**ISU Biotechnology Program Celebrates 20 Years of Innovation**

It was spring break of 1984, and two Iowa State University faculty members were enjoying a hotel swimming pool in Brownsville, Texas, when the conversation turned to a new science called biotechnology. When the faculty members returned to Iowa State and presented the concept of a bold new initiative in biotechnology to Vice President for Research Daniel Zaffarano, he endorsed the concept by appointing a Biotechnology Council, made up of leading biological scientists from five colleges to develop a biotechnology program for the university. Twenty years later, Iowa State is celebrating its success in developing a biotechnology program that is one of the best in the country.

Vice President Zaffarano and President Robert Parks encouraged the Council members to work with industry in presenting the plan to the leaders of state government. The day before Thanksgiving in 1985, the industry supporters met with Governor Terry Branstad to discuss the plan to make Iowa State a leader in biotechnology. The governor and the Iowa legislature adopted the plan and allocated $17 million in 1986 to launch the program. A year later, they provided $30.5 million for construction of the Molecular Biology Building. Those investments have paid big dividends for Iowa.

**Partners in Progress**

The continued success of Iowa State's biotechnology program is due to the close working relationship between the Vice Provost for Research and Advanced Studies; the colleges of Agriculture, Engineering, Family and Consumer Sciences, Liberal Arts and Sciences, and Veterinary Medicine; and more than 30 departments and interdisciplinary programs.

Vice President Zaffarano charged the first Biotechnology Council with the responsibility of developing a bold plan for making Iowa State University a leader in biotechnology. When $17 million was provided by the State of Iowa in 1986, he asked the Council to recommend how the funds should be spent to implement the plan. Every vice president or vice provost for research since Dr. Zaffarano has asked the Council to recommend new activities for the program and to provide input on how to most effectively utilize available funds. The Office of Biotechnology implements the plans that are developed by the Council and the Vice Provost for Research and Advanced Studies.

**Building a Biotechnology Faculty**

Attracting top biotechnology researchers to Iowa State was at the top of the agenda when Iowa State’s biotechnology program began, and it still is. In 1986, six new faculty members arrived on campus and were awarded start-up funds from the Office of Biotechnology to help them quickly establish their research programs. Since then, a total of 89 new molecular biology faculty from 19 academic departments have been awarded a total of more than $10 million in start-up funds from the Office of Biotechnology. Currently, 283 faculty members in 28 academic departments representing five colleges are involved in some aspect of biotechnology research.

**Finding the Right Tools for the Job**

One of the initial investments of biotechnology funds was to establish state-of-the-art facilities that would have the sophisticated instrumentation needed to conduct cutting edge biotechnology research. The number of instrumentation facilities has grown to 14 as new techniques in molecular biology were developed. The Office of Biotechnology provides major financial support to the facilities to ensure the best services are available to faculty and graduate students at the lowest possible cost. The facilities also serve researchers in other institutions and industry.

**Training the Next Generation of Scientists**

The biotechnology program supports departments and interdisciplinary programs as they attract exceptional graduate students in biotechnology-related fields. The Office of Biotechnology has awarded nearly 150 graduate fellowships to students in a broad range of academic programs. In addition to the financial aid provided, these fellowships allow students to rotate from

(continued, page 2)
one biotechnology research project to another to help them determine their research interests.

Reaching Out to Iowa

“The public education program in biotechnology that began in 1988 is our way of making certain that all Iowans can benefit from the state's investment in our program over the past 20 years,” said Walter Fehr, chair of the Biotechnology Council and director of the Office of Biotechnology.

The biotechnology outreach education program serves Iowa's K-12 teachers, ISU students preparing for teaching careers, ISU Extension educators, industry, and the public through hands-on laboratory training and on-site school visits. Every year, free laboratory supplies and equipment are provided by the Office of Biotechnology to educators throughout Iowa. In 2003, those supplies helped educate more than 16,000 students in more than 150 Iowa schools. To explore the ethical issues of biotechnology, the Office of Biotechnology hired the first full-time bioethicist in the country dedicated to state-wide outreach. The bioethics program serves Iowans through presentations to groups throughout the state, online bioethics courses, on-campus workshops, and faculty retreats.

From the Lab to the Marketplace

Iowa State's biotechnology program links university and industry research through a biotechnology industrial liaison. The liaison, funded by the Office of Biotechnology, works with industry and faculty to build collaborations between the sectors and to bring Iowa State technologies to industry and local economic development groups.

Exchanging Ideas

The Office of Biotechnology financially supports and/or organizes conferences and symposia for on- and off-campus audiences. Public forums are held to discuss current issues in biotechnology research, including federal rules for development, testing and commercialization of genetically modified organisms.

Future Opportunities

“The Office of Biotechnology at Iowa State will continue to aggressively pursue biotechnology research, education, and outreach through cooperation with all of the academic units of the university, cooperative extension, and industry. Even though the Iowa State program is 20 years old, the science of biotechnology is still in its infancy. We intend to play a major role as a university in utilizing the talents of our biotechnology faculty and students for the benefit of society,” Fehr said.

Bioethics and Intellectual Property

Kristen Hessler, the Office of Biotechnology’s bioethics outreach coordinator, is administrating a grant recently awarded by Pioneer Hi-Bred International, Inc., for better understanding of intellectual property (IP) protection and ethical issues, specifically focusing on biotechnology and plant germplasm.

For the first of two projects, Hessler and Allen Knapp, associate professor of agronomy, are developing a series of web-based educational activities that will highlight the ethical issues associated with IP protection for producers and consumers in developing countries. The project will involve extensive collaboration with Dermot Hays, professor of economics, and Clark Wolf, director of the ISU bioethics program and associate professor of philosophy. Users, primarily college students, will learn about the perspectives of each discipline through the activities, which also will be available on CD-ROM. Recent developments and current research by scientists, economists, and others will be included in the activities, as well as significant background materials on ethical theory.

The second project funded under the Pioneer grant is the Economics of Innovation and Science Policy lecture series. Through the grant, the three-year-old lecture series will continue to provide relevant information on economics and science policy to a wider public audience. GianCarlo Moschini, professor of economics, organizes the lecture series.

Public Intellectual Property Resource for Agriculture

Iowa State University recently signed a Memorandum of Understanding to join the Public Intellectual Property Resource for Agriculture (PIPRA). According to the PIPRA web site, the organization aims “to make agricultural technologies more easily available for the development and distribution of subsistence crops for humanitarian purposes in the developing world and for specialty crops in the developed world.” More than 30 universities and research foundations are involved in this effort.

A primary PIPRA activity is the development of a database of intellectual property owned by universities and research foundations, which will be made publicly available. Intellectual property barriers often arise when attempting to commercialize agricultural biotechnology innovations both in the United States and in developing countries. This database will be used to facilitate research by providing information on the availability of research materials and tools.

Iowa State University is one of the leading public sector institutions in the number of agricultural biotechnology-related patents.

Lisa Lorenzen, director of industry relations and biotechnology liaison, is the university representative and executive committee member to the Public Intellectual Property Resource for Agriculture (PIPRA).

For more information about PIPRA, go to www.pipra.org.
New Biotechnology Faculty

Every year, the Office of Biotechnology provides start-up funds to new faculty members involved in biotechnology research. Below are two recently hired faculty who are recipients of these funds.

Brett Sponseller, assistant professor of veterinary clinical sciences, received his Ph.D. from Iowa State University in 2003, where he studied host-virus interactions that occur during lengthy infection of equine infectious anemia virus (EIAV), a virus similar to HIV. Before coming to Iowa State, Sponseller received a veterinary degree at Cornell University and completed his residency training program at the University of California, Davis, becoming a diplomate of the American College of Veterinary Internal Medicine in 1999.

Sponseller’s current research builds on his equine infectious disease work, attempting to better characterize lentiviral mechanisms of escape from neutralizing antibody. He hopes this research will advance the development of vaccines for other lentiviruses, including HIV.

Sponseller can be reached by phone at 515-294-2237, by e-mail at baspon@iastate.edu, or at his office in 2134 Veterinary Medicine, Ames, IA 50011.

Erik Vollbrecht, assistant professor of genetics, development and cell biology, comes to Iowa State University from Cold Spring Harbor Laboratory in Cold Spring Harbor, NY, where he worked as a post-doctoral fellow. Vollbrecht received his Ph.D. from the University of California, Berkeley, in 1997, studying genetic mechanisms of plant reproduction in female flowers of maize and molecular genetic regulation of plant meristems.

At Iowa State, Vollbrecht is studying plant developmental mechanisms using genomics technologies and classical genetics to investigate the development of floral architecture in maize and other grasses, including cereals such as rice, wheat, and sorghum. This study will help to identify developmental similarities and differences between various grasses.

Vollbrecht can be reached by phone at 515-294-9009, by e-mail at vollbrec@iastate.edu, or at his office in 2206 Molecular Biology Building, Ames, IA 50011.

Light Microscopy Services Are Plentiful, Varied

Six service facilities at Iowa State University have light microscopes available to on- and off-campus researchers. To determine which light microscope is most appropriate for a specific project, researchers must know each facility’s purpose. The Confocal, Image Analysis and Carver Lab are described below.

Confocal Microscopy and Image Analysis Facilities

The Confocal Microscopy Facility provides high-quality images from fluorescent samples. The system allows real-time optical sectioning of fixed and living specimens, providing significant improvements in optical contrast and resolution over traditional light and fluorescence microscopy. The facility’s confocal microscope system features an upright and an inverted microscope imaging and a hardware zoom that increases in resolution up to six times that of the objective being used. The inverted microscopes also can be used with a digital camera system to capture both fluorescence and bright field images.

The Image Analysis Facility provides 2D and 3D digital image processing. Images can be input to the system through digital or video cameras mounted on a microscope, copy stand, or light table. Images can be captured from microscope slides, photographs, previously digitized images, gels, drawings, or the object itself. After input, the digitized images may be mathematically manipulated to enhance desired aspects of the image. An object in the image is extracted from the background and measured for size, shape, position, density, counts, and other parameters. A laser capture microdissection (LCM) system also is available for use in the facility. This instrument identifies and retrieves individual cells from tissue sections. The cells can be used for assessment/analysis of RNA, DNA, protein and other biochemical properties.

Contact Margie Carter, 515-294-1011, mcarter@iastate.edu.

Roy J. Carver Laboratory for High Resolution Biological Microscopy

The Carver Lab has capabilities for optical and scanning force imaging of samples. The optical workstation consists of an integrated system for prepared and live cell imaging. Software controlling the optical workstation automates image acquisition. Image manipulation and analysis software on four computers analyzes and prepares raw data for presentation. All data can be saved to a CD. The Laboratory also is equipped with three atomic force microscopes for high-resolution sample imaging in several scanning force microscopic modes.

Contact Robert Doyle, 515-294-6513, rtdoyle@iastate.edu.

Upcoming Events

April 17—9:00 a.m. to 5:00 p.m., Bioethics Outreach Education Center (BOEC) Open House. As part of the annual ISU Veishea celebration, the BOEC will host visitors of all ages who want to explore the Center’s laboratory facilities and try activities. 1320 Molecular Biology Building.

May 9—Biotech Mixer VI. This meeting series gives biotechnology industry personnel a chance to meet others and to learn more about the industries that call Iowa home. The sixth mixer will be held in North Liberty, IA, and will include a visit to ViraQuest. For more information, contact Lisa Lorenzen at 515-294-0926 or llorenze@iastate.edu.

The Bessey, Cell and Hybridoma Facilities were described in the February 2004 issue of the *Update*.
**Available Technologies**

Iowa State University is seeking industrial partners to develop and/or commercialize the following technology. 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.techtransfer.iastate.edu.

**Software for EST Sequence Clustering**

Parallel Clustering of ESTs (PaCE) clusters large collections of Expressed Sequence Tags (ESTs) based on sequence similarity. The software is significantly faster and clusters data sets of significantly larger sizes than comparable existing software. It also is generic enough to cluster other types of DNA sequences, such as genomic sequences. PaCE facilitates multiple runs of the software with different parameter settings, which provides scientists with a tool to better analyze sequence data. ISURF 03058

**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.


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The Office of Biotechnology was established at Iowa State University in 1984 as part of the Office of the Vice Provost for Research and Advanced Studies to offer innovative programs in biotechnology research, education, outreach and technology transfer. A Biotechnology Council of leading biotechnology faculty from five colleges makes funding and program recommendations. The Office of Biotechnology has provided more than $10 million to 89 new faculty to help them initiate their research programs. It has awarded more than 155 fellowships for outstanding graduate students. The office operates state-of-the-art instrumentation facilities that serve on- and off-campus researchers. The Biotechnology Outreach Education Center trains educators and students throughout the year, provides free laboratory supplies for K-12 and extension educators throughout Iowa and develops innovative new curricula. The office has a full-time ethicist who teaches an online bioethics course; provides bioethics training for teachers, USDA extension professionals, and other educators; and conducts research on topics related to biotechnology. The office funds a full-time biotechnology liaison who works with faculty and industry to facilitate interactions that promote research, economic development and technology transfer.

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