed to computational molecular biology and is attending the University of Southern California this fall.

Business set to bloom/CONTINUED

state-of-the-art proteomics facility, capable of identifying single proteins from complex mixtures containing thousands of proteins. "The proteomics facility could serve as the analytical arm for protein purification research in plant and animal systems," Howell said.

A high-containment greenhouse also will be added to the building. It's designed to safely contain highly experimental crops such as ones producing biopharmaceuticals.

The facility is named for the Roy J. Carver Charitable Trust of Muscatine, Iowa, which provided the \$3 million lead gift.

Dedication scheduled

Iowa State President Gregory Geoffroy will be among dignitaries present on October 18 to dedicate the Roy J. Carver Co-Laboratory. Activities begin at the Co-Lab three hours before the Iowa State–University of Texas football game. Tours will be available after the ceremony.

Borlaug interns return with new dedication

Eight weeks at the International Maize and Wheat Improvement Center (CIMMYT) have strengthened the commitment of two Borlaug interns, Jenny Hawkins and Arlene Lee, to international agriculture.

Hawkins, an agronomy and environmental science major from Adel studied low-till cultivation and nitrogen. Lee, an ag biochemistry major from Fertile, helped map a *Bacillus thuringiensis* (BT) gene.

Recent research grants

The following 24 new grants totaling \$4.2 million were awarded recently to plant science researchers at Iowa State.

The Role of Starch in Nectar Production

National Science Foundation—\$226,000
(R. Thornburg, biochemistry, biophysics and molecular biology)

High B-Carotene Maize to Alleviate Vitamin A Deficiency in Sub-Saharan Africa: Effects of Processing and Retinol Activity Equivalence

Centro Internacional de Agricultura Tropical (CIAT)—\$182,763
(W. White, food science and human nutrition)

Evaluating and Improving CROPGRO-Soybean and CERES-Maize Models for Predicting Growth and Response to Climate Change Factors

University of Florida/DOE—\$72,177
(W. Batchelor, agricultural and biosystems engineering)

Plant GDB—Plant Genome Database and Analysis Tools

National Science Foundation—\$55,196
(V. Brendel, genetics, development and cell biology)

Utilization of Genetics, Breeding and DNA Technologies to Develop Wheat That Is Resistant to Multiple Disease and Pests

USDA—\$24,520
(W. Miller, plant pathology)

Bone Response to Soy Isoflavones in Women

National Institutes of Health—\$522,088
(L.D. Alekel, food science and human nutrition)

A Transposon-Based System for Site-Specific Recombination in Arabidopsis

National Science Foundation—\$301,618
(T. Peterson, genetics, development and cell biology)

Development of Management Strategies to Control Major Soybean Virus Diseases in the North Central States

North Central Soybean Research Program—\$225,000
(J. Hill, plant pathology)

Genomics of Rice Susceptibility in Bacterial Diseases

National Science Foundation—\$212,157
(A. Bogdanove, plant pathology)

Control of Cap-Independent Translation of a Viral 3'UTR

National Institutes of Health—\$210,086
(W. Miller, plant pathology)

QTL Dissection of Variance Sources for Long-Term Selection

USDA—\$175,000
(J. Jannink, agronomy)

Recombination Mechanisms in Maize

USDA—\$145,000
(P. Schnable, agronomy)

Discovery of Protein Sequence Structure and Function Relationships

National Institutes of Health—\$144,620
(V. Honavar, computer science)

Regulation of Shoot Development in Arabidopsis

National Science Foundation—\$132,063
(S. Howell, genetics, development and cell biology)

Collaborative Research: Metabolic Engineering of Hairy Roots for Alkaloid Production

National Science Foundation—\$81,424
(J. Shanks, chemical engineering)

Chemical Biology of Glycopolymer and Deoxysugar Biosynthesis Using Mass Spectrometry

Research Corporation—\$75,000
(N. Pohl, chemistry)

Enhancing the Microbial Safety of Fresh and Fresh-Cut Melon

University of California-Davis/USDA—\$43,592
(A. Mendonca, food science and human nutrition)

Study on Starch Utilization in Brewing

Anheuser-Busch, Inc.—\$30,000
(J. Jane, food science and human nutrition)

From Source to Target: A Collaborative Search for the Signal

National Science Foundation—\$29,321
(D. Hamapel, horticulture)

Establishment of Robust Maize Transformation Systems for the Public

National Science Foundation—\$836,465
(K. Wang, agronomy)

Target Specificity of the Yeast Retrotransposon Ty5

National Institutes of Health—\$245,280
(D. Voytas, genetics, development and cell biology)

Transcriptional Control of the Competence Phase in Shoot Development

USDA—\$150,000
(S. Howell, genetics, development and cell biology)

ITR: Algorithms and Software for Knowledge Acquisition from Heterogeneous Distributed Autonomous Data Sources

National Science Foundation—\$60,000
(V. Honavar, computer science)

Engineering Carbohydrate Polymers for Value-Added Products from Agricultural Feedstocks

Petroleum Research Fund, American Chemical Society—\$40,000
(N. Pohl, chemistry)

Plant Sciences Institute UPDATE

The Plant Sciences Institute Update is published four times each year by the Plant Sciences Institute at Iowa State University, 1060 Roy J. Carver Co-Laboratory, Ames, Iowa 50011-3650; phone 515 294-5255.

The Plant Sciences Institute at Iowa State University is dedicated to becoming one of the world's leading plant science research institutes. More than 200 faculty from the College of Agriculture, the College of Liberal Arts and Sciences, the College of Family and Consumer Sciences, and the College of Engineering conduct research in nine centers of the institute. They seek fundamental knowledge about plant systems to help feed the growing world population, strengthen human health and nutrition, improve crop quality and yield, foster environmental sustainability and expand the uses of plants for biobased products and bioenergy. The Plant Sciences Institute supports the training of students for exciting career opportunities and promotes new technologies to aid in the economic development of agriculture and industry throughout the state. The institute is supported through public and private funding.

To be added to our mail list, e-mail psidir@iastate.edu.

On the Web at <http://www.plantsciences.iastate.edu/>



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