

Plant Sciences Institute UPDATE

New board holds first meeting

Thirteen leaders of agricultural industry, plant sciences research, commodity groups and government have been named to the Board of the Plant Sciences Institute. The group held its inaugural meeting, October 22, at Iowa State.

The board discussed the institute's strategic plan, accomplishments, financial reports and budget plan.

"The board represents many diverse areas and stakeholders, and brings together renowned scientists and business leaders. It provides us with a vision and input from many different perspectives," said institute director Stephen Howell.

"After the first meeting, it's clear that the board will be very active in the institute. It's a very participatory group. They want to do what they can for the institute," Howell said.

Rick McConnell, president of Pioneer Hi-Bred International Inc., Johnston, was the



Members of the Board of the Plant Sciences Institute toured the construction site of the Roy J. Carver Co-Laboratory.

board's organizing chair and was asked to continue as chair.

"I'm proud to serve on the board and help this vital research institute advance and grow," McConnell said. "The board members are pleased with the progress made by the institute, and we're looking forward to providing input in the coming years."

The board will meet again in April.

Symposium on transposons set

Recent discoveries from large plant genome sequencing projects have revealed that plant genomes have been extensively remodeled and rearranged by transposition and recombination. The forces that have modified plant genomes over evolutionary time can today be harnessed by scientists to modify plant genomes for crop improvement.

In June, the Plant Sciences Institute will bring together leading scientists and students for a landmark event in plant genome research focusing on transposable elements. The fourth Plant Sciences Institute symposium, "Transposition, Recombination and Application to Plant Genomics," will be June 5-8 at Iowa State.

The symposium's atmosphere will be informal and the format allows for extensive discussion, said Thomas Peterson, associate professor of zoology and genetics, and symposium program committee chair. "An important purpose of this symposium is to promote interactions and new collaborations between individuals who might not encounter each other in less focused meetings," he said. "The symposium will

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Members of the Plant Sciences Institute Board

James Bloedel, vice provost, Iowa State University

Norman Borlaug, scientist, International Maize and Wheat Improvement Center (CIMMYT), Mexico City; professor, Texas A&M University, College Station

Steven Briggs, president, Torrey Mesa Research Institute, San Diego, Calif.

Alicia Carriquiry, associate provost, Iowa State University

Bruce Dale, professor of chemical engineering, Michigan State University, East Lansing

Rick Foster, vice president for programs, food systems, rural development and leadership, Kellogg Foundation, Battle Creek, Mich.

John Greaves, president, Kemin Americas Inc., Des Moines

Brent Halling, deputy secretary of agriculture, state of Iowa, Des Moines

Kirk Leeds, executive director, Iowa Soybean Association, Urbandale

Richard L. McConnell, president, Pioneer Hi-Bred International Inc., Johnston

Kyle Phillips, chairman, research committee, Iowa Corn Promotion Board, Johnston

Virginia Walbot, professor of biological sciences, Stanford University, Palo Alto, Calif.

Catherine Woteki, dean of agriculture, Iowa State University



Governance groups provide service

The Board of the Plant Sciences Institute held its inaugural meeting in October. This distinguished group will



influence the direction of the institute for years to come. The board was created to broaden the perspectives of the institute and to connect us to our stakeholders. The board is composed of leaders in different walks of life. We are grateful to our board members for devoting their valuable time to the benefit of the institute and the university. We're particularly grateful to Rick McConnell, president, Pioneer Hi-Bred International Inc., who led the effort to organize the board and who will serve as its first chair.

The board is one of three groups that govern the institute. The board serves in an advisory capacity to the university provost. It is responsible for overseeing and promoting the interests of the institute, for strategic direction, advocacy and fundraising. The institute is governed, in addition, by an executive committee who also advises the provost. The committee is composed of the associate provost, vice provosts of research and extension, deans in the colleges most closely associated with the institute and the president of the ISU Foundation. The executive committee is concerned with hiring policies, resource issues and interaction with colleges.

The third governance group is the council composed of center directors and members-at-large. They are the troops in the trenches who advise me on day-to-day operations, programmatic and budget issues. All three governance groups provide invaluable service to the institute and they, like us, are excited about the prospects for the institute in the future.

Stephen Howell
Director

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Symposium on transposons/CONTINUED

be a valuable educational opportunity for students and postdocs who can interact with leading researchers."

Following are the plenary sessions and speakers.

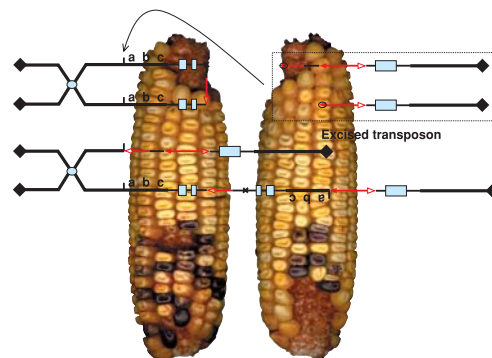
Transposon Biology: Native Elements and their Hosts—Judith Kassis, National Institutes of Health; Peter Peterson, Iowa State; and Susan Wessler, University of Georgia

Regulation of Transposition—Heriberto Cerutti, University of Nebraska; Nigel Crawford, University of California-San Diego; and Virginia Walbot, Stanford University

How Transposons Have Shaped Plant Genomes—Tom Bureau, McGill University, Canada; Marie-Angèle Grandbastien, Laboratoire de Biologie Cellulaire, INRA, France; and Rob Martienssen, Cold Spring Harbour Laboratory

Transposition Mechanisms—Ronald Koes, Vrije Universiteit, Netherlands; Reinhard Kunze, University of Cologne, Germany; and Dan Voytas, Iowa State

Transposon Tagging—Hugo Dooner, Rutgers University; Hirohiko Hirochika, National Institute of Agrobiological Sciences, Japan; and Andy Pereira, Plant



Maize ear with twinned sector produced by sister chromatid transposition, and schematic model for sister chromatid transposition, provided by Jianbo Zhang, zoology and genetics, Iowa State.

Research International, Netherlands

Applications of Transposon-Mediated Recombination for Plant Genome Modification—Holgar Puchta, Institut für Pflanzengenetik und Kulturpflanzenforschung, Germany; Nina Fedoroff, Pennsylvania State University; and Thomas Peterson, Iowa State

Registrants are encouraged to submit abstracts for posters; short talks will be selected from submitted abstracts. Deadline for abstracts is April 4. Complete information is at <http://molebio.iastate.edu/~gfst/phomepg.html>; or e-mail pbmb@iastate.edu.

Flakoll named CDFIN director



Paul Flakoll, a leading clinical nutrition biochemist at Vanderbilt University has been named director of the Center for Designing Foods to Improve Nutrition (CDFIN).

Flakoll is a research associate professor in the departments of surgery and biochemistry at Vanderbilt. He is director of the Diabetes Research and Training Center's amino acid core laboratory in the Clinical Nutrition Research Unit, Section of Surgical Sciences.

Flakoll earned his Ph.D. in animal science at Iowa State. He has conducted research on protein and amino acid metabolism, macronutrient substrate interaction, and endocrinology and regulation of growth. He has authored more than

50 research publications and is the co-holder of two patents. Flakoll is a fellow of the American College of Nutrition and a reviewer for several research journals, including *Diabetes* and *American Journal of Clinical Nutrition*.

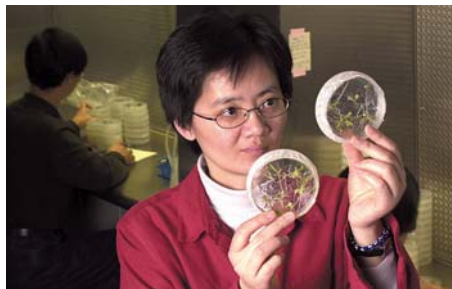
Flakoll's appointment was effective January 1. He replaced CDFIN director Diane Birt, professor and chair of the food science and human nutrition department. Birt continues as department chair and is leading the new research program on dietary botanical supplements. Colin Scanes, professor of animal science and former interim director of the Plant Sciences Institute, served as CDFIN's interim director.

CDFIN is a research center in the College of Family and Consumer Sciences, the College of Agriculture and the Plant Sciences Institute.

Iowa State scientists develop improved maize transformation process for public researchers

Scientists in Iowa State's Plant Transformation Facility have developed a way for public-sector researchers to conduct more efficient maize transformation research. Until now, they have used the biolistic gun, which involved "shooting" the genes carrying desired traits into the plant cells. The transgenic plants generated can be problematic because the process introduces multiple copies of the genes, which can silence the introduced genes and prevent the expression of desired traits.

A different system—the super binary vector system—developed in 1996 uses the soil bacterium *Agrobacterium tumefaciens* to introduce the desired traits. The



Kan Wang led development of the technology.

bacterium is engineered to contain only the desired genes for transformation. This process can deliver a few copies of a precisely defined DNA segment leading to higher transformation precision and less disruption than that achieved using the biolistic gun method. Developed by

industry researchers, the *Agrobacterium* transformation method is inaccessible to public-sector researchers at university and nonprofit research facilities.

The Iowa State researchers developed a similar process that uses a publicly accessible vector system. The technology, which is currently available for public use through the Iowa State University Office of Biotechnology, was developed by Kan Wang, associate professor of agronomy and director of the facility, and Bronwyn Frame, agronomy assistant scientist in charge of corn transformation service and research. Their research was published last May in *Plant Physiology's* "Breakthrough Technology" section.

News Briefs

NSF funds cotton genomics

Jonathan Wendel, professor of botany and a researcher in the Laurence H. Baker Center for Bioinformatics and Biological Statistics, was awarded a five-year, \$4.2 million grant from the National Science Foundation to study the comparative evolutionary genomics of cotton.

Wendel's research could provide new insights into central problems in development and evolution. In his project, morphological, evolutionary and genomic approaches will be integrated in an analysis of the genetic basis of developmental transformations that occurred during cotton fiber evolution. Wendel will work with researchers at the University of Georgia and the University of Arizona on the project.

The grant is part of a \$75.6 NSF program that will support 23 collaborative research projects in plant genomics.

CSSA honors Iowa State faculty

The Crop Science Society of America (CSSA) gave one of its highest honors to a team of Iowa State corn breeders.

Arnel Hallauer and **Wilbert Russell**, both Charles F. Curtiss Distinguished Professors Emeritus of Agriculture, received the Presidential Award in recognition of careers devoted to the improvement of germplasm and breeding methods. Hallauer was cited for his research to adapt important tropical cultivars to temperate environments. Improved germplasm resources and inbred lines developed from his germplasm enhancement programs have been released to public and private corn breeders. Russell was recognized for the development and evaluation of maize inbred lines in the Iowa Agriculture Experiment Station breeding program from 1952 to 1989. His research was instrumental in the release of inbred lines that have contributed significantly to the industry.

CSSA awarded the Monsanto Crop Science Distinguished Career Award to **Walter Fehr**, a Charles F. Curtiss Distinguished Professor of Agriculture and director of the Office of Biotechnology at Iowa State. The award is presented to a crop scientist with outstanding contributions in research, teaching and extension service. Fehr was cited for his plant breeding teaching activities, basic research in soybean breeding and genetics, and soy-

bean cultivar development. The award also recognizes Fehr's initiation of a university-wide program in biotechnology.

CSSA honored **Charles Brummer**, associate professor of agronomy, with the Young Crop Scientist Award that recognizes outstanding contribution to crop science. Brummer was cited for his research to improve alfalfa and other forage species for biomass yield, winter survival and grazing tolerance, particularly through the use of exotic germplasm. He has shown that crosses between particular alfalfa populations produce progeny with substantial heterosis for forage yield.

New fellows named

CSSA named two Iowa State agronomists fellows of the society. **Kendall Lamkey**, Pioneer Distinguished Chair in Maize Breeding and director of the Raymond F. Baker Center for Plant Breeding, was recognized for his research on the inheritance of complex traits, quantitative genetics, breeding methodology and selection theory. Associate agronomy professor **Mark Westgate** was recognized for his research on understanding the physiological basis for effects of environmental stresses on seed formation and development.

Recent research grants

The following 31 grants totaling \$6.4 million were awarded recently to plant science researchers at Iowa State.

Application of Biotechnology to Control the Soybean Cyst Nematode

United Soybean Board—\$747,800
(W. Fehr, agronomy)

Comparative Evolutionary Genomics of Cotton

National Science Foundation—\$732,936
(J. Wendel, botany)

Computational Molecular Biology Training Group

National Science Foundation—\$541,981
(D. Voytas, zoology and genetics)

Functional Genomics of Arabidopsis Starch Granule Metabolism

National Science Foundation—\$518,558
(A. Myers, biochemistry, biophysics and molecular biology)

BarleyBase, A Prototype Online Database for Cereal Microarrays with Integrated Tools for Data Visualization and Statistical Analysis

Department of Agriculture—\$502,039
(J. Dickerson, electrical and computer engineering)

ITR: Display of High-dimensional Metabolic Networks in the C6 Immersive Virtual Reality System

National Science Foundation—\$325,132
(J. Dickerson, electrical and computer engineering)

Visualizing and Modeling Global Expression Data in Arabidopsis

National Science Foundation—\$300,000
(E. Wurtele, botany)

Coordinated Regulation of Host Gene Expression in Response to Viral Infection

Department of Agriculture—\$271,000
(S. Whitham, plant pathology)



Graduate students Heidi Kratsch and Dirk Charlson with Nobel laureate Norman Borlaug. The students described the Interdepartmental Plant Physiology Program at the institute's board meeting in October.

Glutathione Degradation and the Gama-Glutamyl Cycle in Plants

Department of Agriculture—\$210,000
(D. Oliver, botany)

Role of Autophagy in the Response of Plants to Environmental Stress Conditions

Department of Agriculture—\$210,000
(D. Bassham, botany)

Genomics of Rice Susceptibility to Bacterial Diseases

National Science Foundation—\$201,772
(A. Bogdanove, plant pathology)

Database of Maize Genome Information (DBMGI): A New Generation Maize Genome Database

Department of Agriculture, ARS—\$195,122
(V. Brendel, zoology and genetics)

Increasing Soybean Profitability Through Soybean Disease Biotechnology

Iowa Soybean Promotion Board—\$180,000
(J. Hill, plant pathology)

Genetic and Genomic Dissection of Male Fertility Restoration in Maize

Department of Agriculture—\$160,000
(P. Schnable, agronomy)

Characterization of the Biosynthetic Network that Determines Starch Structure

Department of Agriculture—\$140,000
(M. James, biochemistry, biophysics and molecular biology)

An Integrated Program to Improve the Composition and Value of Iowa Soybeans

Iowa Soybean Promotion Board—\$124,592
(M. Westgate, agronomy)

Functional Analysis of Plant MAPK Cascades in Stress and Hormonal Signaling

Massachusetts General Hospital—\$110,416
(K. Wang, agronomy)

Visual Data Extraction and Conversion Programming

National Institutes of Health—\$99,510
(H. Chou, zoology and genetics)

Analysis of CR4 Transduction Pathway Involved in Leaf Epidermis Differentiation

Department of Energy—\$98,000
(P. Becraft, zoology and genetics)

Regulation of Carotenoid Biosynthesis: The Immutans Mutant of Arabidopsis

Department of Energy—\$92,000
(S. Rodermel, botany)

Functional Genomics of Maize Endosperm Development

University of Florida—\$91,903
(P. Becraft, zoology and genetics)

Function of the Maize Starch Synthase zSSIII/DU1 in Amylopectin Biosynthesis

Department of Energy—\$87,000
(A. Myers, biochemistry, biophysics and molecular biology)

Regulation of Inflorescence Architecture in Maize

University of California at Berkeley—\$85,897
(V. Brendel, zoology and genetics)

Collaborative Research: Metabolic Engineering of Hairy Roots for Alkaloid Production

National Science Foundation—\$78,654
(J. Shanks, chemical engineering)

Aphid Control Using Luteovirus Structural Proteins

Iowa State University Research Foundation (Aventis/Syngenta)—\$71,390
(W. A. Miller, plant pathology)

Soybean Transformation Program

Iowa Soybean Promotion Board—\$60,000
(K. Wang, agronomy)

Development of a Catalyst/Sorbent for Methane Reforming

Department of Energy—\$50,000
(B. Shanks, chemical engineering)

Bone Response to Soy Isoflavones in Women

National Institutes of Health—\$41,138
(D. L. Alekel, food science and human nutrition)

Technology Transfer and Commercialization of Soy Protein-Based Adhesives Developed at Iowa State University for Molded Wood Products

Iowa Soybean Promotion Board—\$33,550
(D. Myers, food science and human nutrition)

Plant Sciences Institute UPDATE

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Prepared by University Relations, Teddi Barron, editor

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.

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

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