Integrated Resources for Biotech Business Development

The Iowa State University Research Park is more than just a housing complex for small businesses—it’s also a place where individuals and small companies can expand and develop their businesses through integrated expert advice and assistance.

Three business development resources are housed in the Research Park: the Small Business Development Center (SBDC), The ISU Pappajohn Center for Entrepreneurship, and the Iowa State Innovation System (ISIS). All three resources collaborate to bring a powerful system of business assistance to the people of Iowa State University and the state as a whole.

Pappajohn Center for Entrepreneurship
The ISU Pappajohn Center for Entrepreneurship assists ISU faculty and students, as well as the people of Iowa, who have a technology or idea they want to develop commercially. The center works with the eight colleges at Iowa State to develop companies based on technologies created by faculty and students.

Education, training, and technical support are offered by the center in order to provide a culture and an environment that support new venture creation in the state. The center is part of a collection of Pappajohn Centers at the University of Iowa, University of Northern Iowa, and Northern Iowa Community College, developed on funds from Des Moines businessman John Pappajohn. The centers collaborate on projects throughout the state.

Small Business Development Center (SBDC)
The SBDC is part of a national organization that has 16 centers in Iowa alone. The program provides free, one-on-one assistance to potential and existing companies, whether individually, family or partnership owned. Clients have access to experts in multiple areas of business management and financing to help their companies with growth, expansion, and innovation as well as employee and management productivity. In addition to working with the Research Park, the ISU SBDC works with the Iowa Department of Economic Development, the Environmental Protection Agency, the Center for Industrial Research and Services, and other business-related organizations.

Iowa State Innovation System (ISIS)
ISIS is a university-sponsored incubator service at the Research Park, providing laboratory space and business assistance for scientists and entrepreneurs associated with the university who have a technology or process they want to develop commercially.

A Joint Venture
These three services at the ISU Research Park are part of an integrated business development resource to Research Park tenants and others at ISU and across the state. The combined activities benefit the clients of the university and entrepreneurs from all across Iowa. “The ISU Research Park, ISIS, the Pappajohn Center and SBDC all operate very symbiotically,” said Mike Upah, coordinator of the ISU SBDC.

From the very inception of a technology, the integrated purpose and specialties of these programs assist scientists and entrepreneurs with the potential success of their business. During the earliest stages of development, ISIS assists with laboratory space and the Pappajohn Center with entrepreneurial information. Throughout development, the Pappajohn Center and the SBDC offer continued advice and assistance in developing and maintaining the business successfully.

Steve Carter, interim director of the Research Park, said the programs are one way the Research Park helps new companies grow and thrive. “Start-up companies have limited resources that slow the growth process. The Research Park and the business assistance centers exist to remove the barriers and speed up the process.”

For more information on the Research Park and ISIS go to www.isupark.org. For more information on the ISU Pappajohn Center for Entrepreneurship, go to www.isupjcenter.org. For more information about the Small Business Development Center, go to www.iabusnet.org.
Biotechnology News

Full House for Online Bioethics Course
Not a single seat is left in the virtual classroom for Iowa’s first bioethics course to be taught entirely over the Internet. Fifteen high school and extension educators from the Midwest are taking part in the online course during the spring 2002 semester.

An Introduction to Biotechnology Ethics provides youth and adult educators with the background, resources, and confidence they need to lead ethics discussions with their classes or extension audiences.

All class work is done at home at the educator’s convenience, but the course is far from recreational Web surfing, said course instructor Kristen Hessler, a postdoctoral teaching fellow in bioethics in the Department of Philosophy and the ISU Office of Biotechnology.

“Educators spend much of their time online participating in and evaluating the bioethics case study activities they do in this course for use in their own classrooms or with other audiences,” she said. “There’s a lot of online discussion with other educators. By the end of the course, they will be able to critically discuss and teach others about some moral issues surrounding particular biotechnology issues.”

Educators spend a minimum of 15 hours online, plus an additional 30 of hours reading, writing, research, and taking exams. They are being introduced to moral philosophy and influential moral theories as tools to evaluate biotechnology arguments, both pro and con. Topics covered in the course include some ethical controversies surrounding transgenic plants and animals and ethical issues in human genetics.

Teachers and extension educators in the class earn either one graduate credit from Drake University in Des Moines or one staff development credit toward renewal of their teaching license. The course will be completed on May 10.

Planning is underway to offer the course again over the summer semester.

The course was developed as part of a four-year, $3.7 million grant from the U.S. Department of Agriculture to nine land-grant universities in Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin. The consortium of institutions is studying the social, economic and ethical aspects of biotechnology.

New Process Makes Improved Soy Protein Ingredients
The benefit of soy foods without the negative side effects...that’s the aim of a new process created by Lawrence Johnson, professor and director of the Center for Crops Utilization Research.

Traditional soybeans contain oligosaccharides, sugars that humans have difficulty digesting. These sugars are what produce intestinal gas, a common problem for many soy consumers.

Several processes have been developed to remove the sugars. One method eliminates sugars and fiber from the soybeans leaving just the protein. Another method extracts the sugars, leaving behind both the fiber and protein. Both of these methods are effective in removing the problem sugars, but they are also expensive, reduce levels of healthful phytochemicals, and damage functionality of the protein in foods.

High-sucrose soybeans, which are patented by DuPont/Pioneer, are low in oligosaccharides and have higher levels of sucrose, which is the same as table sugar. Most soy food producers add sucrose to their foods anyway, so the sucrose produced in high-sucrose soybeans become part of the final product. But Johnson decided to take it a step further.

“I thought, ‘Why can’t we simplify that to make a new product?’” he said. In the process he developed, an alkali removes the protein and sugars from the fiber of high-sucrose soybeans, resulting in a high-protein product. Johnson believes the process will preserve the native functionality of soy protein because it is not exposed to harmful chemicals as in other processes. He also believes the process will create higher concentrations of isoflavones, which are chemical compounds with health benefits.

The soy protein produced through Johnson's process can be used in a wide variety of soy protein products, including soymilk, meat products, bread products, and sport drinks. The process has been licensed by DuPont/Pioneer.

New Agriculture Dean at Iowa State
Catherine E. O'Connor Woteki, professor of nutrition and food safety at the University of Nebraska, is the new dean of the Iowa State University College of Agriculture.

In addition to her activities in Nebraska, Woteki holds an appointment in the Joint Institute for the Food Safety and Applied Nutrition at the University of Maryland where she does research in the areas of food safety and nutrition policy, chronic disease prevention, and population health surveillance and monitoring.

A nutritional epidemiologist, Woteki served as the first under secretary for food safety in the U.S. Department of Agriculture. In that capacity, she was responsible for development of U.S. food safety policies through the work of the President’s Council on Food Safety and the Codex Alimentarius Commission.

She also was responsible for the national safety of meat, poultry and egg products under the regulatory authority of the Food Safety and Inspection Service (FSIS). Under Woteki's direction, FSIS implemented the science-based inspection system known as Hazard Analysis and Critical Control Points, which reduced pathogen occurrence in meat and poultry products.

She succeeds Richard Ross, who began a two-year appointment in the position in July 2000. Woteki began her duties as dean in January.

**Faces and Places**

**New Biotechnology Faculty Member**

Jesse Hostetter is one of the newest biotechnology faculty members at Iowa State University. Hostetter is an assistant professor of veterinary pathology, bringing with him experience in small animal medicine and surgery. He received a D.V.M in veterinary medicine from Iowa State University in 1991, going on to work in veterinary practices in Des Moines and Chicago for five years. He returned to Iowa State University to earn his Ph.D., which he completed in 2000.

Hostetter’s research focuses on the characterization of host-parasite interactions in mycobacterial diseases. He is studying how a specific mycobacterial subspecies, a causative agent of Johne’s disease, survives within certain white blood cells. This involves using in vitro systems to evaluate alterations in cell signaling and defense mechanisms within the cells following mycobacterial infection.

Hostetter can be reached in his office at 2764 Veterinary Medicine Complex, by phone at 515-294-3282, or by e-mail at jesseh@iastate.edu.

**Hybridoma Facility Assists Scientists with Antibody Production**

Researchers on and off campus have an excellent resource for creating antibodies for research. Located in the northeast corner of the Molecular Biology Building, the Hybridoma Facility is one of the 10 facilities operated by the Office of Biotechnology.

Hybridomas are created by fusing an antibody producing cell, called a B cell, with a cancer cell. The fused cells develop the properties of the B cell, in that they secrete antibody molecules. The B cells, when fused with the cancer cells, form hybridomas.

The Hybridoma Facility uses mice to make hybridomas because they are easy to handle and inexpensive to raise and use as laboratory animals. If a mouse is exposed to a protein antigen via injection, its immune system will recognize the antigen as foreign and its B cells will make antibodies against the protein.

A typical hybridoma project lasts about three months and involves four stages of development:

- Stage one, mouse immunization, takes one month.
- Stage two, which takes two to three weeks, includes fusing the “B” cells with the cancer cells, growing them in selective media, screening for the production of antibodies, and testing individual hybridoma cell lines for their usefulness to the client.
- Stage three, which takes about two weeks, involves cloning the hybridoma cells to ensure they are pure.
- Stage four, which takes about one month, produces large quantities of a specific antibody in a bioreactor chamber.

The facility also provides other cell culture services such as cyropreservation.

The use of animals in research at ISU is regulated by the federal government, and oversight is provided by the University Animal Care Committee. The Hybridoma Facility follows the guidelines set by the committee and provides this expertise to on- and off-campus labs that want to conduct animal experiments involving the production of antibodies.

“One reason researchers come to us for their experiments is because we have already done 95% of the paperwork involved in getting animal experiments approved,” said Paul Kapke, manager of the facility.

Kapke said the number of experiments conducted every year has increased. The facility works on approximately 20 projects per year, compared with three or four per year four years ago.

To arrange a consultation for a research project involving hybridomas, or for more information on the facility, contact Paul Kapke, 515-294-9837 or e-mail pakapke@iastate.edu. More information is also available on the web at www.biotech.iastate.edu/facilities/CELLHYB/homepage.htm.

**The Update online:**

www.biotech.iastate.edu/publications/biotech_update/default.html

**Biotechnology Industrial Resources online:**

www.biotech.iastate.edu/Industrial_resources.html
Iowa State University is seeking industrial partners to develop and/or commercialize the following techniques. For more information, contact the Office of Intellectual Property and Technology Transfer at 515-294-3893 or www.public.iastate.edu/~isurf.

**Available Technologies**

- **Multiplex Single-Molecule Electrophoresis and Immunoassay**
  Researchers have developed a micro-scale, single-molecule electrophoresis imaging system for the rapid detection and identification of specific targets in the presence of a large excess of similar species. A miniaturized version of capillary electrophoresis allows sensitivities and detection limits appropriate for non-amplified samples, opening up the possibility of screening single copies of DNA or proteins within single biological cells for disease markers without performing polymerase chain reaction or other biological amplification. This invention is suitable for high-throughput, low-cost practical applications. ISURF # 02698

- **Promoter for Gene Expression in Plant Nectar**
  Researchers have isolated the gene promoter for Nectarin I, which can be used to express genes in the nectary tissues of many plants and to secrete proteins into plant nectar. By using the promoter with the appropriate genes, it is possible to produce commercially important protein products in the nectar. Nectar is easy to harvest and there is a potential for large yields as well as simple purification. It also may be possible to increase seed production by improving pollination through changes to the character of the nectar and to repel certain deleterious insects that can damage seeds and reduce seed production. ISURF # 02777

**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 the Biotechnology Industrial Liaison. See address box below.


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