Businesses Benefit from University-Based Resources

Iowa is home to more than 150 biotechnology-related companies, ranging from large international companies to start-ups with just a handful of employees. Iowa State University provides assistance to these companies through programs and centers designed for their success. Resources available include:

**Incubator and Temporary Laboratory Space**
The ISU Research Park provides office and wet-lab incubator space to companies that will benefit from the research capabilities of the university. The Research Park includes the Iowa Small Business Development Center (SBDC), which assists potential and existing companies with growth, expansion, and innovation; the Pappajohn Center for Entrepreneurship, which offers education, training and technical support to Iowans who have a technology or idea they want to develop commercially; and the Iowa State Innovation System (ISIS), a university-sponsored incubator service that provides lab space and business assistance for university-based entrepreneurs. Additional wet-lab space is available through the Center for Crops Utilization Research (CCUR) for companies conducting research using the CCUR pilot plant and in the Roy J. Carver Co-Laboratory, which will open in spring 2003. More information on the Research Park is available at 515-296-7275. More information on CCUR is available at 515-294-0160 or ljjohnson@iastate.edu.

**Center for Industrial Research and Service (CIRAS)**
www.ciras.iastate.edu
CIRAS helps a range of industries throughout Iowa. For biotechnology companies, it focuses on management and manufacturing techniques; product design, development, and engineering; and quality issues. CIRAS has completed projects related to animal and grain production issues, agrichemicals, and value-added agriculture. CIRAS has field offices in nine Iowa cities. More information is available at 515-294-3420 or info@ciras.iastate.edu.

**Center for Advanced Technology Development (CATD)**
www.catd.iastate.edu
CATD is a resource for companies that need assistance with product development engineering and process improvement changes. Cost-sharing is available for some Iowa companies meeting certain criteria to work with research and technical experts at the university. The three primary components of CATD include collaborative research, technology commercialization, and small business research assistance. In addition, CATD provides assistance in developing SBIR and STTR research grants through instructional seminars and one-on-one counseling. More information is available at 515-294-4644 or laurenzo@iastate.edu.

**ISU Service Facilities**
www.biotech.iastate.edu/instrumentation_facilities
The Office of Biotechnology has a broad range of facilities on campus that provide services for on- and off-campus researchers. Areas of specialization include DNA sequencing and synthesis, flow cytometry, plant and animal gene transfer, plant transformation, chemical instrumentation, electron microscopy, confocal microscopy, fermentation, microarray technologies, hybridomas, and 2D and 3D image analysis. More information on the specific facilities can be found at the web site at the beginning of this paragraph.

**Iowa State University Research Foundation (ISURF)**
www.iastate.edu/~isurf
ISURF is responsible for managing and licensing intellectual property developed at the university. Companies that are interested in commercializing a technology developed at Iowa State University work with ISURF to negotiate the terms of use. ISURF also plays a key role in the development of ISU technology-based start-up companies. More information is available at 515-294-4740 or licensing@iastate.edu.
Companies with general questions about working with Iowa State University, or that want to explore a working relationship with ISU researchers, can work with the director of industrial relations and biotechnology liaison. Individualized tours of campus facilities, meetings with university researchers and administrators, and assistance with the process of aligning with the university can be arranged for individual companies. More information is available at 515-294-0926 or llorenze@iastate.edu.

**Career Day Highlights Iowa’s Biotech Job Opportunities**

Finding the right job or internship was made easier for more than 150 undergraduate and graduate students who attended the fourth annual Biotechnology Career Day.

The students met with nine of Iowa’s top biotechnology companies and three academic organizations to plan their occupational future. Companies attending included Diamond V Mills, ExSeed Genetics, Fort Dodge Animal Health, Iowa Human Resources Consortium, Kemin Industries, Lab Support, Phyto dye, Pioneer Hi-Bred International, Proliant, and ViraQuest. The University of Iowa Carver College of Medicine, ISU Interdepartmental Graduate Majors, and ISU Career Services also attended the event.

“This event continues to be well received by both student and industry participants. It’s encouraging for Iowa’s biotechnology industry to see students interested in working for our companies,” said Lisa Lorenzen, director of industrial relations and biotechnology liaison.

Biotechnology Career Day is co-sponsored by the Office of Biotechnology and the Iowa Biotechnology Association.

**Office of Biotech Director Receives Crop Science Award**

Walter R. Fehr, Charles F. Curtiss Distinguished Professor in Agriculture and director of the Office of Biotechnology at Iowa State University, has been awarded the Monsanto Crop Science Distinguished Career Award. Fehr was presented the award at the annual meeting of the Crop Science Society of America on Nov. 12 in Indianapolis, Ind.

The award honors a crop scientist who has built an outstanding record of service to agriculture through teaching, research, and outreach. The award is sponsored by the Monsanto Company, St. Louis, Mo.

Fehr has been a member of the plant breeding faculty in Iowa State’s agronomy department since 1967. He has been active in undergraduate and graduate education in plant breeding, basic research in soybean breeding and genetics, and soybean cultivar development.

Fehr has mentored more than 120 undergraduate research interns and 70 graduate students. He established and taught a graduate course for which he wrote a textbook, *Principles of Cultivar Development*.

Fehr’s soybean breeding program has produced more than 150 soybean varieties for general and specialty uses. Fehr was the first to develop and commercialize nutritionally-improved soybean oil containing reduced amounts of saturated fat and linolenic acid. His specialty soybeans serve the manufacturers of tofu, soymilk, vegetable soybeans, and traditional Japanese products, such as miso and natto.

Fehr’s research innovations include the first year-round soybean breeding nursery in Puerto Rico, a self-propelled research plot combine that became the prototype for the most widely used harvester currently in use, and computer systems that manage large numbers of genotypes in a breeding program. In 1984, Fehr initiated a university-wide program in biotechnology research, education, and outreach. He has served as the director of Iowa State’s Office of Biotechnology for the past 18 years.

**Computer Technology Adds to Outreach Education Experience**

The Office of Biotechnology’s Biotechnology Outreach Education Center (BOEC) recently added new personal computers to the mix of laboratory and experimental equipment in its education labs.

Twelve new iMac desktop computers, which connect to the Internet via wireless technology, will make it possible for the BOEC to provide hands-on experience in bioinformatics technologies, including DNA sequencing.

The BOEC has developed a training curriculum on bioinformatics that uses a software program called BLAST, found on the National Center for Biotechnology Information web site ([www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov)). Other training programs using the computers are currently being developed in the BOEC, including one that utilizes the Gene Challenge web site ([www.biotech.iastate.edu/genechallenge](http://www.biotech.iastate.edu/genechallenge)), developed...
by the BOEC. These and future online and computer-based curricula now can be taught in the BOEC’s labs along with other experiments and laboratory procedures.

“These computers will make teaching educators, students, and industry personnel about the latest technologies in the field possible and convenient. As technology in the research field continually expands, so does our need to teach those technologies to educators, students, and other interested groups,” said BOEC coordinator Mike Zeller.

The computers also will be used in cooperation with ISU Extension, especially with E-SET (Extension-Science, Engineering, and Technology), with which the BOEC frequently collaborates.

The computers were purchased with funds from the Office of Biotechnology.

**Improved Maize Transformation Process for Public Researchers**

Iowa State University researchers have developed a way for public-sector researchers to conduct more efficient maize transformation research.

Formerly, the major process for transformation in the Plant Transformation Facility was the biolistic gun, which involved “shooting” the genes carrying desired traits into the plant cells. The transgenic plants generated through this process sometimes can be problematic because the process introduces a high number of copies of the genes, which could cause significant disruption to the plant, as well as potentially causing the desired traits to stop expressing.

A different system was developed in 1996 that uses a soil bacterium, *Agrobacterium tumefaciens*, to implant the desired traits into a plant. The bacterium is engineered to contain only the desired genes for transformation. The primary benefit of the process is that it can deliver a precise copy of the DNA segment at a lower quantity than the biolistic gun method, leading to higher transformation precision and less disruption. This new method, called the super binary vector system, was developed by industry researchers, which makes it inaccessible for public-sector researchers at university and non-profit research facilities.

The Iowa State researchers have developed a similar process, called standard binary vector system, which utilizes the same *Agrobacterium*-mediated transformation technology. The new process, utilizing a publicly accessible vector system, makes an efficient means for public researchers to access the same technology at an affordable cost.

“This new system will benefit the public-sector research community by allowing them to use the latest technologies in their lab, which were heretofore inaccessible to them,” said Kan Wang, director of the Plant Transformation Facility and principal investigator of the research that developed the standard binary vector system. She said the technology is currently being used for public service in the Plant Transformation Facility.

Wang is co-author of a paper describing this methodology, which was published in a major international plant journal, *Plant Physiology*, in the “Breakthrough Technology” section in May 2002. The lead scientist in this research and development is Bronwyn Frame, an assistant scientist in charge of corn transformation service and research in the Plant Transformation Facility.

The research was funded by the Iowa Corn Promotion Board, the Agricultural Experiment Station, ISU’s Office of Biotechnology, ISU’s Plant Sciences Institute, the Baker Endowment Advisory Council for Excellence in Agronomy, the National Science Foundation, and the Rockefeller Foundation.

**New Biotechnology Faculty**

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

**Carolyn Komar**, assistant professor of animal science, is a new biotechnology faculty member receiving start-up funds from the Office of Biotechnology. She is conducting research in reproductive physiology with a focus on ovarian function. She is primarily interested in regulation of steroid production by the ovary, growth and development of ovarian follicles, and cellular changes that occur in the follicles around the time of ovulation and formation of the corpus luteum, a temporary endocrine gland that forms from the remains of the follicles after ovulation. Understanding these processes could lead to improved means of diagnosing and treating the causes of infertility.

Before coming to Iowa State University, Komar was a postdoctoral fellow at the University of Kentucky in the obstetrics and gynecology department. She earned her Ph.D. in physiology from Cornell University in 1998.

Carolyn Komar can be contacted by phone at 515-294-3629, by e-mail at ckomar@iastate.edu, or at her office in 2356F Kildee Hall, Ames, IA 50011.

**Ron Mittler**, assistant professor of botany, came to Iowa State University in 2001. He is receiving start-up funds from the Office of Biotechnology. His research interests include environmental plant stressors, such as drought, heat shock, and oxidative stress. He is interested in the mechanisms plants induce to counteract environmental stressors, with the goal of generating crops that are resistant to and better able to recover from environmental stressors.
Mittler earned his Ph.D. in biochemistry at Rutgers University in 1993. Before coming to Iowa State University, he did postdoctoral work at Rutgers University. He was an assistant professor of plant sciences at Hebrew University in Jerusalem and assistant professor of biology at Technion, the Israel Institute of Technology in Haifa.

Mittler can be contacted by phone at 515-294-7455, by e-mail at rmittler@iastate.edu, or at his office in 353 Bessey Hall, Ames, IA 50011.

Available Technologies

Iowa State University is seeking industrial partners to develop and/or commercialize the following techniques. 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.

Biodiesel Production from Oils with Fatty Acids
Researchers at Iowa State University have developed a technology that can convert alkali oil refinery waste and used restaurant frying oil into biodiesel. The technology acidifies the oils to recover the lipid material by using an acid-catalyzed reaction. The acid oil resulting from this process can be converted to methyl esters, which can be used as biodiesel. A smaller amount of methanol is used than in traditional methods, making this method more economical. Other oils and fats with relatively low free fatty acid content also can be used with this process. ISURF# 02449

Taking the Pink Out of Irradiated Poultry and Pork
Researchers at Iowa State University have identified the pigment and mechanism that causes the pink color in irradiated raw and cooked poultry breast. A technology based on this information has been developed to eliminate or reduce the pinkness and off-odor problems associated with poultry irradiation without the use of additives or treatments. The technology can also be applied to pork irradiation. ISURF# 02841

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.

Ashlock, Daniel; Wise, Roger; and Dickerson, Julie. Mathematics, Plant Pathology, and Electrical and Computer Engineering. An integrated database for barley genomics. Oregon State University.


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