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# BUSINESS sphere

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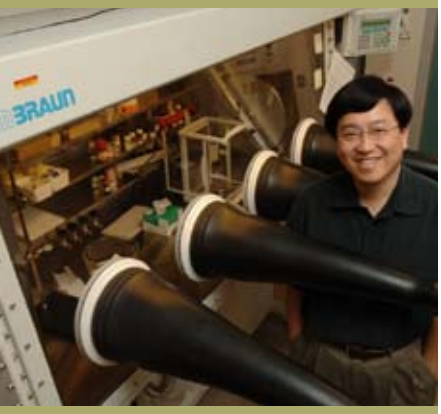
NEWS FROM THE IOWA DEPARTMENT OF ECONOMIC DEVELOPMENT

## INSIDE






**Revolution coming in biodiesel** (see story page 7)

# Iowa's Project Liberty set to Revolutionize Ethanol Production

With the nation's stated goal of producing 35 billion gallons of renewable fuels by the year 2017, there are concerns as to whether there will be enough corn to fuel the burgeoning ethanol industry, as well as supply the needs of the livestock producers and food industries.

Ethanol from crop waste, grass or other materials—known as biomass—may hold the key to helping the United States reduce its reliance on petroleum. And in Emmetsburg, Iowa, the nation's largest dry-mill ethanol producer is constructing the world's first commercial-sized cellulosic ethanol plant in hopes of unlocking the secrets to producing ethanol from biomass.

Jeff Broin, chief executive of Broin Companies, says his company will convert its Voyager Ethanol plant in Emmetsburg from a 50 million-gallon-a-year conventional corn dry-mill facility into a 125 million-gallon-a-year commercial-scale biorefinery producing ethanol from not only corn but from corn stover—the stalk, leaves and cobs of the corn plant.

"This is an important initiative for both the Broin Companies and the ethanol industry," Broin says of the project that is receiving an $80-million U.S. Department of Energy grant. "The need to commercialize cellulosic ethanol is apparent as the United States continues to move away from its dependence on fossil fuels. We have been working very hard at developing technologies and making advancements the past several years to position Broin as a leader in this area. The project in Emmetsburg is a major step toward reaching that goal."

Known as Project Liberty, the $200-million expansion has an expected completion date in mid-2009, says Mike Muston, Project Liberty manager. "Project Liberty will create commercialization results that include 27 percent more ethanol from an acre of corn while using 83 percent less fossil fuels needed

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**"Supported by strong investment in R&D and new manufacturing plants like Fort Dodge, our scientists are working hard to meet demands for renewable energy and move towards an ever more bio-based economy. We're very proud to be building here in Iowa and very much look forward to becoming part of the local community."**

**Iain Ferguson**
**Chief Executive**
**Tate & Lyle**

# Tate & Lyle's $260 million Iowa investment

Bringing new proprietary technologies to Iowa, Tate & Lyle has begun construction of a $260 million industrial starch and ethanol plant near Fort Dodge, the first corn wet mill to be built in the United States in more than a decade.

When completed in spring 2009, the Tate & Lyle facility will create 110 new full-time jobs. The huge facility will process 150,000 bushels of corn a day, producing more than 100 million gallons of ethanol per year.

Chris Olsen, director of community and governmental relations for Tate & Lyle, says the London-based company is an industry leader in cereal sweeteners and starches, sugar refining, value-added food and industrial ingredients.

Olsen says the corn wet milling facility will employ state-of-the-art technologies that make processing corn more efficient and will lower the costs of a variety of products.

As corporate officials gathered for the official ground breaking ceremony last fall, Tate & Lyle CEO Iain Ferguson said "this marks the beginning of a bright future for both the company and Fort Dodge as we move closer to our main ingredient."

"This investment will double our ethanol capacity, producing environmental and energy-saving benefits in the U.S. while reducing America's foreign oil dependence," he continued. "This is an important strategic move into the western Corn Belt."

Along with ethanol, the facility will produce cationic starches for the paper industry. "Cationic starches are used to improve the internal bond and tensile strength during the paper-making process," says Olsen.

While Tate & Lyle looked at sites throughout the western Corn Belt, Olsen said Fort Dodge was selected "due to its local corn supplies, two railroads, available and skilled workforce and cooperation from local and state officials."

Leveraging the plant—the single largest business investment in Webster County's history, according to John Kramer, executive director of Webster County Economic Development—was a series of awards from Iowa Department of Economic Development programs.

Those include a $1 million award from the Community Economic Betterment Account (CEBA), and $300,000 from the Value-Added Agricultural Products and Processes Financial Assistance Program (VAAPFAP), along with tax incentives and road improvements from Webster County.

"Tate & Lyle believes the corn fields of today will be the oil fields of the future. So what better place to build but here in Iowa?" says Ferguson. ■

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# Embria Health Sciences to build $12 million headquarters in Iowa

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Embria® Health Sciences, manufacturer of natural ingredients for use in high-quality human nutritional products, is in the midst of building a $12-million headquarters facility in the central Iowa community of Ankeny. The 5.1-acre site will include manufacturing facilities for its two new human nutrition ingredients: EpiCor® and eXselen®.

With the successful international launch of those two natural ingredients to the human-nutrition market, Embria will use its new Iowa headquarters to look for continued opportunities to design products and ingredients that assist the immune system and further human health says Paul Faganel, Embria Health Sciences president.

Both ingredients are backed by 15 years of research and by 60 years of proprietary fermentation technology by Embria's parent company, Diamond V® Mills, which began researching and developing nutritional products in 1943. Since then, the company has been recognized as a global leader in animal nutrition.

"Our proprietary fermentation and drying technology produces biologically complex products. The end result of our process is unique metabolites that provide beneficial nourishment and superior bioavailability to our ingredients," says Faganel.

Those who know the human nutrition market agree. Embria holds Nutrition Business Journal's 2005 product merit award for its launch of eXselen®, and Embria was named one of Nutraceuticals World's 2006 "Companies to Watch." In early 2007, Embria was honored with Nutrition Business Journal's Investment in the Future Award for its substantial 2006 internal growth, long-term investments and flagship ingredient, EpiCor®.

"eXselen® is an all-natural, organic ingredient that guarantees high levels of organic selenium, an essential trace mineral the human body is dependent on but can't produce on its own," says Faganel. "EpiCor® is an all-natural, high-metabolite immunogen that helps support and balance a healthy immune system."

Embria chose Ankeny for its headquarters after conducting a national site-selection search. "After a thorough research of several states' tax rates, regulations and overall business climate, we came back to Iowa as the place to do business," says Faganel. "We're confident our commitment to Iowa will enhance and build upon the state's already strong economic pulse."

The expansion project was awarded $140,000 from the Community Economic Betterment Account (CEBA) and tax benefits from High Quality Jobs Creation (HQJC) program, both administered by the Iowa Department of Economic Development. When the project is completed in mid-2007, 28 new jobs will be created with 16 of the jobs paying an average wage of $59.23 per hour.

Combining science with nature to deliver high-quality, research-based natural ingredients to the global human nutrition market, Embria will continue to design condition-specific ingredients and supplements that bolster human health. And just as Embria's natural ingredients can help keep people healthy, Embria has found that an Iowa location bolsters its bottom line. ■

# Cosmeceutical company Dermacia to build biobank, R & D facilities in Iowa

On the campus of the University of Iowa, a new biobank facility—the world's largest and the third of its kind—will soon be advancing development of customized medicine for skin cancers and other related skin conditions.

National Genecular Institute, Inc. (NGI), a fully owned research subsidiary of Newport Beach, Calif.-based Dermacia, is constructing not only the biobank — known as the BioTrust™ — but also locating its pharmacogenomic and cosmeceuticals research and development operation in the Oakdale Research Park.

In fact, Dr. Tannin Fuja, NGI chief scientific officer, says the company has begun the process of hiring 178 new employees while taking up temporary residence on the University of Iowa Oakdale campus.

Fuja said the company is beginning to hire employees across a wide range of levels and disciplines including engineers, IT specialists, biologists and chemists as well as research assistants, lab technicians and office staff. "Employees are being recruited nationally and are relocating to Iowa," says Fuja. "However we plan to draw significantly from the available and highly skilled Iowa labor pool."

Dermacia is known as the industry leader in the development of cosmeceuticals—skin care products formulated to provide cosmetic and therapeutic benefits to the user. Its Lycogel™ and Dermesse™ product lines are designed for post-plastic surgery cover and special camouflage applications, facilitating rapid healing of wounds and minimization of scarring while providing effective, flawless cover. "Our products are sold in more than 1,000 physicians' offices as well as surgical and dermatology centers and pharmacies across the U.S. and Mexico," says Fuja.

Fuja explains that the biobank at UI's Oakdale Research Park will be a depository of genetic and cellular materials which are linked to updated medical history of donors. "Biobanking remains the most efficient and effective means to helping researchers move closer to the development of customized medicines for complex, rare and often mistreated diseases," says Fuja.

The $26-million expansion, which includes a new 90,000 square foot research facility and 20,000 square foot biobank, was awarded $655,000 from the Iowa Department of Economic Development-administered Community Economic Betterment Account (CEBA) as well as tax benefits from the High Quality Jobs Creation (HQJC) program.

"We'll use our research and development from our new Iowa location to fuel our rapid sales growth and aggressive marketing and product initiatives, including research and development of nanotechnology and genetic science applications in cosmetics and skin care," says Matt Nicosia, Dermacia's chief executive officer and co-founder. ■

# Iowa's Tjaden Biosciences poised to meet worldwide opportunities

Recent start-up Tjaden Biosciences came about through the vision of Erik Tjaden who returned to his hometown of Burlington, Iowa, to launch the venture. The company, located in 13,000 square feet of office and laboratory space, began filling its first orders in January 2007.

While working at a lab that offered a diverse array of pharmaceutical services including custom radiosynthesis, Tjaden saw an opportunity for a new radiochemical company manufacturing and distributing custom and catalogue compounds radiolabeled with carbon-14 and tritium, "The $200-million-a-year industry is evolving and changing," says Tjaden. "Large pharmaceutical and life sciences companies are reducing in-house capabilities in favor of increased outsourcing to reduce operational costs, while smaller biotech companies rely completely on the outsourcing model."

Tjaden Biosciences "implants radioactive isotopes into molecules, allowing researchers to study how compounds interact with blood and tissue, and the environment," explains Tjaden, adding that a sheet of paper provides enough protection to block the radiation emitted by carbon–14 and tritium. "The radioactive molecules, which are used to track how the compounds breakdown in the body and are eliminated, are used in early phases of research, as well as in animal and human drug trials."

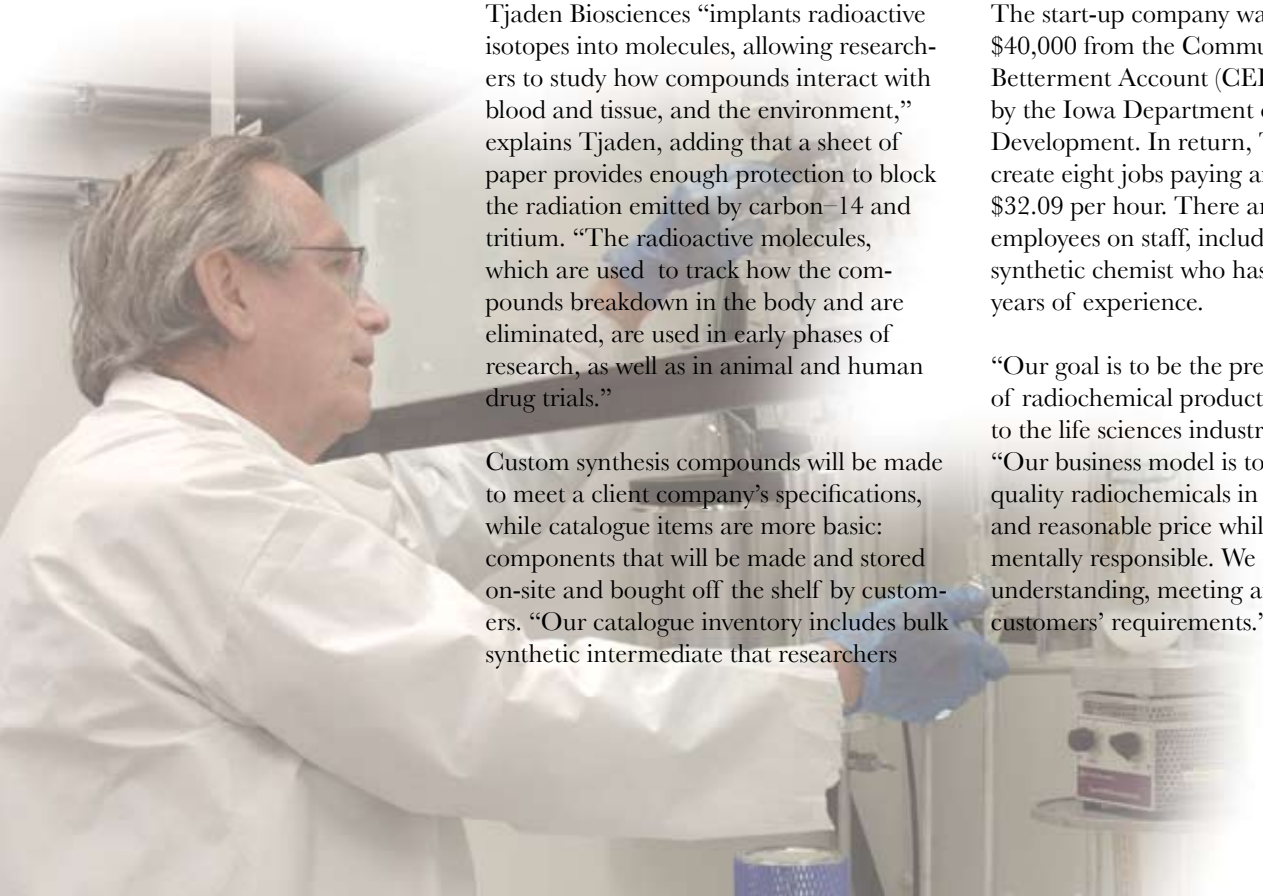
Custom synthesis compounds will be made to meet a client company's specifications, while catalogue items are more basic: components that will be made and stored on-site and bought off the shelf by customers. "Our catalogue inventory includes bulk synthetic intermediate that researchers subsequently convert into more complex proprietary molecules and biologically relevant compounds such as steroids, carbohydrates, amino and fatty acids and others that are used directly in academic research," says Tjaden.

Not only does Tjaden manufacture and distribute commonly used or catalogue radiochemical compounds, they also custom make radio labeled compounds for customers. "Our tailor-made radio chemical compounds are used in pharmaceutical, agrichemical, and consumer-product research and development departments," says Tjaden.

The 6,800 square feet of office space and 7,500 square feet of warehouse space is more than the startup needs at the moment. "It will give us ample room to grow," says Tjaden, whose partner in the company is Russian chemist Andrey Topin.

The start-up company was awarded $40,000 from the Community Economic Betterment Account (CEBA), administered by the Iowa Department of Economic Development. In return, Tjaden pledged to create eight jobs paying an average wage of $32.09 per hour. There are currently three employees on staff, including Phil Korb, a synthetic chemist who has more than 40 years of experience.

"Our goal is to be the premier supplier of radiochemical products and services to the life sciences industry," says Tjaden. "Our business model is to provide high quality radiochemicals in a timely fashion and reasonable price while being environmentally responsible. We are committed to understanding, meeting and exceeding our customers' requirements." ■



Project Liberty — Continued from page 1


**Broin's Project Liberty will create commercialization results that include 27 percent more ethanol from an acre of corn while using 83 percent less fossil fuels.**

to ferment corn into ethanol and reducing water consumption at an ethanol plant by 24 percent.

Broin, which operates 19 ethanol plants throughout the U.S., could have located Project Liberty at any of its existing plants. "Emmetsburg was chosen because of its access to main rail lines, abundant water resources, and a good location in a major corn-producing region," notes Muston. "Local and state governmental leaders have been very supportive and the state's permitting process is streamlined."

The expansion project will receive a series of tax abatements and credits from the Iowa Department of Economic Development-administered Enterprise Zone program.

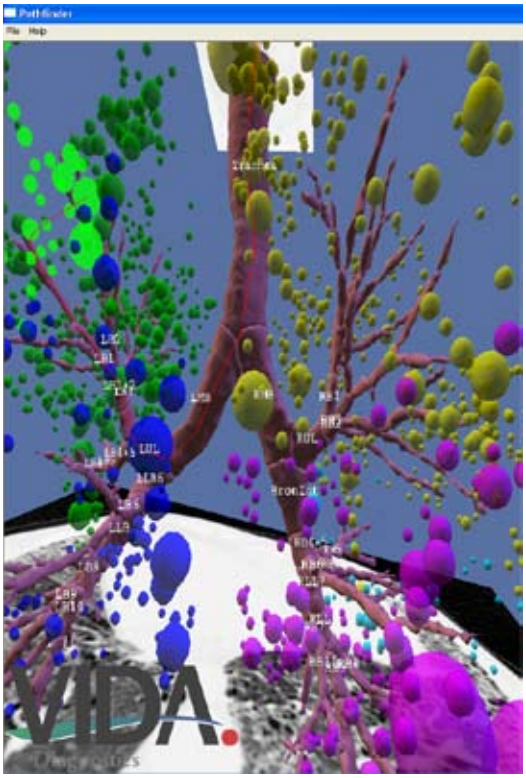
While there are still challenges to overcome in making cellulosic ethanol, "We are partnering with Iowa State University, DuPont, ag-equipment manufacturers, the Danish enzyme company Novozymes and others to develop technologies that will revolutionize the ethanol industry," says Muston.

Iowa currently has 28 ethanol plants producing about 1.8 billion gallons of ethanol per year more than any other state. With construction of Project Liberty, Iowa continues its leadership in renewable fuels, while setting the stage for greater—and greener—accomplishments to come. ■

## Researching disease treatment & detection

VIDA Diagnostics, a company located in the University of Iowa's Technology Innovation Center, has earned a $750,000, two-year grant from the National Institutes of Health to advance an imaging system that can detect and treat lung diseases including lung cancer and emphysema. VIDA received a Phase II Small Business Innovation Research (SBIR) grant, a highly competitive funding program used by federal agencies to fund small business research and development. VIDA Diagnostics is a spin-off company using core technology licensed from the university. Earlier, VIDA Diagnostics was awarded $100,000 from the Iowa Department of Economic Development for product development.

Gap funding from the Iowa Values Fund has been awarded by the University of Iowa to an early stage technology under development by Gregory Leno and John Engelhardt, professors in the department of anatomy and cell biology. The research will develop cell therapy techniques that could be used to treat Alzheimer's Disease, Parkinson's Disease and other diseases. A startup company, RepGenix LLC, is being formed around their discoveries, in collaboration with other Iowa resources and companies. ■



**Researcher Ted Heindel, at Iowa State University, is working with Frontline BioEnergy to commercialize gasifiers that convert biomass into a mixture of flammable gases. The resulting gas could be used to replace natural gas burned in ethanol plants. The project is partially supported by the Iowa Values Fund, Iowa's premier economic development program.**

Photo credit –
*Bob Elbert*
*Iowa State University*

# On the Frontline of biomass energy

Ethanol, the clean-burning, high octane fuel distilled from Iowa's corn fields, has the potential to free the U.S. from its foreign oil dependence. Transforming corn into ethanol, however, takes energy, usually in the form of natural gas or coal.

Ames-based Frontline BioEnergy is developing biomass-to-energy conversion methods that reduce an ethanol plant's consumption of fossil fuels, making ethanol an even greener product.

As Iowa's ethanol industry continues to grow, developing energy from biomass could result in huge savings for the state's production facilities.

The Iowa Renewable Fuels Association says that at the end of 2006 Iowa had 28 ethanol plants capable of annually producing more than 1.8 billion gallons of the corn based fuel as well as eight biodiesel facilities with an annual capacity of 136 million gallons. Iowa ranks first in the nation in production capacity for both ethanol and biodiesel.

"Using biomass to fuel an ethanol plant can reduce costs in making ethanol. It also hedges against volatility in the natural gas market and doubles the renewable energy ratio of the ethanol product," says Jerod Smeenk, Frontline engineering manager. Smeenk says natural gas accounts for one third of the cost of producing ethanol, the second-largest expense after corn.

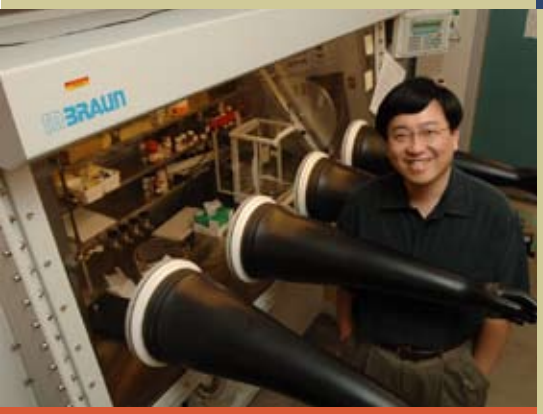
The nine-employee Frontline moved to Ames from Colorado in late 2005 to be closer to producer customers for its new biomass technologies.

Assisting its move was a $60,000 award from the Value-Added Agricultural Products and Processes Financial Assistance Program (VAAPFAP), administered by the Iowa Department of Economic Development.

The company is also working closely with Iowa State University to improve the design and operation of gasifiers that could process more than 300 tons of biomass per day. Smeenk says that while the USDA estimates a potential annual supply of 1.4 billion tons of biomass, there are challenges in using biomass as an energy source.

"There are the issues of collection, transportation, storage and end processing of the biomass," says Smeenk. "But every step we take in developing energy from biomass is another step away from our dependence on foreign and fossil energy sources." ■

Photo credit –
*Bob Elbert*
*Iowa State University*




## Revolution coming in biodiesel

Victor Lin and a team of Iowa State University researchers have found a better way to make biodiesel in a chemistry lab. Now they're testing the tiny nanospheres they've developed on a bigger scale and looking toward establishing a company that would move the new technology into biorefineries. "This is a project that's definitely relevant to the state's economy," Lin said. "I thought as a scientist I could contribute something to the state." The project is supported by a grant from the Iowa Values Fund. ■

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**Dean Oestreich, President, Pioneer Hi-Bred International Inc. / a DuPont Company, and member of the executive committee, Biosciences Alliance of Iowa**

## guest opinion

# A battle over biofuels . . . Don't underestimate farmers and science

While nearly 80 percent of Americans favor increased use of ethanol to ease our "addiction" to oil, there is still concern that ethanol's demand for corn will create grain shortages that drive up the cost of food.

It is a question that once again will challenge the abilities of agriculture to increase grain production in ways that are economically efficient and environmentally sustainable.

Eighty years ago, the development of hybrid corn sparked a revolution that allowed farm production to outpace rapidly growing global population. The question today is whether agriculture, with advanced seeds, new technologies and improved management practices, can meet its food and feed objectives and deliver a stable, sustainable fuel supply through ethanol, biodiesel and other biofuel production.

There is no easy answer to the energy challenge, so it is important to see the whole picture, especially when food sources are being considered as fuel. Energy conservation and the development of new energy sources must be fully researched. It also is essential to know what we can expect from agriculture, a sophisticated, research-based field that our non-agrarian society may not fully appreciate. Many of the top seed-industry players, for example, invest as much in research as a pharmaceutical company per dollar of sales. Agricultural research, both public and private, has one primary goal — to increase productivity to meet growing demand.

In the near future, new technologies will enable ethanol production from nearly any source of cellulose — including crops and crop residue, wood, grasses and even trash. Those advancements will enable the biofuels industry to grow to a much larger scale. But for now, we are relying solely on crops such as sugar cane, soybeans and especially corn.

To see where corn production can go, it is helpful to see how far it has come. In 1945, U.S. farmers harvested about 40 bushels of grain per acre. Today, thanks to elite hybrids, new technologies and growers' management practices, the U.S. average is 160 bushels per acre. Many growers consistently produce 250 bushels, up to a record of 400-plus bushels.

The revolution in agricultural science and technology over the past 80 years is no less phenomenal than other scientific fields that have taken us to unimagined places. As we grapple with how to secure a sustainable food and energy future, we should not underestimate the ability of the world's farmers — armed with cutting-edge science from both public and private institutions — to perform great things. ■