

College of Agriculture and Life Sciences

NEWS

Spring 2007



Teaching Science through Inquiry

Also inside

Engineering with Nucleic Acids
Keeping Watch over Dairy Foods
Harvesting Heavy Metals



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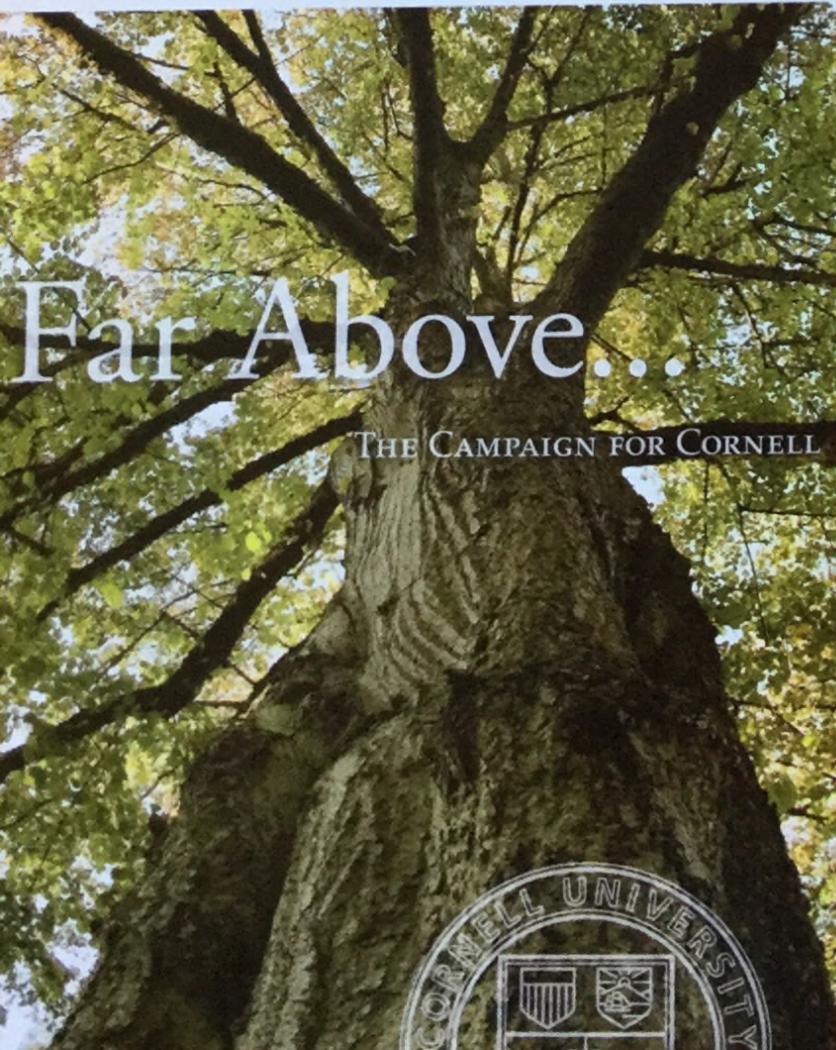
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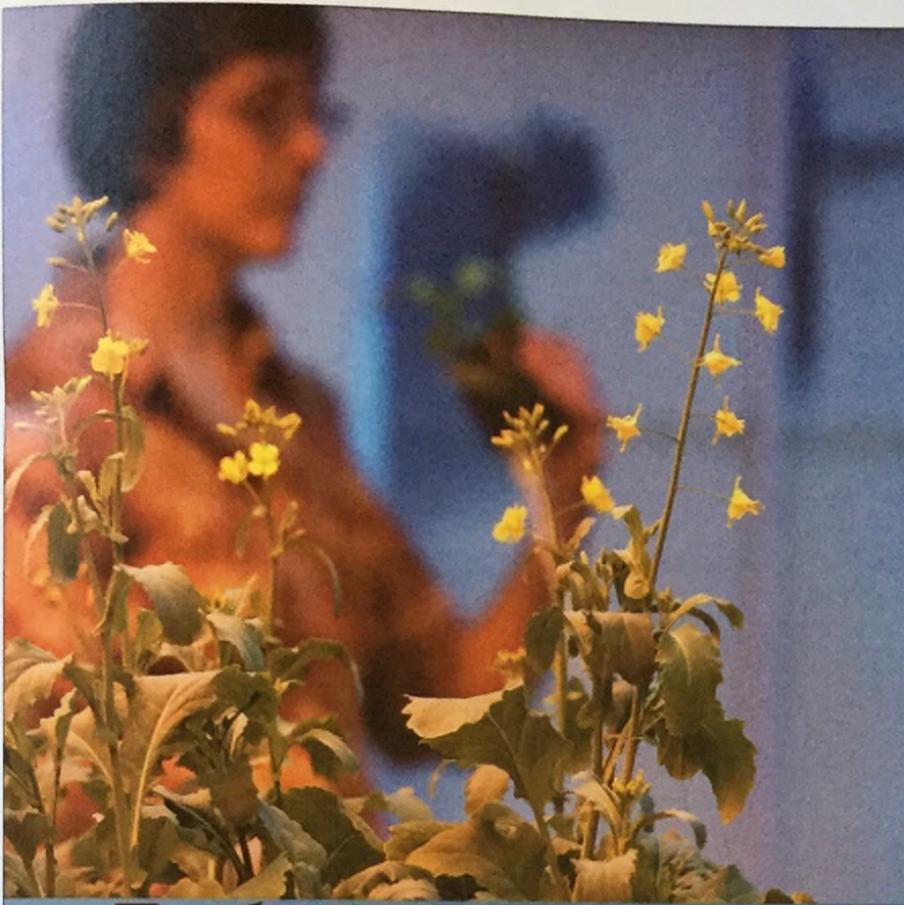


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Spring 2007



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CALs scientists are exploring the potential of plants to clean up polluted soils.

On the Cover:

Inset: Professor Barbara Crawford (foreground) and PhD students Robert Humphrey and Xenia Meyer are collaborating with the Paleontological Research Institution (PRI) to design curricula to teach evolution and scientific inquiry. Mastodon: The Hyde Park Mastodon is a focal point at PRI's Museum of the Earth. (Inset by Lindsay France; mastodon courtesy of PRI.)

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Message from the Dean

Spring has arrived, and good news is in full bloom all over CALS. Two of our signature programs have gotten important press recently. The *Chronicle of Higher Education* reported in late January that our long-noted program in food science was rated first in the nation in the 2006 Faculty Scholarly Productivity Index. And we were also thrilled to learn that our Undergraduate Business Program jumped four places in one year to number 10 in *BusinessWeek's* 2007 rankings. Our program was one of four featured in the article, which appeared in the March 19 issue.

Both of these programs have recently benefited from outstanding gifts from alumni. Yongkeun Joh, MS '78, and his wife, Sunny, MS '77, have endowed the first chair to be based at our Geneva experiment station, the Yongkeun Joh Professorship of Food Ingredient and Product Formulation. And the Dyson Foundation has established the Dyson Scholars Program, which will combine merit-based recognition with need-based financial aid for the benefit of students in the Undergraduate Business Program. For more information on both initiatives, see page 6.

We have also received two significant grants for our leading programs in biological and environmental engineering and plant genomics. The first, \$10 million from Empire State Development Corporation, will allow us to equip laboratories in Riley-Robb Hall to support cutting-edge research in industrial biotechnology. The second, a \$1.8 million grant from the National Science Foundation, will support the International Tomato Sequencing Project. Researchers in CALS and the Boyce Thompson Institute for Plant Research will lead the project, a collaboration with institutions in nine other countries.

We began 2007 by celebrating three 19th-century milestones of fundamental importance to our college and to New York agriculture: the founding of the New York State Agricultural Experiment Station (NYSAES) at Geneva 125 years ago, the establishment of the New York State Agricultural Society 175 years ago, and the birth of Ezra Cornell on January 11, 1807. We owe our existence as a state college of agriculture to both Ezra Cornell and the Agricultural Society—which lobbied for years to get our college established—and we have enjoyed a productive and mutually beneficial partnership ever since.

The Ides of March found us in New York City celebrating the success of New York wines with more than 200 Cornell alumni and friends at our first annual Enology and Viticulture Gala, successor to the Vinification and Brewing Gala that we have held in the Finger Lakes region for the past nine years. With John Dyson '65 as master of ceremonies, Peter Saltonstall '75 of King Ferry Winery representing the New York Wine and Grape Foundation, and a Christie's auctioneer to drive up the bidding on cases of wine, weekend getaways, and other donated delights, the benefit for our Enology and Viticulture Program was a sparkling success.

We also recently celebrated the career of CALS alumnus A. Colin McClung, MS '49, PhD '50, a 2006 World Food Prize laureate. Dr. McClung, a soil scientist who spent his career at North Carolina State University, helped transform the Cerrado, a vast, infertile swath of Brazil, into highly productive agricultural land in the 1950s. His work inspired more than two decades of close collaboration between scientists and students at N.C. State and Cornell and in Brazil. He is the third CALS alumnus—with Pedro Sanchez '62, MS '64, PhD '68, and John Niederhauser '39, PhD '43—to win the World Food Prize. CALS faculty member Per Pinstруп-Andersen, the H. E. Babcock Professor of Food, Nutrition, and Public Policy, won the prize in 2001.

These highlights and many other achievements as well affirm the excellence and central relevance of our work to advance the life sciences and environmental, agricultural, economic, and social sustainability in New York, the nation, and the world. With so many remarkably accomplished and dedicated alumni, students, faculty, and staff members, we can look forward to guiding many more advances of importance to our collective future.

—Susan A. Henry, PhD,

the Ronald P. Lynch Dean of Agriculture and Life Sciences



College of Agriculture and Life Sciences

NEWS

College of Agriculture and Life Sciences News is published twice a year by the College of Agriculture and Life Sciences, a unit of the State University of New York, Cornell University, Ithaca, N.Y. Cornell University is an equal opportunity, affirmative action educator and employer.

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Produced by Office of Publications and Marketing
at Cornell University

05/07 ML 48.2M 070262

Short Reports

New York Farmers Visit Mexico to Probe Dairy Workers' Lives

In December 2005 and January 2007 a group of New York state dairy farmers headed to Mexico to better understand Central American workers back home.

The trip was designed for farmers who hire employees from Mexico and Guatemala to experience Hispanic culture by visiting communities where dairy workers come from and promote cross-cultural understanding in their local communities. Trip coordinator Thomas Maloney '74, MPS '84, a senior extension associate in applied economics and management in CALS, led the trips.

"All of those who went gained a better understanding of how complex the situation is and that people come to the United States because of economics," Maloney says. "Mexicans are motivated and productive because they can make so much more money here in a shorter period of time."

Clifton Springs dairy producer John Mueller '86, who participated in the first trip, says, "There is no question that this understanding will make my business better. The trip to Mexico taught me why my employees eat what they eat, do what they do, and think the way they think."

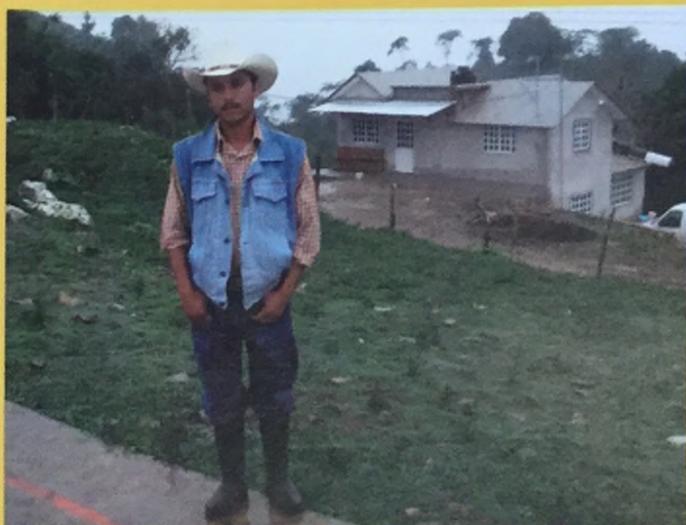
The trip also primes farmers to participate in current immigration reform discussions. Part of a comprehensive approach to address needs of the farm communities and supported by a Cornell Cooperative Extension grant, Maloney's program efforts also include development of a conference on supervising Hispanic workers in conjunction with Penn State University and a survey of Hispanic employees and their managers.

Participants in the study trips visited agricultural operations in Mexico where employees typically work for \$8 to \$12 a day. On a New York dairy farm, they typically make \$60 to \$80 per day.

In Malacatepec, Mexico, the participants stayed with a former New York dairy employee who initially came to the U.S. in 1999. Two years later, when he returned to Mexico, his U.S. earnings allowed his family to build a two-story house with running water and electricity, purchase 20 cows, plant 8,000 coffee plants, and operate a small store out of their house.

Since the mid-1990s, the trend toward hiring Hispanic workers on New York's dairy farms has steadily increased. To document these trends, Cornell's Maloney and former state extension specialist David C. Grusenmeyer co-authored a survey to help create a demographic profile of Hispanic dairy workers on New York farms. For more information on the survey, link to <http://aem.cornell.edu/research/researchpdf/Rb0502.pdf>

Julie Berry '97



After working for two years on a New York dairy farm and sending most of his earnings home, Teodoro returned to his home village of Malacatepec to oversee the construction of the new family home shown here. Many immigrants want to work in the U.S. for a few years, save money, and return to a better life in their home country.



Tom Maloney (second from left), visits with dairy farm workers in Malacatepec, Mexico.

Gourmet Mushrooms, American Ginseng, and Maple Syrup— Coming from a Forest Near You

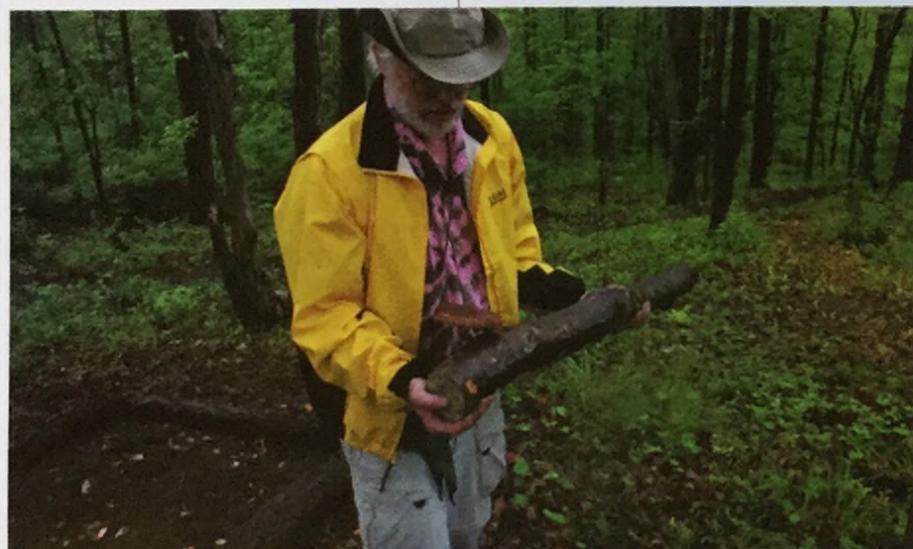
From understory to canopy, the millions of acres of forests that cover much of New York have untapped potential to provide popular products to consumers and generate additional income for landowners.

Cornell's agroforestry researchers and instructional technology specialists recently unveiled a new online resource center devoted to helping forest owners manage their forest resources by cultivating economically viable and environmentally sustainable crops other than timber. The How, When, and Why of Forest Farming Resource Center (HWWFF) uses video clips, web text and images, PowerPoint presentations,

and text files to provide a one-stop shop for farmers, landowners, researchers, natural resource managers, and agencies to work together to create thriving agro-ecosystems out of forest lands.

"Many landowners question how to afford to have so much forest land and pay taxes on it," says Louise Buck, co-coordinator of the program and senior extension associate in Cornell's Department of Natural Resources.

In New York, gourmet mushrooms, maple sugar, and medicinal herbs such as American ginseng and goldenseal are among the products that have the highest potential for producing additional income.



Ken Mudge, associate professor of horticulture, examines a log for growing Shitake mushrooms. For log-grown mushrooms to thrive, tree selection is important as is the timing of inoculation and harvesting.

Funded by a federal Hatch grant from the Cornell University Agricultural Experiment Station, Cornell associate professor Ken Mudge is working to unlock the secrets of popular gourmet mushrooms to increase predictability and economic viability through an innovative research-extension forum at Arnot Forest, in Van Etten, close to Ithaca, N.Y. Forest log-grown Shitake mushrooms, which are considered epicurean delights, sell for two to eight times more per pound than the more widely available version grown in commercially prepared wood products.

Mushroom farming is just one of the seven "learning units" highlighted on the new online resource center, which was instituted by Paul Treadwell, IT Team Leader for Cornell Cooperative Extension. The HWWFF web site, which is funded by the USDA Sustainable Agriculture Research and Extension program, provides information on forestry farming combined with an online interactive learning platform for different audiences, from educators to forest owners. Landowners can research and evaluate soil quality, existing vegetation, pests, drainage, and other factors to determine which crops would be most suitable for their particular forest. Natural resource educators can tap into course content for forest resource management, while maple sugar farmers can learn to cultivate American ginseng, a crop that thrives in the understory of maple forests.

The HWWFF Resource Center may be viewed at <http://hwwffce.cornell.edu>.

Lauren Chambliss

Students Put Business Skills to Work for Kenya's Seed Industry

In early January, five Cornell students led by Edward T. Mabaya, MS '98, PhD '03, a research associate in the Department of Applied Economics and Management, traveled to Kenya for an intense 10-day field study. Their task: work with two local seed companies to lay out business and marketing strategies in Kenya's competitive seed industry.

They were the fourth group of students to travel abroad with the Seeds of Development Program (SODP), an initiative devoted to alleviating rural poverty in Africa.

Mabaya and his students worked with Freshco Seed in Nairobi and Oil Crops Development in Nakuru. The students consulted with senior personnel, visited maize farms, and talked to distributors who serve as an important link in the companies' sales chain.

The students then developed comprehensive marketing strategies, including designing promotional brochures and building web sites, and presented empirical approaches with broader perspectives that the companies need for future growth. They will follow up by writing a case study and individual papers, and by providing additional consultations for the two companies.

Seed has been shown to play a crucial role in the sustainability of the agricultural system and in food protein supply in sub-Saharan Africa. But building systems to deliver the most recent technologies to farmers is a challenge.

"The overall objective of the field course is to help students build skills needed to address critical issues most likely faced by those doing small and medium business in emerging markets by developing sustainable growth strategies for a

number of selected small and medium private seed companies," Mabaya explains. "Specifically, those strategies will help to make the companies more competitive in both local and international markets, more unflinching to challenges, at the same time reducing risks."

The demand for quality seeds is high, especially for hybrids, improved open-pollinated varieties, and indigenous seeds. But those seeds are not always available to the farmers. Small and medium seed companies must overcome the poor rural transportation infrastructure, lack of effective sales points, and inadequate access to financial services as well as competition from multinational corporations.

The SODP is a project of Market Matters Inc., a nonprofit organization that collaborates with Cornell's Emerging Markets Program.

Huong Quynh Pham

First Endangered Fish Species Recovers—in New York City's Hudson River

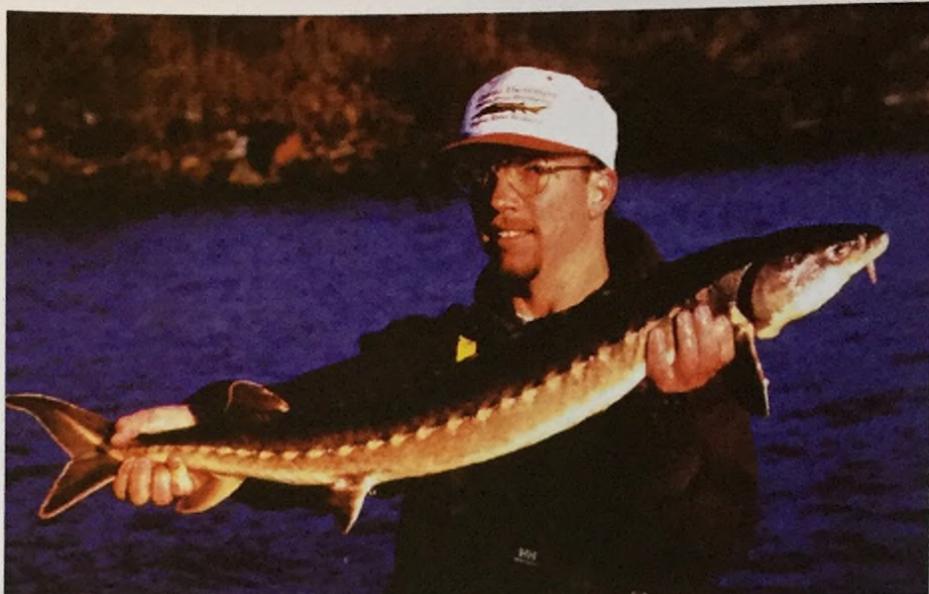
For the first time in U.S., and probably global, history, a fish identified as endangered has been shown to have recovered—and in the Hudson River, which flows through one of the world's largest population centers, New York City.

The population of shortnose sturgeon, which lives in large rivers and estuaries along the Atlantic coast of North America, has increased by more than 400 percent in the Hudson River since the 1970s, reported Mark Bain, associate professor of natural resources at Cornell, and his colleagues in the January 24 online edition of *PLoS ONE*. However, the shortnose sturgeon is still endangered in other rivers, Bain says, and will not necessarily be removed from the endangered species list by the U.S. government.

In the past 100 years, 27 species of fish have died out in North America and four have become extinct. The U.S. government currently protects 149 fish species and subspecies and a total of 1,311 species under the U.S. Endangered Species Act.

"Recovery is very rare," says Bain, who has been monitoring the shortnose sturgeon's population since the mid-1990s and has access to data on the populations since the 1970s.

"The nature of this species, its habitat, and evidence for a large and secure population are



Doug Peterson, a former Cornell postdoctoral researcher, who worked with Cornell's Mark Bain on the study, holds a shortnose sturgeon, the first fish species to recover enough to be taken off the endangered species list.

an example of successful protected species management," says Bain. "Scientists and legislators have called for changes in the U.S. Endangered Species Act; the act is being debated in Congress and has been characterized as failing to recover species."

However, he says, recovery of the shortnose

sturgeon suggests that combining species and habitat protection with patience can successfully recover threatened species, even next to one of the busiest cities in the world.

PLoS ONE is an international, peer-reviewed, open-access, online publication from the Public Library of Science.

Susan Lang

A Building Designed to Keep the Bugs In

There are thousands of dollars of caulk in the new Sarkaria Arthropod Research Laboratories near Game Farm Road in Ithaca.

Normally the idea is to prevent bugs from entering a building, so why all the attention given to sealing up the building from the inside?

"This facility allows us to handle arthropods that don't occur in the U.S. or are here and pose

a threat (mainly to plants)," says Paul Weston '79, entomology, a lead researcher who studies viburnum leaf beetles.

The caulk, along with the screened exhaust system, negative air pressure, double-tank wastewater handling system, black-lit entry vestibule, and other "security" features prevent the arthropods under quarantine from escaping.

The lab is a self-contained research unit—complete with walk-in insect rearing rooms, growth incubators, and wet labs. To maximize researchers' ability to study arthropods in an environment that approximates their native habitats, two greenhouses are attached to the main building—a first for a quarantine facility on campus.

Both the USDA and New York State's Agriculture and Markets must conduct inspections

for each species that will be studied at the lab. Researchers will rotate through the facility—with four or five in at one time—and each new arthropod requires a new certification.

The completion of the facility enables Cornell entomologists to conduct important research on the biology and ecology of invasive species and facilitate evaluation of control strategies. The facility will also permit studies of pest control with natural enemies from overseas, which are subject to quarantine restrictions just like pest species, until it is determined that their release will not cause likely harm in the U.S.

Along with Weston, entomologist Ann Hajek was involved in planning and construction during the seven-year-long project and is conducting research on Asian longhorned beetles.

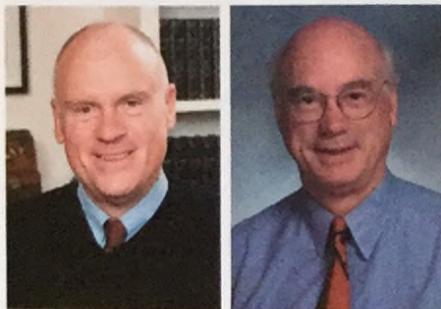
Other researchers expected to make use of the facility are E. Richard Hoebeke, entomology, on alien woodwasps, and Lindsay Milbrath, MS '92, USDA-ARS, who is studying swallowwort.

The facility was named in early 2007 in recognition of a significant gift from Daljit S., PhD '48, and Elaine Sarkaria.

Aaron Goldweber



Dyson Scholars Endowment to Boost Cornell Undergraduate Business Program



Rob Dyson

John Dyson

A prestigious new scholarship program will soon benefit top students in the CALS Undergraduate Business Program (UBP). The Dyson Scholars Program, to be funded with a \$5 million gift from the Dyson Foundation, will begin making awards to UBP freshmen in the fall of 2008. The program will expand in subsequent years to cover all four undergraduate classes and, ultimately, to a select number of UBP students who commit

to enrolling in the Johnson Graduate School of Management's MBA program.

Dyson Scholars will be chosen based on academic performance, with award amounts determined by financial need. Once fully funded, the Dyson Scholars Program will offer awards to approximately 60 students each year. The new endowment will also allow faculty in the Department of Applied Economics and Management to develop special program offerings for the Dyson Scholars, such as an annual visiting speaker, teaching-assistant experience and/or faculty-guided independent study or research, and networking activities.

"The Dyson Scholars Program is intended to build a special sense of community among Cornell's most exceptional undergraduate business students and to offer an added incentive to the best among them to continue their business studies in Cornell's Johnson Graduate School of Management," explains Robert R. Dyson, a 1974 graduate of the Johnson School and

president of the Dyson Foundation. "At the same time, this program will allow outstanding students with financial need to participate more fully in the academic experience at Cornell without undue hardship."

Rob Dyson's brother John, a 1965 graduate of the Department of Applied Economics and Management and the chair of the CALS advisory council, first proposed the idea for the Dyson Scholars Program.

"John and Rob Dyson have played key roles in the rapid rise to prominence of the Undergraduate Business Program, both as benefactors and advisors," says Susan A. Henry, the Ronald P. Lynch Dean of Agriculture and Life Sciences. "These are exciting times for the Undergraduate Business Program, which *Business Week* has just ranked in the top ten, and the Dyson Scholars Program ensures an even brighter future for the program and for many of tomorrow's outstanding business leaders."

Jeanne Griffith

Geneva Experiment Station Reaps First Professorships

The first endowed chair to benefit the New York State Agricultural Experiment Station (NYSAES) in Geneva may also be the first professorship of its kind in the nation. Yongkeun Joh, MS '78, and his wife, Sunny, MS '77, the power couple behind Advanced Food Systems, a powerhouse in the burgeoning field of food ingredient technology, have endowed the Yongkeun Joh Professorship of Food Ingredient and Product Formulation in the Department of Food Science and Technology.

"If you go to most fast-food restaurant chains or sit-down places, most of the products, especially the chicken and sauces and beef, have our products in them," says Joh, whose master's degree is in food science.

The new professorship will reflect the multidisciplinary, problem-solving approach that Joh credits for his success in business. With its industry focus, the Joh professorship will enable greater economic development and add to Cornell's leadership in applied research, says Susan A. Henry, the Ronald P. Lynch Dean of Agriculture and Life Sciences. "By addressing a recognized need of the food ingredient industry, the Joh professorship will contribute significantly to the creation of profitable new business opportunities in New York and the Northeast," she says.

Also at Geneva, Professor Susan K. Brown has been named the first Herman M. Cohn Professor of Horticultural Sciences. The Cohn professorship was established with the proceeds

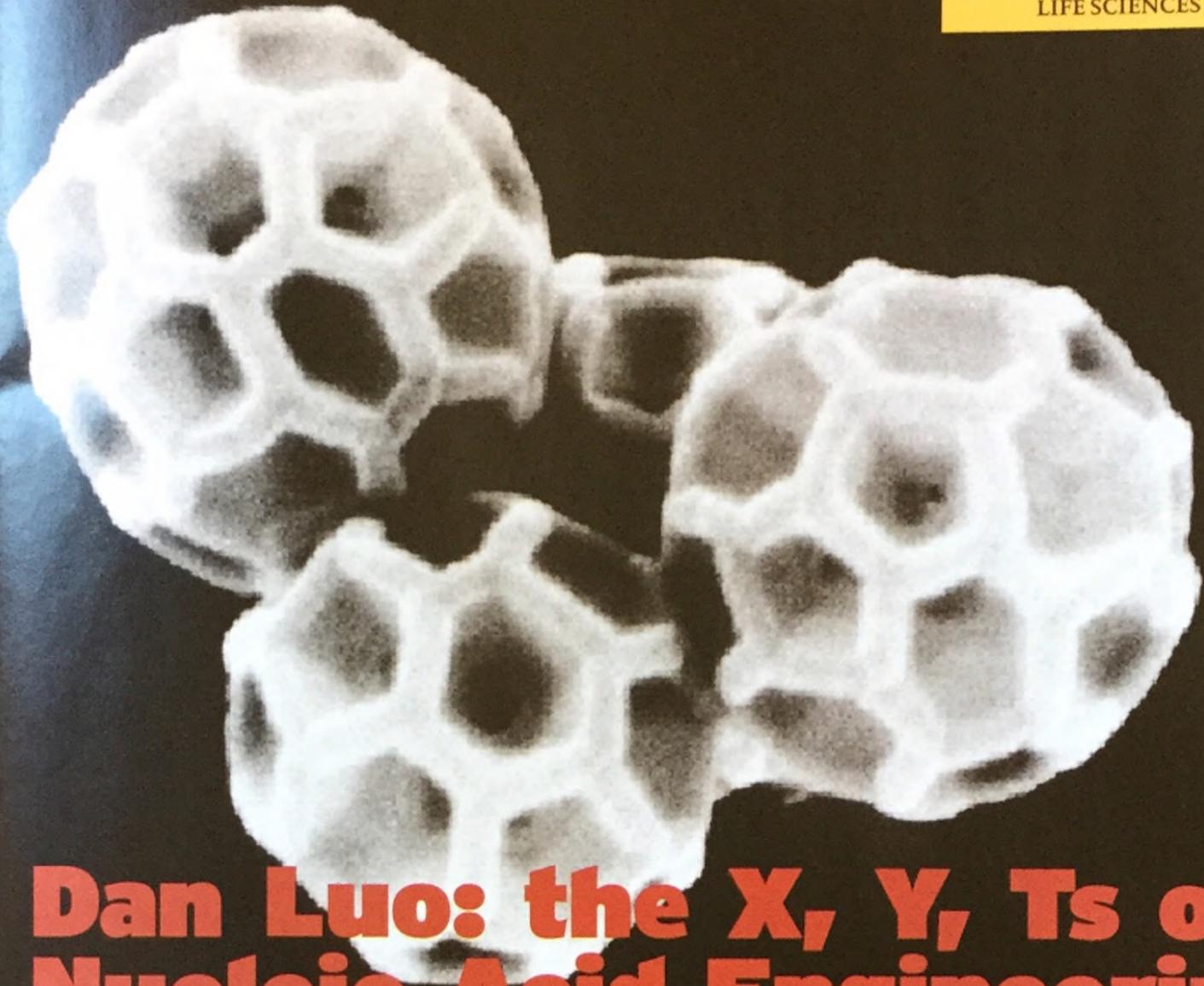


Inset: Professor Cy Lee (left) joins Sunny and Yongkeun Joh at a reception held in their honor. Large photo: Professor Susan Brown stands in an experiment station orchard.

of sales in 1980 and 1992 of parcels of a 300-acre fruit farm on Lake Ontario. The land in Sodus, N.Y., was bequeathed to Cornell upon Cohn's death in 1966.

The Cohn professorship will help support Cornell's apple-breeding program, one of the world's largest. The program emphasizes genetic approaches to understanding and improving apples, including marker-assisted selection,

apple fruit quality, nutrition, plant architecture, and the role that genes play in tree architecture and development. Thomas J. Burr, director of the NYSAES, says Brown is most deserving of the endowed chair. "She is recognized as a world leader in apple breeding and genetics. Her research on apple tree architecture and related genetic markers has the potential to greatly impact the apple industry worldwide."



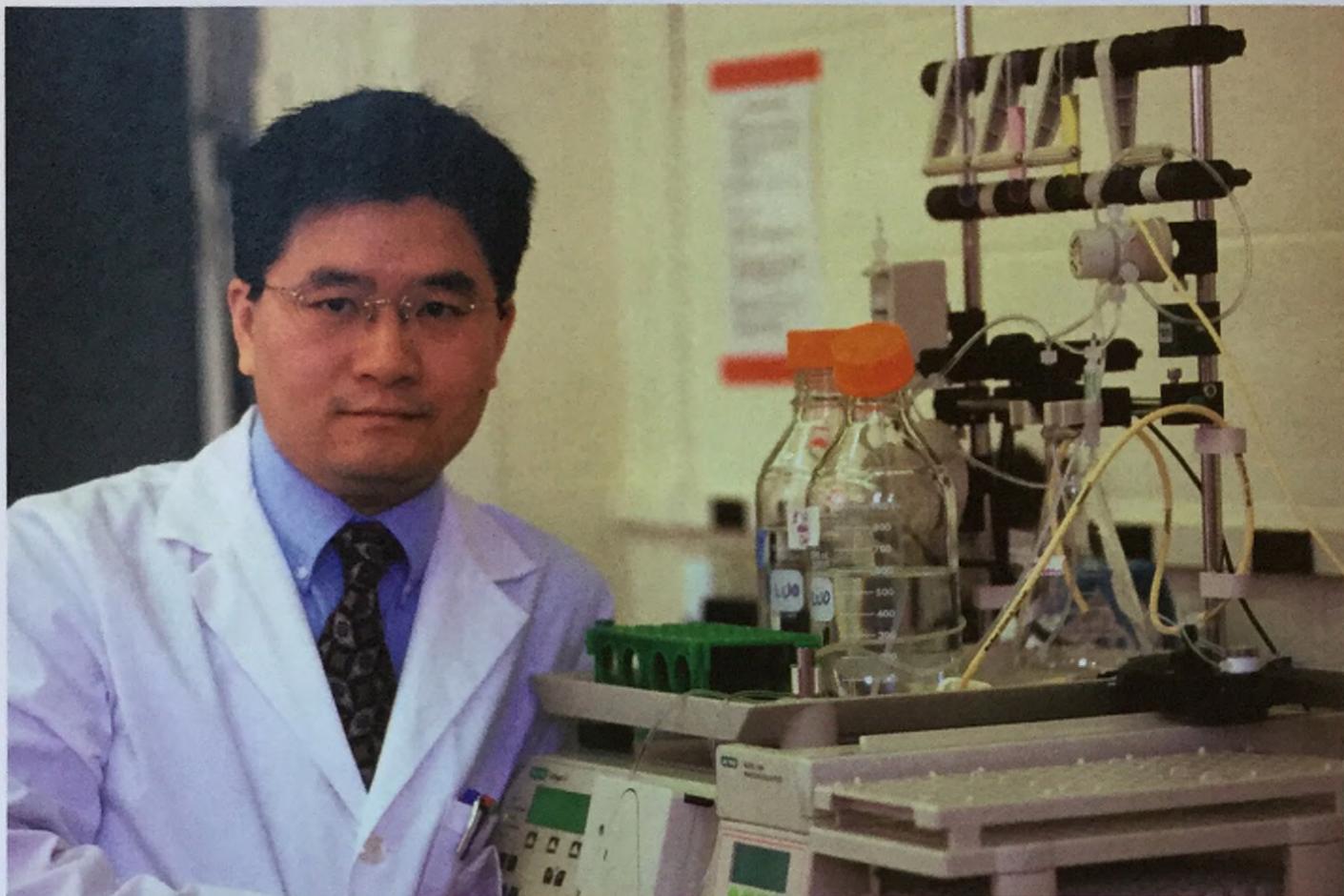
Dan Luo: the X, Y, Ts of Nucleic Acid Engineering

This bioengineer transforms DNA into building materials to construct such things as biocompatible hydrogels and nanobarcodes.

BY ROGER SEGELKEN

In a department first called Farm Mechanics—and subsequently Agricultural Engineering, and now Biological and Environmental Engineering—steel and wood were once the building materials of choice, with nuts and bolts and screws and rivets used to hold structures together.

Those early ag engineers could hardly have imagined the 21st century use of a building material that self-assembles into nanometer-sized buckyballs (the hollow spheres named for Buckminster Fuller and his geodesic domes and made of carbon). Or a biocompatible, biodegradable hydrogel (a semisolid structure with cross-linked molecules and empty spaces) to deliver chemotherapy drugs to tumors and healthy tissue to ailing organs. Or a tree-shaped nanobarcode lighted with different colors to simultaneously detect many pathogens including



anthrax. Or a gel to produce a large amount of protein without any living organisms.

Or countless other structures yet to be imagined by a “mechanic” who trained as a molecular biologist and a chemical engineer, who learned to ignore conventional wisdom about the supposedly impossible, and who now calls himself “a nucleic acid engineer.”

Dan Luo, associate professor of biological and environmental engineering, is the principal investigator (PI) of Cornell’s Molbel (molecular bioengineering laboratory) where seven postdoctoral researchers, eight PhD students, and more than a dozen highly motivated undergraduates work at 30 different projects to make useful structures from a remarkable building material.

That material is DNA. Known as the molecule of life when it carries genetic information, Luo’s DNA begins its career as a building material as a Lego® piece. It has the same chemical components, called nucleotides A, G, T, or C (adenine, guanine, thymine, cytosine), just like a natural DNA. But it is made extremely short (less than 20 bases). In fact, the DNA is so short that it

does not have any genetic function (a typical gene has at least 1,000 bases). In addition, unlike natural DNA, which is always in a linear/circular shape and floppy, Luo’s DNA is stiff and can be branched into a variety of genometric shapes including X, Y, and T. With these Lego® pieces made of DNA, Luo is able to build different architectures from them.

Born to Build

That is because the DNA Lego® pieces still retain a connective affinity for other pieces of their kind, which allows nucleic-acid engineers in the Luo lab to create much more sophisticated architectures because of the famous “non-palindromic sticky ends” property of DNA molecules—in the presence of the appropriate enzymes—the T, X, and Y building blocks self-assemble themselves into non-random structures (called “anisotropic molecules”)—without the need for nano-rivets or fasteners of any kind.

Even real Lego® pieces need kids to assemble them. But Luo’s branched DNA

molecules in what Luo calls the “designer construction kit” (X-, Y-, and T-shaped pieces plus enzymes and the right physical conditions) almost seem to “know” how to put themselves together into two- and three-dimensional structures that humans will find useful.

Of course, it’s not quite as simple as that. If it were, Luo’s group would not be called the first to create DNA bulk materials and would not be eligible for patents on the technologies they develop. But Luo does seem to have a way with DNA. He refuses, however, to take too much credit, saying: “I am very fortunate to have the best postdocs and students in my lab.”

And useful, new materials keep on coming from the Molbel labs that occupy much of the top floor of a newly outfitted east wing of Riley-Robb Hall. The steady output of innovations keeps patent attorneys hired by CCTEC (Cornell Center for Technology, Enterprise, and Commercialization) and publicists in Cornell’s Press Office especially busy.

For instance, the DNA buckyball (actually,

made of DNA-hybrid molecules that include polystyrene) was named "the most innovative product" of 2006 by *R&D Magazine*.

The DNA-based hydrogels can be molded into any shape and size (Luo's "CORNELL," shown on the following page, is about the size of Abraham Lincoln's beard on a copper penny), and the spaces between the branched DNA molecules in the hydrogel structure can encapsulate time-release small-molecule drugs, active large proteins, and even live mammalian cells at the same time as gel forms. Collaborating with Dr. Dolca Thomas, a physician at Weill Cornell Medical College, the latter capability is being investigated to encapsulate live islet cells and to deliver them to a living mouse for the treatment of type I diabetes. The DNA hydrogel's ability to achieve sustained, controlled release of drugs (including insulin and camptothecin, a chemotherapy model drug) also has been proven in laboratory settings.

Always Room for P-gel

More recently, the Luo group invented a cell-free, protein-producing DNA gel that can make, among other things, large amounts of functional GFP (green fluorescent protein) or, alternately, the same glow-in-the-dark luciferase used by fireflies to attract a mate. At first glance, the accomplishment seems not so remarkable, given that genetically engineered microorganisms or cultured cells routinely generate commercial quantities of pharmaceutical proteins—deep inside industrial bioreactors that cost hundreds of thousands or even millions of dollars. But the Luo group's protein-producing DNA gel, which they have dubbed "P-gel," for protein producing gel, synthesizes plenty of protein in a microcentrifuge tube at room temperature. It does this overnight using enzymes and without any living organisms. No more worry about inclusion bodies (proteins aggregate inside *E. coli*), cell culture, or viral contamination. Most proteins can now be produced inside P-gel (Luo's lab tested five proteins so far and all were produced). In essence, from the DNA Lego® pieces, Luo successfully transformed a biological process into a chemical process inside a gel.

As Luo travels to other institutions and describes the evidence from P-gel experiments (without giving away too much detail on a possibly patentable technology), some molecular biologists are calling the process "PCR for protein" (in reference to polymerase chain reaction, the Nobel Prize-winning system to amplify minuscule amounts of DNA into many identical copies). Certain usually skeptical peers go so far as to utter the accolade "breakthrough" when they envision the potential impact of P-gel on the biotechnology and pharmaceutical industries.

The Barcode Reader

One Luo technology that is closest to emerging from the laboratory and finding a place in the sometimes-hazardous world is the so-called DNA nano-barcode system that "reads" distinctive patterns of tree-shaped DNA and fluorescent tags of pathogenic organisms. A much more sophisticated form of the retail-store scanners that read product UPC barcodes, the DNA nano-barcode system from the Luo laboratory is able to detect at least eight different pathogens (anthrax, rabbit fever, ebola, SARS, among them) simultaneously and in a matter of minutes. Taking the DNA nano-barcode technology into the field—and into the hands of technicians who don't have PhDs and advanced training—involves what Luo is calling a portable fix-cytometer: a silicon chip and a UV light source, a digital camera to record color ratios and patterns in wells of the chip, and a PDA (personal digital assistant) computer. Minutes after loading a sample into the fix-cytometer, an operator knows whether the suspicious white power is anthrax—or something else. This project, as almost all other projects in Luo's lab, is a fruit of collaborations with a number of Cornell professors (Y. F. Chang from the College of Veterinary Medicine, H. Craighead from Applied and Engineering Physics, B. Baird from Chemistry, and D. Aneshansley from Biological and Environmental Engineering).

Translating Research

From the window of his Riley-Robb office,

Luo gazes across athletic fields and watches the shell of the university's 250,000-square-foot Life Sciences Technology Building rising to the west. He knows, from reading the floor plans, precisely where DNANO Systems, a start-up company co-founded by Luo, will be in the building's business-incubator space and how far it will be from specialized, shared facilities that the start-up company will need to move his research into the marketplace.

Although they are set apart at ground level, the Life Sciences Technology Building and the Biotechnology Building will be linked by underground tunnels—a likely conduit for new ideas as well as samples traveling from one lab to another. One of Cornell's newest departments, Biomedical Engineering, will be practically next door to the business incubator, as will the new Institute of Molecular and Cell Biology. A stone's throw away are other facilities that are crucial for Luo's DNA work—the Nanobiotechnology Center in Duffield Hall, the CAT center and Bioresource Center in the Biotechnology Building, CHES (the Cornell High-Energy Synchrotron Source) for x-ray analysis at Wilson Laboratory, and CCMR (the Cornell Center for Materials Research) in Clark Hall, to name a few.

"Cornell is a great place to do the kind of basic research that interests me, to do translational research, and to grow a business," says Luo, who was born and schooled in China before undertaking advanced study in the United States. "There are few places anywhere in the world with this many resources."

If Dan Luo has lingering doubts that the start-up DNANO will succeed in the cutthroat world of biotechnology, those doubts don't show, and others share his optimism. DNANO earned a third-place, \$10,000 prize in the first International Nanotechnology Business Idea Competition and a second place, \$28,000 prize in the fourth annual Purdue University Business Plan competition. Luo plowed back the prize money into his academic research in the Department of Biological and Environmental Engineering.



Molecular Bioengineering Lab/Cornell University

These molded samples of hydrogels demonstrate that DNA hydrogels will hold their shape for applications such as tissue engineering.

But another confidence-inspiring award, a half million dollars from the NYSTAR (New York State Office of Technology, Science, and Academic Research) Technology Transfer Incentive Program will help promote R&D at DNANO, Luo promises.

Training the Next Generation

Even a motivated multitasker like Luo can't do all this without plenty of talented help, a reality that he is the first to acknowledge, and he takes pride in recruiting some of Cornell's top students to explore the possibilities of nucleic acid engineering. In fact, his first lab helpers—before any grad students joined the Molbel research program—were undergraduates. Luo still maintains about 12 undergrads a year, including some who make the cross-campus trek to Riley-Robb from different departments (including Chemical Engineering, Materials Sciences and Engineering, Biology, and Applied and Engineering Physics) and find themselves intrigued and then engaged in

the wonders of DNA as a building material. They work side by side with Luo's graduate students and postdoctoral fellows, often on research projects that the undergrads designed themselves to complement the overall mission of the program.

Graduate students and postdocs who join the Luo lab, however, don't stumble onto it accidentally. They know what they want to learn and they know his work from reports in top-tier publications (such as *Nature Materials*, *Nature Biotechnology*, *Nature Protocols*, and *Journal of the American Chemical Society*) and from invited presentations at conferences, university lectures series, and industrial laboratories around the world. As a matter of fact, Luo gave more than 30 invited talks in year 2006 alone. Also in 2006, Luo won a prestigious National Science Foundation's Early Career Award.

For a scientific educator with such a keen view of his field, the lines between science, engineering, and learning are somewhat blurry. He's absolutely clear about his own career objective ("to integrate molecular

biology with engineering, and to educate a first-rate, new generation of biological engineers") and he asks grade-obsessed students to learn by asking tough-but-interesting questions and by acting like an engineer. "My underlying philosophy of research and teaching is to integrate 'what has been discovered' in molecular and cell biology to engineer 'what has never been.' When you engineer 'what has never been' you discover more 'what is' in science. And the cycle goes on."

One Impossible Mission

As Luo leads a visitor through his laboratory spaces, heads pop up for quick, friendly greetings before the students return eagerly to their investigations.

In some rooms, newly arrived equipment has yet to be installed. In one darkened room, wires dangle from previously used equipment—silent evidence of a line of inquiry that didn't pan out. Nevertheless, that is a valuable learning experience for students, Luo comments. Not every scientific experiment proceeds as planned, no matter how many times it's tried, and even fewer result in a new product or a better technology.

The busiest labs feature fish tanks with silvery creatures swimming lazily through crystal-clear waters, a surprising contrast to all the stainless steel, glassware, and electronic gear. The fish are not part of the biology experiments (or the source of weekly lab lunches/dinners), Luo notes. Rather, their presence is thought to help relieve stress among the hard-working humans who share their space. "I try to keep everyone happy," he says.

Workplace happiness is also the reason for the amply stocked refreshment bar that offers fresh coffee, hot chocolate, and a variety of teas and filtered water—everything but fruit smoothies. Yet, a high-speed blender sits nearby, woefully under-utilized.

Surely, would-be bioengineers who whip up high-tech hydrogels can make a simple smoothie? They can, all right, and his students used to make some of the best. But they're not allowed to anymore. "The smoothie machine," the ever-practical professor states, "is impossible to keep clean in a 30-person lab."

Informed Citizens: Improving Science Literacy by Teaching through Inquiry

BY AARON GOLDWEBER

For many scientists, science teachers, and science-minded Americans, some longstanding foundational theories of modern science are under attack, dismissed with nothing more than a wave of the hand and the casual muttering, "Well, after all, it's just a theory." A potential victim of the vagaries in modern language, the concept of a scientific theory—actually a title given only after years of study, research, and debate—is being eased into the mainstream lexicon alongside hypothesis or guess. Faculty members in the college's Department of Education answer this growing challenge to science and help promote healthy public dialogue by preparing teachers to bring a high-level of scientific literacy and hands-on methods into their high school science classrooms to produce knowledgeable graduates.



Professor Barbara Crawford (foreground) and doctoral students Robert Humphrey and Xenia Meyer are designing innovative curricula to help diverse students learn about evolution and science inquiry by using authentic fossil samples.



For Barbara Crawford, associate professor in the Department of Education, there's no better example of science under fire than the current debate about Darwin's theory of evolution. According to Crawford, what's most noticeable in the debate is the low level of public literacy about science in general—and evolutionary theory specifically—that prevents people from discussing evolution from an informed point of view.

"Evolution through natural selection is a commonly misunderstood concept for students and adults alike," says Crawford. "Many people misunderstand how a scientific theory is developed. An increase in public understanding of the nature of science would lead to healthier conversations about controversial topics like evolution."

According to Crawford, the debate about evolution could be greatly improved with the reshaping of how it is taught in secondary schools and the way science teachers are prepared to assist students—future citizens—in building an understanding of the nature of science and scientific theory.

She says that many students are graduating from high school with almost no grasp of how scientific research is done or what goes into making good science. It's not surprising, then, that the public discourse about evolution often doesn't include basic, up-to-date information about research methods or empirical evidence. The reason for this lack of understanding is simple. Crawford says as early as the eighth grade, many students lose interest in science; they're intimidated and therefore shut down—learning little. Then they graduate and become part of the adult society, largely confused and uninformed about science and unable to grasp basic concepts or construct evidence-based arguments.

Photos by Lindsay France



Connecting Students to the Data

One of the ways to prepare prospective teachers to teach controversial concepts, Crawford says, is employing a teaching approach called “teaching science through inquiry.” Crawford researches how teachers can use inquiry-oriented approaches to engage students in investigations similar to the methods of practicing scientists. So, instead of students learning by primarily reading a textbook or hearing a teacher’s lecture, they ask questions, conduct hands-on investigations, and use evidence to develop understandings about science concepts.

“At the heart of inquiry is the process of using data to develop an evidenced-based explanation, just like scientists do,” explains Crawford. “The challenge, though, is connecting to that data; what we’re preparing our pre-service teachers to do is draw on their students’ own life experience and connect it to the science lesson in front of them.”

She says that the science-through-inquiry approach goes into the concepts in greater depth. But quite surprisingly, perhaps, some practicing science teachers don’t know their science well enough to reach the necessary depth. And even after gaining a stronger foundational knowledge in science, how do they go about employing classroom techniques that are so foreign to their own experiences as students?

“CALs undergraduate pre-service teachers benefit from the same foundational knowledge in the sciences as students with a pre-med focus at Cornell,” Crawford explains. As for giving them a fresh perspective on how classroom science can be approached, prospective teachers take a teaching methods course where they experience, as a learner, an inquiry-oriented approach.

According to a newly presented research paper co-authored by Crawford and doctoral student Robert Humphrey Jr., a Cornell pre-service teacher recently tackled teaching evolution in a classroom in rural New York. Positive findings indicated that by using an inquiry-based approach, 69 percent of the tenth graders demonstrated an “informed/scientific understanding of evolution by natural selection as compared to only 21 percent during the [unit’s] pre-test.” A previous study indicated just 12 percent proficiency of students learning the same topic. Why such a big difference in the numbers?

“We find that you can learn more when you’re given the opportunity to make sense from data and fit it with your experiences,” Crawford says. “The more opportunities that our pre-service teachers have to integrate this approach, the more success we think they’ll have in helping their future students in gaining understandings of science.”

As a way to help teachers engage their students in learning about evolutionary concepts and the nature of science through inquiry, Crawford is collaborating with Warren Allmon and Rob Ross of Ithaca’s Paleontological Research Institution on a project called Fossil Finders. The project

More than Farming: New Directions for Agricultural Education

When nearly one-third of American high school seniors can’t comprehend basic written information, Travis Park wonders why language arts curricula start falling off in the fourth grade.

Park, an assistant professor of education, sees a particular neglect of language arts skills among high school students in agricultural education programs. In fact, the neglect goes beyond language skills and includes a paucity of education in the sciences.

“By bringing English language arts, math, and basic science to the aged classroom, we’d be helping to shape more well-rounded students with strong critical-thinking skills,” Park says.

“For example, studying photosynthesis can be approached from a couple of perspectives, like biology and horticulture, with each of them having theoretical and applied benefits. And by requiring a written paper at the end of the unit, we can make sure students understand the subject and are capable of communicating this understanding,” he explains.

How is Park helping to bring about these changes? His research is demonstrating that practicing teachers can employ even just a handful of strategies—like pre-reading and pre-writing assignments at the start of a unit—to successfully bring language literacy into the classroom.

For prospective teachers, Park gets to them early so they have the tools to create a learning culture in the classroom that shows the importance of reading and writing. According to Park, with the proper tools in hand, they’re willing to take on the challenge.



University Photography

Preparation for the Classroom: Cornell Teacher Education Program



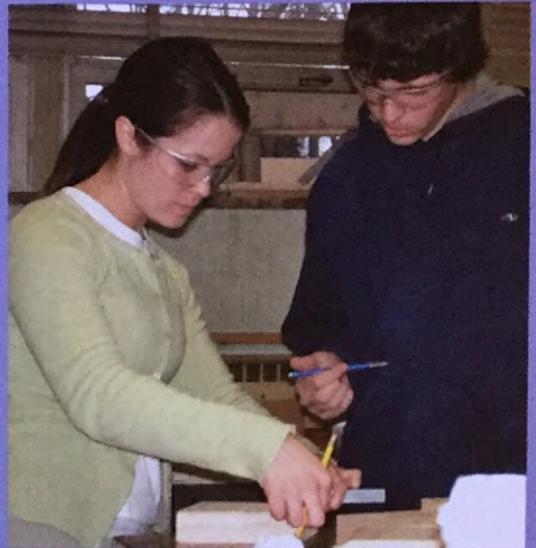
"Becoming an excellent teacher is a process that has no end; there are always new things to understand, new ways to act," says Deborah Trumbull, associate professor of education and director of the Cornell Teacher Education (CTE) program.

The CTE program supports the unique needs of high-school teachers of agricultural science, mathematics, or science and prepares teachers to work with a range of students in a variety of educational settings—urban, suburban, and rural. Courses and fieldwork integrate both the practical and theoretical aspects of learning and teaching. By engaging

in experiences that focus on learning in different subject areas, developing critical and reflective thinking skills, professional development, and the use of inquiry in the classroom, prospective teachers develop a greater understanding of their subject areas and an increased awareness of how pupils can best learn.

To prepare for teaching, nearly all of the 15 to 25 graduates a year complete a BS in their content area, followed by a master of arts in teaching (MAT). Students who begin the CTE program as Cornell undergraduates also complete an undergraduate minor in education and are able to complete the MAT with two additional semesters. Students who have completed the bachelor's degree elsewhere require three semesters to complete the MAT.

Explains Trumbull, "A good teacher must not only understand one's subject matter deeply, especially now when new discoveries continually challenge our existing ideas, but also encourage learners to care enough for the subject matter to engage with it and come to use that new knowledge in their lives."



Students at McKinley High School in Buffalo learn how to create floral arrangements by practicing the use of balance, symmetry, texture, and color.

will ship samples of shale from the Ithaca area to classrooms across the country. Students and teachers will participate in an authentic investigation of Devonian fossils and engage in identifying fossils and adding data to an on-line database. One goal is to motivate children to learn more about science, including culturally and linguistically diverse groups of children.

Former Teachers Take New Approach

Two former high school teachers think teaching science is so important that they left their jobs. They want to design new curricula and methods for the teachers who walk in their footsteps—to face students who often don't grasp the differences among beliefs, hypotheses, and theories, or how to use data to prove that something is true. For example, when studying evolution, the data are fossils.

Robert Humphrey Jr., who taught biology in Syracuse and Binghamton, N.Y., is now a doctoral student in the CALS

Department of Education. Humphrey says, "I was drawn to the college by the types of science education research being done here, which is centered around hands-on experiences for students. I also considered the history of outreach at Cornell, the body of experience, and the varied expertise here."

After receiving his PhD, Humphrey plans to teach science education at a college or university and thereby have a greater impact on how science is taught in schools. "As a high school teacher, I could impact about 100 students a year, but as a professor, I could expand that out, based on the number of college students I had. Those future teachers could reach maybe 1,000 or 2,000 high school students each year," he says.

Xenia Meyer, who formerly taught environmental science in San Francisco, is also studying for her doctorate in the Department of Education. "I came to Cornell to study for my doctorate because I wanted to work with faculty whose

research focus is inquiry-based science," she says. Her goal is to find the most effective means of integrating inquiry-based methods into high school science curricula.

After she earns her PhD, Meyer would like to work with teachers, policy makers, or think tanks in looking critically at science education and finding ways to better reach marginalized students.

Crawford concludes, "The challenge in educating students escalates with novice teachers who may feel uncomfortable with orchestrating classroom discussions that drift into controversial areas and areas in which they themselves lack understanding. In studies over the last decade, 97 percent of science teachers said that their undergraduate methods class did not prepare them to teach evolution. Our goals are to change that."

CAUTIONSTOP MACHINE BEFORE
MAKING ADJUSTMENT
KEEP FINGERS
CLEAR OF MACHINE
WHILE IN MOTION

Food Scientists Keep Watch Over Dairy Foods

In the labs and offices of Stocking Hall, CALS' experts in food safety, sensory evaluation, and regulatory compliance are serving the state's billion-dollar dairy industry, consumers of its products, and the next generation of the industry's personnel.

University Photography

BY METTA WINTER

It's Monday morning on the top floor of Stocking Hall. Kathryn Boor '80 has just hung up the phone. The call from Tom Eastham, plant manager for Empire Cheese in Cuba, N.Y., hadn't taken long—he had just wanted to bounce around some new ideas for microbiological troubleshooting.

Down in the basement, David Brown '69, MS '72, is taking a call from a newly licensed farmstead cheese maker, who, only weeks into production, had walked into his aging room to find a mold growing that he had never seen before. He asked: Was it friend or foe? How did it get there? What do I do? (It was foe, and Brown gave him detailed instructions on how to get rid of it.)

Here are a few of the many other efforts currently underway by faculty members in the Department of Food Science in Ithaca.

Robert Gravani, MS '69, PhD '75, professor of food science, developed the concept for a National Good Agricultural Practices (GAPs) program, funded by USDA, to assist farmers throughout the country in reducing the microbial hazards and risks in the production, harvesting, and packing of fresh fruits and vegetables. GAPs has created innovative education and training materials in English and Spanish for farmers and farm workers and their children. In addition to conducting GAPs training programs around New York State for grower organizations, an online course for growers is being developed.

Harry Lawless, professor of food science, with Kathryn Chapman '69, research support specialist, maintains a sensory testing laboratory open to all researchers at Cornell and external clients who need to do taste tests. The facility is extensively used by the Milk Quality Improvement Program for shelf-life testing. The lab is equipped with data collection software for administering questionnaires, setting up test design, and analyzing data. It also provides advice to users on sensory test methods, to make sure they have the right tool to answer their research questions.

Dennis Miller, PhD '78, professor of food chemistry and nutrition, participates in HarvestPlus, a global research alliance focused on reducing hidden hunger in the poorest of the poor in developing countries. The group is conducting studies to assess the bioavailability of iron and zinc from bio-fortified crops developed by plant breeders in the Consultative Group on International Agricultural Research (CGIAR) system. They use cell culture and piglet models to measure the content of bioavailable iron and zinc in these crops.

Joe Regenstein '65, MS '66, professor of food science, has been researching fish gelatin derived as a by-product from the skin of fish. This protein can have a range of melting points lower than those for beef and pork gelatin, allowing the food industry to optimize food products using this additional dimension. Fish gelatin also meets the specific needs of both the Muslim and Jewish communities for gelatins not obtained from warm-blooded animals. Regenstein works closely with the Islamic Food and Nutrition Council of America and advises groups concerned with Jewish dietary laws.



In a second-floor classroom, Martin Wiedmann, PhD '97, is shaking up a new bunch of animal science undergraduates who, deeply engrossed in scientific strategies for economically efficient milk production, don't want to face the ever-changing irrationality of a consumer-driven marketplace.

Sitting in his first-floor office, David Barbano '70, MS '73, PhD '78, also has consumers on his mind: their nutritional savvy. Barbano continues to tweak the formulation for a high-protein, high-calcium shake that would be low in sugar as well as fat.

Safety First

Although nutrition, quality, cost, and environmental issues are food-related worries on the minds of consumers, their foremost concern is safety. In the last quarter of 2006 alone, bacteria-tainted tomatoes, spinach, and lettuce made the headlines with hundreds of people sick and several dead.

But when it comes to dairy products, New Yorkers can rest assured. The first-rate scientists in the college's Department of Food Science are doing the worrying for them.

Most people don't remember that not all that long ago milk carried diseases that routinely killed New York City's children. It wasn't until the mid-1920s that physicians and scientists discovered that raw milk was the culprit in spreading diphtheria, typhoid, and tuberculosis. Pasteurization, in which high heat is applied long enough to kill disease-spreading organisms, was instituted not long after, ensuring that milk would be safe to drink.

"People don't realize that the pasteurization of milk is a public health measure mandated to protect everyone," says Professor Kathryn Boor, who, as director of the Food Safety Laboratory, has received international recognition for her research on microorganisms responsible for foodborne diseases and food spoilage.

To be effective, pasteurization must meet safety regulations set by the New York State Department of Agriculture and Markets. To make sure that operators of the highly technical equipment know their jobs thoroughly, specialists in the Food Science Dairy

Extension Program train them at schools held twice yearly.

These pasteurization schools are part of a multipart collaboration between the New York State Department of Agriculture and Markets and the Food Science Dairy Extension Program that involves every segment of the dairy industry beginning on the farm and extending all the way to the household refrigerator. Certified milk inspectors who are responsible for farm hygiene, dairy laboratory personnel who analyze the safety and quality of milk and dairy products, dairy product specialists who inspect dairy processing plants, and superintendents of those plants who are responsible for manufacturing safe products attend trainings and updates each year run by the extension program staff.

"We have our fingers in every single processing plant in the state—big and small," says Boor. "So there's a mechanism in place for getting information about new regulations and new issues in food safety out in a timely fashion."

Taste Matters, Too

Milk is a billion dollar industry in New York. As the state's leading agricultural product, it accounts for over one-half of the total agricultural receipts: \$1.91 billion in 2005, the latest year for which statistics are available.

The better milk tastes and the longer that good taste lasts, the better it sells. Farmers know this. And for that reason New York farmers put up nearly \$400,000 per year in support of the food science department's research and outreach. Funded by farmers, the Milk Quality Improvement Program

(MQIP) is unique in the country, perhaps the world. Participation is voluntary, but because it's based on routine testing of milk, it is considered by the Department of Agriculture and Markets as a sentinel for quality and safety, in lieu of additional layers of regulatory oversight. Most New York processing plants have chosen to participate. Seeing its virtues (between 1996 and 2005, New York State dairy processors had a 47 percent increase in milk products that "tasted good" at the end of shelf-life), plants in Massachusetts, New Hampshire, New Jersey, Pennsylvania, and Vermont have joined up.

Twice yearly each plant is visited unannounced. A sample of the plant's milk is taken and analyzed for its chemistry, microbial content, and sensory characteristics. The analysis is done three times (at pick-up, half-way through shelf-life, and at the end of shelf-life). The data are put on line, so each plant can benchmark itself against the entire state. At the end of the year, the best plant is awarded a gold medal at the New York State Fair.

"Participation in the Milk Quality Improvement Program is one of the tools we use to be pro-active in ensuring product quality in our fluid milk," says Stephen Lally '76, director of quality assurance for Crowley Foods, a division of H.P. Hood.

Free trouble-shooting is offered to all participants. "They get very targeted, very directed feedback on exactly what they need to do," Boor says.

More Than a Beverage

Americans are eating more cheese and cultivating a taste for crowdie, tilsit, fromage blanc, and fresh chevre. More than one-third of the milk produced each year in the United States is manufactured into cheese. About half of the cheese produced in New York is Italian type, followed by creamed cheese, and cottage cheese.

In fact, New York leads the nation in cottage cheese production; more is made in New York than the total production of its two closest competitors combined. The big reason why this industry is so vital today is a



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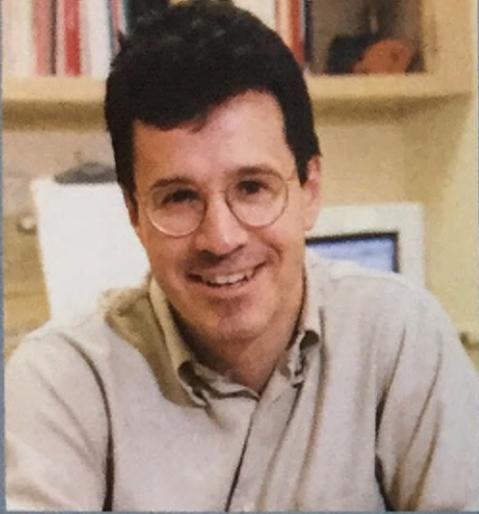
Kathryn Boor, professor of food science and director of the Food Safety Laboratory, is internationally recognized as an expert on microorganisms that cause foodborne disease and spoilage.

scientist in the food science department recognized that the same gas that carbonates soda can keep cottage cheese from spoiling.

"We ate a lot of cottage cheese when we were young, but, by the mid-1990s, my wife stopped buying it, saying that it spoiled before we used it up," recalls Professor David Barbano, director of the Northeast Dairy Foods Research Center, who took Professor Joseph Hotchkiss's discovery and developed the technology to make it work. The airtight plastic sheet beneath the lid that is now common on plastic cheese and yogurt containers was suggested by Barbano who had found that the carbon dioxide escaped through conventional packaging. Not only did the cottage cheese taste better, but the shelf-life could be extended from 21 days to between 50 and 90 days.

A year after adopting these new technologies, cottage cheese sales increased for the first time in 20 years and has been on the rise ever since.





Fingerprinting Pathogens Using DNA

The hiding place at the fish plant turned out to be the cushioning grooves in the rubber floor-mats that OSHA mandates for worker comfort while standing.



So wily is *Listeria monocytogenes* that the bacteria would evade the most sophisticated of sanitation processes on Friday night, spend the weekend cozied-up in the mats, emerge once again each Monday morning, and possibly spread in a plant after production starts. It took Martin Wiedmann, PhD '97, and his team of graduate students one and a half years to figure this out. They could never have done so without DNA fingerprinting.

"DNA fingerprinting allows us to identify one specific strain of an organism for which there are thousands," explains Wiedmann, of *L. monocytogenes*, a bacteria so deadly it kills 500 Americans each year, yet is so ubiquitous that 5 percent of the swabs Wiedmann took from the sidewalks of Albany turned out positive for it. Wiedmann is the director of the Laboratory for Molecular Typing within the Department of Food Science's Food Safety Laboratory.

"Once we get the fingerprint," he went on, "then we can trace the trail of the strain through a plant to find where it might be hiding." *Listeria monocytogenes* is a challenge for many producers of ready-to-eat foods (foods that are usually eaten by the consumer without further cooking), but Wiedmann and Kathryn Boor have worked with small-scale cheese producers and smoked-fish processing plants throughout New York to help them using DNA fingerprinting methods to control this pathogen.

"Over the years, we've gained a better understanding of how this organism survives in processing plants and how it moves from the plant environment to the product," says Wiedmann, whose group has published many scientific papers as a result. "This knowledge is now being applied broadly to many food products."

Metta Winter

Designing Products for Consumers' Lifestyles

"The turnaround in cottage cheese sales is because we made the product fit the lifestyles of those who buy it," explains Barbano, who pioneered the development of reduced-fat mozzarella that's now popular on pizza.

He currently is working on ways to use a new filtration technology he's developed to deliver milk protein in beverages more acceptable to kids (apple juice, for example).

Now that he can separate out different kinds of milk proteins, Barbano is figuring out how to use one kind—colorless and flavor-neutral soluble milk proteins from skim milk—to fortify clear beverages. The drinks will have the same appearance and refreshing taste with the nutritional value of milk.

At the same time, Barbano is working with calcium-rich caseins—another of the separated proteins—which, when concentrated in a low-sugar shake-type beverage, impart the mouth feel of a high-fat product without containing any fat at all. The added advantage of caseins is that they can tolerate high-temperature treatments, so milkshakes made with them need no refrigeration until right before opening.

Growing a Niche Market

Prior to 1851 when the first cheese factory in the United States was opened in Oneida County, N.Y., all cheese was made on the farm. Today, program staff offer technical assistance and critical guidance to New York's cheese makers of all sizes from giant corporations to the 24 artisanal cheese makers whose products range from sheep yogurt made from 1,000 East Friesian cross-bred sheep to organic gouda from a herd of just 15 grass-fed Jersey cows.

In the modern era of artisanal cheese, goat's-milk cheese made a comeback in New York in the mid-1980s. By the early 1990s, sheep's-milk cheese had caught on. The last five years have seen a sharp increase in both as well as in cow's-milk cheese, on farms from the eastern tip of Long Island to the North Country, and west to the Finger Lakes and beyond.

David Brown is there to help every step of the way from facilitating regulatory com-

pliance with the Department of Agriculture and Markets to troubleshooting to creating nutritional labels when a huge retailer like Wegmans agrees to stock their product.

"For some, the only cheese they had ever made was in a double boiler on top of their kitchen stove," says Brown, whose goal is to provide the science that the cheese makers need to produce a safe, wholesome, and delicious product season after season.

"The failure rate of these businesses has been about 80 percent," he says, adding that maintaining consistent quality is tough, especially for those interested in rotational grazing and other less-mechanized methods of animal husbandry. "I ask a lot of hard questions, give a reality check, and keep my phone line open. I want that 80 percent to become a success rate."

Industry of Tomorrow

It's not just artisanal cheese makers who need background in this staple first made by Arabian traders 4,000 years ago. Increasing numbers of new industry employees didn't grow up on farms, nor do they have degrees related to food science or dairy foods. The jobs are there, so Department of Food Science staff provide crash courses (with web site back-up) for all companies that ask.

The foundation course for undergraduates aspiring to careers in tomorrow's dairy industry, whether on the farm or beyond, is Food Science 351 Milk Quality.

"First and foremost, I want students to think all the time about the fact that what they are producing is food for real customers, not a commodity for a cooperative or wholesale buyer," says veterinarian and food safety expert Professor Martin Wiedmann. "This is essential to make them forward-thinking farmers who will anticipate trends and deliver the milk the industry needs."

Harvesting Heavy Metals

CALS scientists are exploring the potential of plants to clean up polluted soils.

BY JEANNIE GRIFFITH

The ground beneath our towns and cities harbors a legacy of the industrial age that threatens to endure for decades, if not centuries. In many areas of the developed world, the soil has high concentrations of organic toxins and heavy metals deposited through smelting, manufacturing, and other industrial processes, and the burning of fossil fuels. In remote areas of the Rocky Mountain states and elsewhere, groundwater fills thousands of abandoned mines, creating toxic soups of arsenic, copper, cadmium, zinc, lead, sulfuric acid, and other substances that are endangering whole watersheds. Even farmland is less than pristine, contaminated from the application of phosphate fertilizers and sewage sludge.

Professor Beth Ahner and doctoral student Tim Vadas look at the roots of a hydroponically grown *Brassica napus*, the plant that yields canola oil. The plant has biochemicals that are able to bind with lead and cadmium.

Photo by Jason Koski

It will take some inspired approaches to undo so much damage. Though science is far from having all the answers, one area of exploration that shows promise is phytoremediation, the use of plants to clean up polluted soils.

A Mighty Little Weed

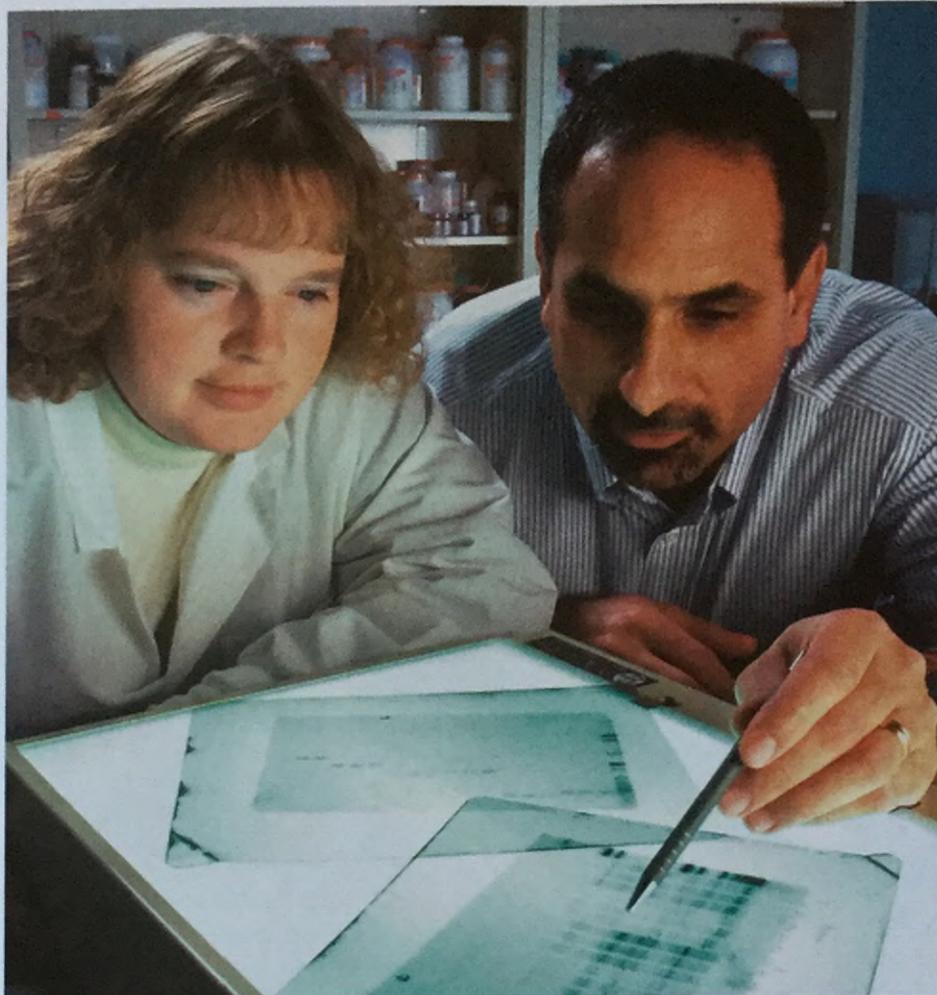
"There are some really cool plants out there that will not only tolerate very toxic soils but will accumulate some of those metals to very high levels in the shoot," says Leon Kochian, a USDA plant physiologist, director of the U.S. Plant, Soil, and Nutrition Laboratory located on Cornell's campus, and Cornell professor of plant biology and crop and soil sciences. In particular, Kochian cites *Thlaspi caerulescens*, a member of the cabbage family known to some as Alpine pennycress: "This plant accumulates metals to astounding levels."

What sets a hyperaccumulator apart from other plants is its ability to allow heavy metals to cross the membrane from the roots to the xylem for transport to the shoots. *Thlaspi* can pack its leaves with 30,000 to 40,000 parts per million of zinc and 10,000 to 20,000 parts per million of cadmium, says Kochian, who has studied the plant for many years. But this humble-looking weed is too small to have a meaningful impact on a heavily polluted site. Kochian's work with *Thlaspi* is focused on figuring out the molecular mechanisms that allow the plant to tolerate having up to four percent of its leaf mass taken up with very toxic metals.

"We have found a couple of membrane transporter genes that look really interesting," says Kochian. "The idea is to identify a suite of hyperaccumulation genes and transfer them into a plant with bigger biomass."

Willows

Willows (*Salix spp.*) do have enough biomass to be useful for phytoremediation. While they do not accumulate metals to anywhere near the levels of *Thlaspi*, they are valued for their ability to accumulate cadmium and zinc from both soil and groundwater. Murray McBride, a professor of soil chemistry, has been surveying an array of *Salix* species for metal tolerance by grow-



Scott Bauer, USDA

Leon Kochian and research associate Deborah Lethman study electrophoresis films to identify *Thlaspi caerulescens* genes responsible for heavy-metal transport.

ing them in hydroponic solutions laced with cadmium and zinc. "At this point," he says, "two of the 14 species or subspecies we have screened look excellent as candidates for field remediation. We're getting at least 1,000 parts per million zinc in the leaf tissue, and they have no problem with cadmium levels at 100 parts per million, which for cadmium is very high."

McBride notes a second advantage of using willows for phytoremediation: "This plant grows like a weed, and it generates a lot of biomass that can be used for biofuel."

Undesirable Uptake in Crops

The tendency of a plant to accumulate heavy metals is not good, however, if that plant ends up in the food chain. There has been concern about willows in this respect, says McBride, especially as deer use them for forage. And while our diets depend on the ability of forage and food crops to pick up

trace amounts of iron, zinc, and many other metals, crop plants sometimes accumulate toxic substances as well. Durum wheat tends to concentrate cadmium in the grains, the part of the plant that is ground to make pasta flour. This is an issue for wheat grown in North Dakota, where a low level of cadmium occurs naturally in the soil.

Jonathan Hart, a Cornell senior research associate in the Kochian laboratory, has studied this problem for a dozen years. While Kochian works with clearly toxic levels of cadmium in *Thlaspi*, Hart is working with "agriculturally relevant concentrations," as Kochian calls them, of less than one part per million. While this level is deemed acceptable in the United States, international trade organizations have sought to impose much stricter limits on the level of cadmium allowable in foodstuffs, a move that might bar imports of North Dakota durum wheat.

"My approach is to look at the physiological aspects of how cadmium is taken up by the plant, how it's distributed, and how it arrives in the grains," Hart explains. To study this, he is examining two durum wheat cultivars, isolines that are identical except for a few genes involved in limiting cadmium accumulation in the grains.

Engineering a Solution to Lead

Another analog of cadmium and zinc is lead, one of the top three pollutants of soil. But lead presents a different problem. "We're looking at lead because it's not very soluble; it's very hard to move it from soil," says Tim Vadas, MS '06, a fourth-year doctoral student in the laboratory of Beth Ahner, associate professor of biological and environmental engineering. Lead has been solubilized, says Vadas, using synthetic chelators such as EDTA. "But the compound is pretty stable and not as biodegradable as biological compounds, so it has a greater potential to leach away into the groundwater if it isn't taken up by a plant."

Working primarily with hydroponically grown *Brassica napus*, the plant that yields canola oil, Ahner and Vadas are focusing on cysteine and glutathione, two important biochemicals in plants that are able to bind with lead and cadmium so that the plants will take them up into their roots. "Thiol-containing compounds such as cysteine and glutathione are relatively specific ligands for these two metals, and they are biodegradable," Ahner says.

In collaboration with Professor Roger Spanswick, a department colleague with expertise in membrane transport, Ahner and Vadas are also examining the corresponding glutathione transporter within the plant membrane. "It was not obvious to us that this glutathione transporter would actually take up a lead complex," says Ahner. "We've been surprised and pleased to find that we are getting a lot more uptake of lead in the presence of these thiols."

Their progress will ultimately depend in part on the progress of plant genomics research. "Even in *Arabidopsis*, where they have the whole genome sequence, the molecular biologists don't know what every

gene does," Ahner points out. "We're aware of the plant molecular biology and trying to take advantage of those intrinsic plant mechanisms as part of our strategy for the engineering application."

Although much more research is needed to make phytoremediation effective for large-scale environmental clean-up, plants offer inexpensive and renewable tools for addressing serious environmental challenges. One of many questions remaining

to be answered is why a plant would take up toxic metals in the first place. Leon Kochian has a theory about that one: "When we were growing *Thlaspi* in the lab, the plants had a lot of problems with thrips. But when we fed them heavy metals and they accumulated them, the thrip problem went away. It was like they were immunizing themselves against the bugs by being toxic."

Filtering Toxins with Plant Material

Gary Harman, a professor of plant pathology at Cornell's New York State Agricultural Experiment Station in Geneva, became interested in phytoremediation through his studies, beginning several decades ago, of the common soil fungus *Trichoderma*. Harman created an asexual hybrid of *Trichoderma* with greatly enhanced antifungal properties and started a company in Geneva in the 1980s to market it. In addition to controlling plant diseases and increasing nitrogen utilization, he says, his hybrid significantly increases plant root growth, which is very important in phytoremediation. Harman is actively working to elucidate the molecular basis of *Trichoderma*'s effect on root growth. "We've identified about 300 separate proteins that are upregulated by *Trichoderma*," he says. "When you find out what those are, you can begin to see pathways."

But Harman has also moved in another direction, searching for plant-based solutions for cleaning up metals and chemicals too toxic for live plants to tolerate. "What you want is something that still has its cellular structure but has the cellulose degraded away and still has lots and lots of lignin left," he explains of his search for a suitable material to mop up spills and to filter polluted groundwater. He struck upon a very basic solution. "Plants and other biomass have been known for years to sequester heavy metals in soils," he says. "Lignocellulose, the active component, will absorb both oils and heavy metals from polluted water. The best materials turned out to be those that have a low level of cellulose; manure is well suited to this since cows digest cellulose and leave the lignin." Harman developed a process for expressing manure that leaves behind only the plant material; cleaned and sterilized, it is very lightweight and 10 times as absorbent as cat litter.

Harman found that tree bark is also a good material. "The best bark is the stuff you get for mulching around your vegetables," he says, "because landscaping companies put it in enormous piles, and the anaerobic process gets rid of the cellulose. This material is particularly good at removing heavy metals from polluted water."

This spring, Harman will begin commercial application of his bark product, cleaning up a former industrial site in Rochester that is polluted with chromate, a form of chromium that is highly toxic to humans. He has also been pilot-testing—very successfully, he says—a modification of the process that is designed to remove hydrogen sulfide gas from landfills.



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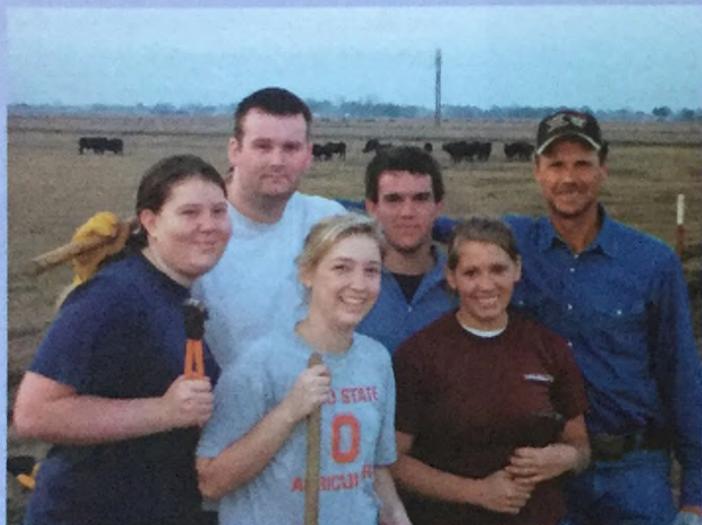
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People

Alpha Zeta Members Head South over Winter Break



Alpha Zeta members (from left) Lena Smith '07, Michael Oak '07, Sarah Wells (Ohio State), Lloyd Winslow (North Carolina State), and Tricia Adams (Ohio State) worked with rancher Hank Moss to repair flood damage.

Four Cornell Alpha Zeta members—Brittany Mosher '09, Lena Smith '07, Michael Oak '07, and Paula Ortiz '09—met other AZs from across the country in Louisiana, on December 17 to 22, 2006, to assist farmers and ranchers in rural communities still reeling from Hurricanes Katrina and Rita.

"Our efforts were focused mostly on repair-

ing fences and clearing debris" says Oak. "There was one day, however, that a small group of students helped to repair flood damage in a rancher's home. The farmers and ranchers lost almost everything they had, yet they have all remained dedicated to rebuilding their communities. Their resolve is truly inspirational."

More than a year after the two hurricanes devastated the Gulf Coast, normalcy has yet to return, according to Scott Bickham, field services representative for the Louisiana Farm Bureau Federation. "Debris and trees may be cleared, but lots of people are still living in tents and trailers. Many schools haven't reopened, and few services are available."

Louisiana Farm Bureau helped place the Alpha Zeta crew in locations with the greatest need. In Vermilion Parish, cattle and grain farmers were ravaged by both Katrina and Rita.

"Their strong will and sense of community have helped them tremendously to rebuild. We felt honored to be so instantly accepted as part of that community," says Mosher. "It seemed that each farmer was more concerned for their neighbor than they were for themselves. I like to think that we have helped improve the neighbor situation for years to come. As we all know, good fences make good neighbors—and we made some really good fences."

For more information about the trip see www.alphazeta.org.

Samantha Wickham

Mood-Food Connection: We Eat More, Less-Healthy Foods when We're Down

In the January issue of the *Journal of Marketing*, Brian Wansink, the John S. Dyson Professor of Marketing in the Department of Applied Economics and Management, and two colleagues described several studies they devised to test the link between mood and food. In one study, they recruited 38 administrative assistants to watch an upbeat, funny movie (*Sweet Home Alabama*) or a sad, depressing one (*Love Story*). Throughout the viewings the participants were offered hot buttered, salty popcorn and seedless grapes.

Wansink, author of the recent book *Mindless Eating: Why We Eat More Than We Think* (Bantam Books), found that those who watched *Love Story* ate 36 percent more popcorn than those who watched the happier *Sweet Home Alabama*.

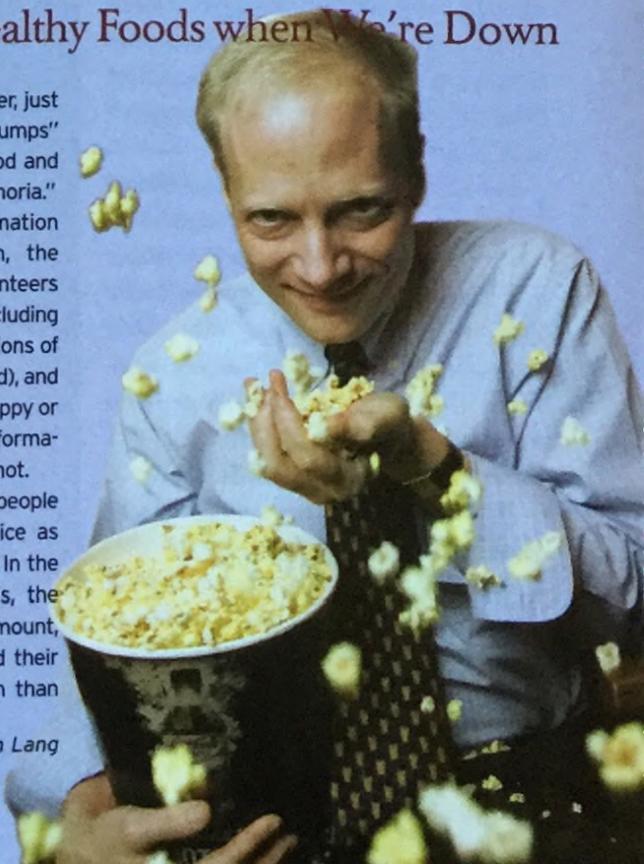
Wansink suspects that happy people want to maintain or extend their moods in the short term, while still considering the long term, turning to comfort food with more nutritional value.

People feeling sad or depressed, however, just want to "jolt themselves out of the dumps" with an indulgent snack that tastes good and gives them an immediate "bump of euphoria."

To see whether nutritional information influences comfort-food consumption, the researchers offered popcorn to volunteers who completed several assignments, including irrelevant mental tasks, writing descriptions of four things that made them happy (or sad), and reading short stories that were either happy or sad. One group reviewed nutritional information about popcorn, while the other did not.

The researchers found that the sad people with no nutritional information ate twice as much popcorn as those who felt happy. In the groups that reviewed nutritional labels, the happy people ate about the same amount, but the sad people dramatically curbed their consumption, eating even less popcorn than the happy people.

Susan Lang



Malaysian Breast Cancer Project Builds Awareness and Combats Taboos



The two lead researchers for the women's health project with the queen of Malaysia, who launched and helped support the first National Summit on Breast Cancer Education in 2006. From left: Her Majesty the Raja Permaisuri Agong; Rosemary Caffarella, CALS professor of education; and Mazanah Muhamad, Universiti Putra Malaysia.

In 2002, Cornell professor and longtime breast cancer survivor Rosemary Caffarella received a call from a Malaysian colleague who had been diagnosed with the disease but who could find no information on it in Malaysian libraries.

Breast cancer literature in Malay languages does not exist largely because of cultural mores regarding privacy about women's bodies, lack of education about the disease, and the lack of public hospitals to prescreen women and provide early diagnosis.

In partnership with Universiti Putra Malaysia (UPM), Caffarella, chair and professor in the CALS Department of Education, confronted medical, cultural, linguistic, and ethical challenges, and began to fill the breast cancer information gap in Malaysia.

Caffarella, now one of the principal investigators in the Laboratory of Education and Research in Cancer at UPM, seeks to develop an infrastructure to support Malaysian women suffering from breast cancer, build a network of interested groups, acquire funding, and initiate translations of educational materials.

Breast cancer, the most common and deadliest form of cancer among Malaysian women, affects about one in 16 women (comparable to the rest of Asia, but twice the rate of occurrence in the United States). Malaysian doctors estimate that from one-half to one-third of the women who develop the disease die from it.

"Even when women would come in and be diagnosed, often they would not come back for surgery," Caffarella says. "And if they have surgery, they may not come back for radiation or other treatments."

Caffarella, with co-principal investigator Mazanah Muhamad, professor of continuing education at UPM (the friend who initially phoned Caffarella about her breast cancer), and Cornell education postdoctoral researcher Mazalan Kamis, initiated the translation from English of 12 booklets on diagnosis, treatment, nutrition, and commonly asked questions. The booklets, mostly American Cancer Society publications, were translated into Bahasa Malayu with the help of physicians, the Malaysian Translation Association, and volunteers. The translations had to be culturally and linguistically appropriate.

Physicians and patients have been extremely appreciative of these materials, said Caffarella, noting that two government ministries have helped distribute the materials. Two-thirds of the country are native Malaysians (most of whom are Muslim) and one-third are ethnic Chinese, so plans are underway for booklets in Chinese and simpler translations for rural populations.

Along with organizing the first major summit on breast cancer education held in Malaysia in the summer of 2006, the project is helping raise awareness about the disease. The Ministry of Health is placing mammography machines for screening and early detection in public hospitals. UPM has just built a new hospital providing badly needed space for the project, and data are being collected to develop more complete statistics on breast cancer in Malaysia and how women cope with this disease.

Krishna Ramanujan

People

Great Day for Shaz Kahng '85 at Nike

The Nike swoosh. It's reputed to be more recognizable worldwide than Mickey Mouse. And Nike? Most people will tell you that it's an unstoppable mega-business that is at the top of the pile in everything athletic. But they'd be wrong.

When Shaz Kahng '85 took over Nike Cycling as its global general manager in January 2006, she found everything but an unstoppable force—or even profitability.

"All of the critical areas of the business were in poor shape: branding, product design, product quality, distribution strategy, and marketing," Kahng recently told Professor S. P. Raj's Integrated Marketing Communications class as a guest lecturer.

To turn the division around, she came up with a new strategic approach to the product portfolio, created innovations in product and branding, and generated some brand heat. One idea she spearheaded was the first head-to-toe cycling collection, the Alpe d'Huez collection named after one of the greatest climbs in the Tour de France.

Her work has taken her from her office in Beaverton, Ore., to all over the U.S. and to Paris to check on the Nike cycling execution at retail on the Champs-Élysées and to play secret shopper in everyday cycling shops.

"I wanted to see how our products were being displayed—and not being displayed," said Kahng.

One way Kahng is helping Nike Cycling stand out among its target consumers is with an updated, eye-catching product line and with a slogan that she hopes will stand up well next to another Nike signature: Just do it.

"The serious amateurs we're looking to reach should respond well to this sentiment: 'Great day for a ride.' Because when you're a dedicated cyclist, no matter how bad the weather or how much your body may be aching, there's nothing better than getting on a bicycle," Kahng said.

Kahng apparently hasn't had much trouble finding her own inner motivation. Her dramatic career shifts can only be the result of a strong will to pursue what she wants. After major-

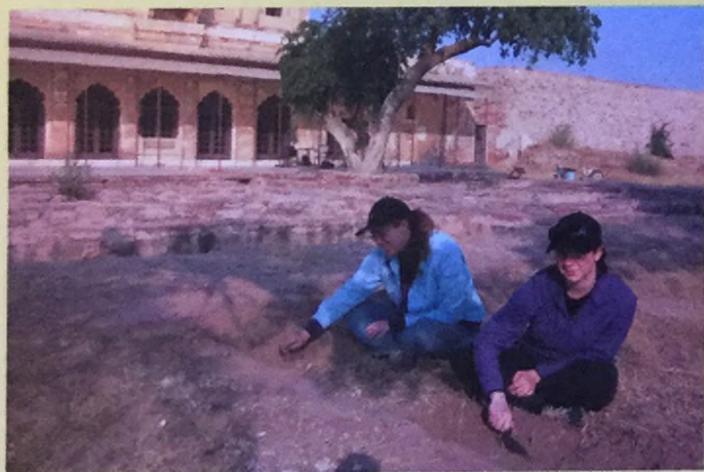
ing in food science/chemistry at Cornell, Kahng went to work for Kraft General Foods in Tarrytown, N.Y., as a research scientist. She saw quick success with her invention of synthetic blueberries to be used in cereals. But her heart was more in marketing than food science.

After winning an award that funded her business school education, Kahng earned her MBA from the Wharton School. She became one of the youngest and the first female non-Caucasian partner at Kurt Salmon Associates, a global consulting firm specializing in retail and consumer goods. Prior to Nike, she was head of strategy at Wolff Olins, a global brand consultancy, where she worked with GE, Carter's, the College Board, Staples, and on the re-branding of New York City.

Aaron Goldweber



Students Investigate How Ancient Indian Gardens Thrived in Arid Conditions



Stacy Day

Maureen Costura and Carolyn Keenan discover new garden areas just beneath the surface of the Abha Mahal.

Some 400 years ago, magnificent gardens flourished at Ahichatragarh, the Fort of Nagaur, in Rajasthan, India, in the middle of the Thar Desert. Today, the fort is a UNESCO Heritage site, its complex of richly painted palaces recently restored to be a major tourist attraction and economic generator for the region—but the elaborate, thriving gardens are history.

Kathryn Gleason '79, a CALS historical garden archaeologist, recently led a team of her graduate students on a 10-day excavation of the now-vanished gardens to probe into how the extensive Mughal- and Rajput-era gardens that graced the fort's palaces in the 16th and 17th centuries thrived in such arid conditions. Their goal was to glean valuable clues for developing sustainable gardens in desert areas worldwide.

The group's findings are now being applied to the re-creation of the gardens and their water system as part of the overall restoration of the complex.

"It immediately became clear how the water provision and drainage supported the gardens. Less expectedly, the excavations also gave the first evidence that the garden soils themselves were key to the water distribution and drainage within the larger water harvesting system," says Gleason, an associate professor of landscape architecture with an Oxford University doctorate in archaeology. "The enriched loams of the garden soils are underlain by deep layers of sand, which appear to have allowed for successful irrigation and redirection of the water, possibly to known drains leading out to ponds on the periphery."

Accompanying Gleason were landscape architecture master's degree students Jacob Brown '04 and Stacy Day; historic preservation student Carolyn Keenan; and archaeology and anthropology doctoral students Daniel Costura, MLA '01, and Maureen Costura.

Susan Lang

News from Albany

Governor Spitzer Appoints Alumni to Key Posts

Patrick M. Hooker '84 will serve as commissioner of the New York State Department of Agriculture and Markets. He served as director of public policy at the New York Farm Bureau from 1999 until 2007. Hooker was the deputy director of governmental relations at the Farm Bureau from 1990 to 1999. From 1987 to 1990, he was director of the New York State Senate Agriculture Committee. He and his wife, Karen, own a 360-acre farm in Richfield Springs, where they grow hay, board horses, and produce maple syrup. Hooker received his BA from CALS in 1984 and his AAS from SUNY Morrisville.

Andrew C. Beers (Andy) '87 has been appointed executive deputy commissioner of the Office of Parks, Recreation, and Historic Preservation (OPRHP). Beers has been with the Nature Conservancy since 1989, serving as deputy state director from 2000. He was also acting state director, director of conservation programs, and director of government relations. Previously, Beers was assistant commissioner for government relations and community affairs in the OPRHP. Beers received his BA from Colgate University and his MS from CALS in 1987.

Michael F. Hogan '67 is being nominated to serve as commissioner of the Office of Mental Health. Hogan has been the director of the Ohio Department of Mental Health since 1991. While there, he was chairman of the federal government's New Freedom Commission on Mental Health from 2001 to 2002. Previously, Hogan was commissioner of the Connecticut Department of Mental Health from 1987 to 1991 and deputy commissioner for administrative services from 1984 to 1987. From 1979 to 1984, he was the district manager for Mental Health and Retardation Services and superintendent of Northampton State Hospital between 1982 and 1984. He received his BS in 1967 from CALS, his MS from SUNY Brockport, and a PhD from Syracuse University.

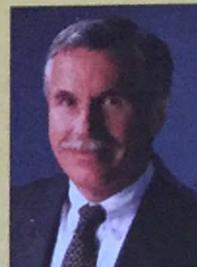
Other Cornellians selected by Governor Spitzer include **Richard Baum**, who will serve as secretary to the governor. He was Spitzer's right-hand man and longtime chief of staff while Spitzer was attorney general. Baum was the executive director of the transition office as well as Spitzer's top campaign aide. He



Beers



Hooker



Hogan

graduated from Cornell in 1991 with a B.A. from Arts and Sciences.

Richard F. Daines, MD, is being nominated to serve as commissioner of the Department of Health. Daines is president and CEO of St. Luke's-Roosevelt Hospital Center in New York City. Prior to becoming president, he served as senior vice president for professional affairs and as medical director. Daines received his BA from Utah State University and his MD from Weill Cornell Medical College in 1978.

Martin J. Mack (Marty) is being nominated to serve as deputy secretary for intergovernmental affairs. He has been deputy attorney general for the last eight years. Mack is the former mayor of Cortland, N.Y.; he received a BS in industrial and labor relations from Cornell in 1975.

Dedicating the Blaschka Marine Invertebrate Display Cases



Professor C. Drew Harvell (*left*), Ecology and Evolutionary Biology, celebrated with faculty, staff, students, and friends the generosity of W. Barlow Ware '47 (*second left*), whose gift provided for stunning display cases specially designed for the newly restored Blaschka Marine Invertebrate Collection in Corson-Mudd Hall. Dean Susan Henry was on hand for the event, as was Professor Emeritus Thomas Eisner (*right*), who in 1957 found the spectacular 19th-century glass zoological models in storage in the old Roberts Hall. The dedication was held on November 14, 2006.

Continuing the Tradition of Alumni Nurturing the College

Dear Fellow Alumni,

Cornell's place in the world, in higher education and in its contribution to the larger community, has always relied on the strength of its individual colleges and the alumni who have passed through its gates. CALS has always been at the core of that greatness, and we often think we are the product of curricula and professors, labs and lecture halls. But more than we realize, our fellow alumni have led the way in supporting the college's work and inspiring generation after generation of new graduates who have made significant contributions around the world.

Think back for a moment about why you chose to go to Cornell, how you looked at your future, and how you saw yourself getting there. Sure, there were the courses, professors, research possibilities, or that special major you might not find anywhere else. But there were probably also alumni who might have guided you or inspired you, directly or indirectly, and you thought you could follow in their footsteps. That has always been one of the hallmarks of Cornell's and CALS' greatness—the alumni who never forgot how much Cornell meant to them and have always been ready and willing to give back to the college.

How do we continue this tradition? Alumni are involved in many efforts that support the college. Recruiting new students has always been high on the list, but increasingly alumni are initiating and nurturing new programs that benefit both current students and their fellow alumni. We invite you to explore opportunities to serve on college advisory committees, speak on or off campus on topics of interest to the CALS community, advise students on career choices through Career Link and personal interaction, or sponsor programs that tie your local community to the CALS community in Ithaca. These programs include the Hicks lecture series on Long Island, the AEM alumni network events in New York and soon to begin in Boston, and visits by professors at alumni events around the country.

Whether or not you choose to engage in or support any of these activities, your financial contributions are also most welcome. As the cost of maintaining a world-class research college rises and budgets come under greater financial strain, any size contribution, from a portion of your dues to lifetime endowments, is increasingly welcome and necessary.

Our legacy is a combination of what we become and what we give back. To ensure that legacy for future CALS alumni, we look forward to your continued and active involvement in supporting the college in the many ways that ensure Cornell's distinction in Ithaca and around the world.

Sincerely,
Laurey G. Mogil '76
 2006–2007 CALS Alumni Association President



Membership Form

Membership levels available:

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- Lifetime \$350
 - \$125 toward 3-yr installment

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Gift Membership to the CALS Alumni Association of the College of Agriculture and Life Sciences at Cornell University (great gift from parents to graduating seniors!)

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ALUMNI NOTES

1930s

Ruby Rice Little of Eugene, Ore., attended CALS in the 1930s and nearly earned a PhD in mycology, but became the mother of twins instead. Her husband, Elbert Little, was the author of 17 books on tree identification, including the *Audubon Field Guide to North American Trees*. He died a few years ago. Ruby will celebrate her 100th birthday this July 23. She is very active, gets around town in an electric scooter, paints watercolors, and sings. She lives with her daughter Alice Stroud.

1940s

E. Travis York, PhD '49 of Gainesville, Fla., received The Special Service Award from the University of Florida Veterinary College last May. The Special Service Award is one of three equally prestigious honors that encompass the college's Distinguished Awards Program. York received the award by the college's dean who called York the person most responsible for creating the college, which opened its doors in September 1976. York's work to establish the college dates back to 1963, when he arrived at University of Florida to serve as provost for agriculture.

1950s

George Casler '50, MS '59 of Ithaca, N.Y., and his wife, Pat, enjoyed an 18-day Lewis and Clark Elderhostel bus trip from St. Louis to Astoria, Ore., last fall. They also spent a week in Oregon and visited their son, Bill, in Cincinnati before returning home.

Donald I. Wickham '55 of Victor, N.Y., was recently re-elected to the Board of Finger Lakes Community College as secretary. Wickham owned and operated a large vegetable grain farm in the Stanley, N.Y., area for 40 years. Currently, he farms part-time, now working with one of his sons.

1960s

L. George Wilson '61 of Raleigh, N.C., has been selected to serve for the next two years as a senior adviser with the U.S. Agency for International Development (USAID). Wilson will work in the Washington D.C.-based Agriculture Office in the Bureau for Economic Growth, Agriculture and Trade. He will provide guidance on international and domestic programs in agricultural research, training, and outreach carried out by U.S. universities.

Pedro A. Sanchez '62, MS '64, PhD '68 of Nyack, N.Y., was recently awarded an honorary doctorate by Ohio State University. Sanchez is director of tropical agriculture for the Earth Institute of Columbia University and a recipient of the 2002 World Food Prize.

Martin P. Galen '64 of Dayton, N.J., joined Sheldon Gross Realty, Inc., in September 2006 as a sales associate. In addition to receiving his BS degree from CALS, Galen received his master's degree in public administration from Fairleigh Dickinson University. Galen has owned over 300 apartment and office buildings and received his real estate license in 2004. He is a member of the National Association of Realtors and the Tri-State Realty Alliance.

Gerald F. Arkin '65 of Peachtree City, Ga., has served as assistant dean of the Griffin campus of the University of Georgia for nearly 20 years. In July 2006, Arkin was promoted to assistant provost of the campus.

1970s

Stephen J. O'Brien, PhD '71 of Frederick, Md., is the chief of the Laboratory of Genomic Diversity at the National Cancer Institutes (NCI). His new book, *Tears of the Cheetah: The Genetic Secrets of Our Animal Ancestors*, O'Brien narrates fast-moving science adventure stories that explore the mysteries of survival among the earth's most endangered wildlife. In addition to *Tears of the Cheetah*, O'Brien is the

author or co-author of over 450 scientific articles and the editor or co-editor of 14 volumes.

R. Daniel Lineberger, MS '74, PhD '78 of College Station, Texas, received the 2006 Distinguished Teaching Award from Texas A&M University. In addition to being a professor of horticulture, he has a joint appointment with Texas Cooperative Extension of Aggie-Horticulture. Lineberger teaches an introductory horticultural systems course that trains students to use the web as a learning tool. He also teaches a graduate course in web site construction and management.

Daniel A. Potter '74 of Lexington, Ky., received the Distinguished Achievement Award in Horticultural Entomology from the Entomological Society of America (ESA) for his work on turf and landscape insects and Integrated Pest Management. Potter is a professor of entomology at the University of Kentucky.

Priscilla M. Elsass '75, MPS '77 of Woodstock, Conn., was recently named senior associate dean of the Graduate School of Management at Clark University.

Janet Sawiki, PhD '76 of Wynnewood, Pa., is a professor at the Lankenau Institute for Medical Research. She was recently invited as a guest lecturer to the First International Conference on Ovarian Cancer: State of the Art and Future Directions in Crete, Greece, last July. The conference brings together international experts interested in the development of novel diagnostic, prognostic, and therapeutic tools to treat ovarian cancer.

William H. Schlesinger, PhD '76 of Durham, N.C., was reappointed by Gov. Mike Easley to the North Carolina State Museum of Natural Sciences Advisory Commission. The commission formulates policies for the advancement of the museum and promotes wider and more effective use of the museum as an educational, scientific, and historical exhibit. Schlesinger is dean of the Nicholas School of Environmental and Earth Sciences at Duke University.

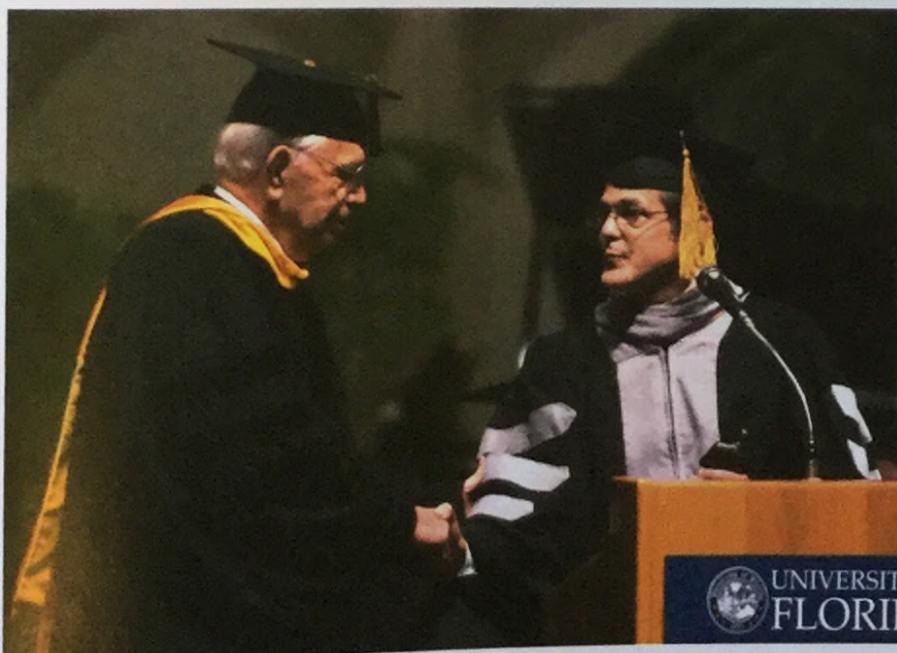
Robert M. DeGregorio '77 of St. Paul, Minn., was recently appointed the new dean of Concordia University's College of Business and Organizational Leadership. DeGregorio was president of Purina Mills and Land O' Lakes Animal Nutrition from 2001 to 2004 and executive vice president and COO for Land O' Lakes, Inc.

Glenn R. Osterhout '77 of Madison, N.Y., was recently inducted into SUNY Cobleskill's Athletic Hall of Fame. Osterhout was recognized for his excellence on the men's outdoor track and field team and still holds the Cobleskill record for shot put at 49 feet, 9-1/4 inches, made in 1975. Osterhout transferred to Cornell where he was a starter on the Big Red football team.

Douglas B. Quine, PhD '79 of Bethel, Conn., was recently promoted to the rank of Fellow in the Pitney Bowes Advanced Concepts & Technology Center. Earlier this year, Quine's work on a Biohazard Isolation and Screening System for postal mail was awarded the top gold "Innovation Prize" by the Connecticut Quality Improvement Award Partnership. Quine also received a Pitney Bowes One Award for his role in developing a Secure Mail screening facility in Europe.

1980s

May R. Berenbaum, PhD '80 of Urbana, Ill., received the Distinguished Achievement Award in Horticultural Entomology from the Entomological Society of America (ESA) for her work in the Department of Entomology at the University of Illinois Urbana-Champaign. She was also recognized as ESA's outstanding teacher of the year.



E. Travis York, PhD '49, left, chancellor emeritus of Florida's State University system, shakes hands with Julio Ibanez, president of the University of Florida College of Veterinary Medicine Alumni Council, as York receives the 2006 Special Service Award from the college at its commencement ceremony in Gainesville on May 27, 2006.

ALUMNI NOTES

Sue E. Blodgett, MS '80 of Brookings, S.D., was named the new head of South Dakota State University's Department of Plant Science. She is an entomologist and was professor of entomology at Montana State University. She earned a BS degree in biology from Syracuse University in 1974, an MS degree in vegetable crops from CALS in 1980, an MS degree in entomology from Kansas State University in 1987, and a PhD in entomology, also from Kansas State, in 1989.

George Frantz '80 of Ithaca, N.Y., has been environmental impact review coordinator for Thomas Associates Architects, the nation's 12th largest design firm for universities since March 2006. Frantz is on his fifth year as visiting lecturer in the Department of City and Regional Planning in Cornell's College of Architecture, Art, and Planning, teaching land use planning and urban design. He is currently completing Agricultural Land Preservation and Economic Development Strategy for the Town of Porter, Niagara County.

James "Jess" Lowenberg-DeBoer, MS '82 of West Lafayette, Ind., was named associate dean and director of international programs in agriculture at Purdue University. He holds a BS degree in journalism and comparative literature from University of Iowa, an MS degree in agricultural economics from CALS, and a PhD in agricultural economics from Iowa State University.

Ralph D. Waniska, PhD '82 of College Station, Texas, received an award from the Tortilla Industry Association for his research contributions to tortilla production. Waniska is a professor of food science and technology in the Cereal Quality Laboratory at Texas A&M University.

Robert C. Silvershein '84 of Manhattan Beach, Calif., was named regional vice president of Sales for Reactrix Systems, Inc.

Simeil Wen, MS '85 of Guangdon Providence, China, was appointed the vice president of South China Agricultural University in April 2006. Wen remains the university's Chair Professor of Agricultural Economics and Management.

Karen Kao '88 of Palo Alto, Calif., attended the Kaiser Vallejo Hospital PNF Proprioceptive Neuromuscular Facilitation three-month neurological physical therapy residency.

1990s

Lily Y. Li, PhD '90 of Lexington, Mass., is laboratory director of Tandem Labs-New England, a leading contract research organization providing bioanalytical and immunoanalytical testing for the pharmaceutical industry. Li earned her PhD in lipid chemistry in 1990.

Jacqueline M. Ferguson '92 of Liverpool, N.Y., is the owner and medical director of Cortland Eye Center. Previously, Ferguson was the chief of ophthalmology of the Veterans Administration Medical Center. She received her BS from CALS in 1992 and is also a graduate of the State University of New York Medical University.

Brian M. Ashe '94 of Fort Collins, Colo., formerly living in Denver, works for Riverside Technology, Inc., where he leads the business development and marketing efforts of this water resources engineering company. The firm specializes in developing hydrologic models for the National Weather Service and building water use programs in under-developed countries around the world.

Tracy A. Rutherford '94 of Bryan, Texas, received the 2006 Distinguished Teaching Award from Texas A&M University. Rutherford is an assistant professor since 2002 and teaches introductory agricultural communications, electronic media, agricultural publications, digital photography, and visual communications courses.

Michael E. Laurenti '94 of Waxhaw, N.C., was recently named vice president of information technology of Family Dollar Stores, Inc. Prior to joining Family Dollar, Laurenti was employed by Linens-N-Things as vice president of business and technology services.

Stephen A. Church '95 of Quito, Ecuador, has worked as the program manager for the Habitat Conservation program of the Peace Corps in Ecuador for one year now. Church is responsible for 41 Peace Corps volunteers throughout the country. He has been enjoying exploring Ecuador, one of the planet's most biologically diverse countries, and its people. He lives in Quito with his wife, Katy, and 6-year-old son, Joshua.

Angela M. Ichwan, MS '95 of Beaverton, Ore., is co-founder of Arico Natural Foods, a snack food company she started with her husband, Hermanto Hidajat '92, MEng '97. Before starting Arico, Ichwan spent eight years traveling the globe for Heinz and Kellogg, creating new flavors for blockbuster brands in places like Thailand, India, and Mexico.

Adriano A. Sabatelli '95 of Washington D.C., is a senior consultant at Thomas Medstat. The company provides integrated data-warehouse and consulting solutions to large employers, health plans, hospitals, and providers. Sabatelli is working in the Employer Group servicing Fortune 500 employers. Sabatelli and his wife had their first child, Giovanni Arcangelo, on October 26, 2005.

Molly M. Hislop '96 of Atlanta, Ga., is the director of market research, Adinsights, for InsightExpress, LLC, a leading online market research firm. Before joining InsightExpress, Hislop worked at Aspen Analytic in Atlanta where she most recently held the position of statistical consultant.

Joel P. Weiman '97 of Olney, Md., designed the King Carter Golf Club in northern Virginia, which was just named the best affordable new public golf course in America by *Golf Digest* magazine.

Heather A. Abbott '98 of Roslyn, N.Y., began a new position in late February 2006 as manager of the corporate and 3rd party gift card programs at Barnes & Noble, Inc. She is also an active board member for the Cornell Club of Long Island and the CALS Alumni Association.

Nicholas W. Clavin '98 of New York, N.Y., and Keri M. Ruscito were married on July 8, 2006, on Shelter Island. Clavin is a surgeon for New York-Presbyterian Hospital and Keri is an event planner for the New York Public Library. Clavin received his BS degree from CALS and his medical degree from Upstate Medical University in Syracuse, N.Y.

Jamie Critelli '98 of Allschwill, Switzerland, is working on an MBA in Switzerland after having spent eight years in the Army. Critelli is also working full-time with Ajilon IT as a recruitment consultant for the IT industry.

2000s

Kristine D. Buchholtz '00 of Syracuse, N.Y., became engaged in February 2005 to Michael Duran, also of Syracuse, N.Y. Buchholtz is a banking center manager with Bank of America in Manlius, N.Y. Duran is co-manager of 84 Lumber in Baldwinsville, N.Y. A September 23, 2006, wedding was planned in Batavia, N.Y.

Christopher M. Godfrey '00 of Norman, Okla., graduated in December 2006 with a PhD in meteorology from the University of Oklahoma. He received a BS degree in atmospheric sciences from CALS in 2000.

David N. LaMacchio '01 of Marietta, N.Y., became engaged in October 2006 to Jamie M. Howard '01 (HuEc). LaMacchio is an MBA candidate at the Wharton School of Business, University of Pennsylvania. Howard is a PhD candidate in clinical psychology at Northwestern University. A June 23, 2007, wedding is planned in Syracuse, N.Y.

Nicole M. Neroulias '01 of Briarcliff Manor, N.Y., won the Cassels Award from the Religion Newswriters Association for her religion reporting. Neroulias is the former *San Mateo County Times* Faith Page editor. She is also a graduate of the Columbia University School of Journalism.

Adam M. Becker '02 and Kathleen "Katie" E. Cody-Becker '02 of Varysburg, N.Y., were married on August 19, 2006, in Cazenovia, N.Y. Becker works on his parent's farm, Outback Dairy, and Cody-Becker is a marketing manager for ValueCentric, a company that works with pharmaceutical manufacturers.

Laura Granka '02 of San Francisco, Calif., has been working at Google for about a year and a half.



Thomas Dubois, PhD '03 received his Promising Young Scientist Award in December 2006; he is shown here with Paul D. Wolfowitz '65, president of the World Bank.

ALUMNI NOTES

Adam Scott Tope '02 of Washington, D.C., is studying law at Georgetown University Law School.

Catherine Bauer '03 of White Plains, N.Y., is earning a master's degree in clinical psychology at Teachers College-Columbia University.

Thomas Luc Monique Dubois, PhD '03, a bio-control specialist with IITA (International Institute of Tropical Agriculture), received the Promising Young Scientist Award for his work creating more durable bananas in the Great Lakes region of eastern Africa, where the plant is often the chief contributor to household income. Dubois developed enhanced tissue culture planting material with resistance to pests and diseases. The material, internationally infected with a beneficial fungus, has been delivered to farmers via an innovative public-private partnership.

Ariel Dawn Schaffer '03 of Buffalo, N.Y., has been an associate marketing manager with Rich Products Corporation for three years and is currently working on the company's cake and pie categories.

Jill A. Simoneau '03 of Parish, N.Y., married Brian G. Reinhard on August 5, 2006, in Owego, N.Y. They honeymooned in the Dominican Republic and both work for Bristol-Myers Squibb.

Douglas R. Brown, PhD '04 of Mississauga, Ontario, Canada, is senior sector specialist in environment and natural resource management for World Vision Canada.

David A. Hughes '04 of New York, N.Y., is the co-founder of DH Krahn Spirits, which has secured its first round of financing and is proud to announce the upcoming launch of its first product, DH Krahn Gin.

Melissa A. Stephenson '05 of Ithaca, N.Y., became engaged to Timothy L. Morse while on vacation in North Carolina. Stephenson is a graduate student in the CALS Department of Education; Morse is a graduate student in Cornell's Department of Mechanical Engineering. A July 6, 2007, wedding is being planned at La Tourelle Inn in Ithaca.

Seth Daniel Gordon '06 of Charlotte, N.C., is working as an analyst with Wachovia Securities.

Anthony Fortunato Malone '06 of Endwell, N.Y., is a project manager with Lockheed Martin.

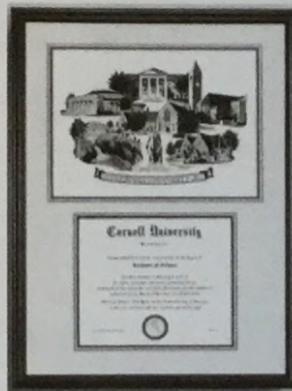
Julle Teresa Weber '06 of Fairfax, Va., is a research associate for ICF Consulting within their Energy Division.

Ryan Michael Zacharia '06 of Long Beach, N.Y., is a financial analyst at Citigroup in the Investment Banking Division.



Prepared by
Emily A. Réjouis '08

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Moving?

Stay in touch with your alma mater through uninterrupted delivery of *CALS News* by returning the change-of-address form. Mail to Cornell University, College of Agriculture and Life Sciences, Office of Alumni Affairs, 274 Roberts Hall, Ithaca, NY 14853-5905.

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Class Year _____

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Alumnus Faculty Friend

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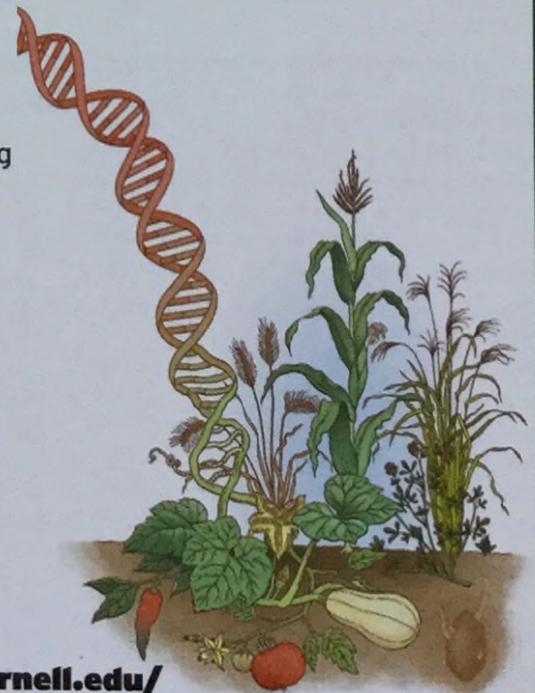
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Department of Plant Breeding & Genetics

Celebrating 100 Years of
Crop Improvement

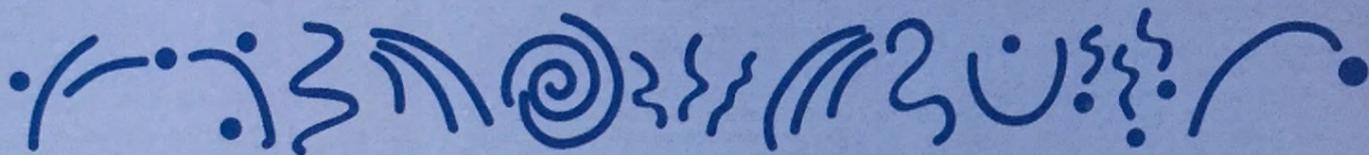
2007 Cornell Plant Breeding
Centennial Symposium
July 26-28



For more information:

<http://plbrgen.cals.cornell.edu/>

Join CALS for Reunion Weekend • June 8–9, 2007



Friday, June 8

A Handheld Tour of the Asian Galleries

Herbert F. Johnson Museum of Art,

10:00 AM–11:30 AM

Through exciting and innovative uses of technology, the Johnson Museum of Art is expanding how art is presented. Tours with handheld computers engage museum visitors and broaden understanding of individual works in the galleries through the addition of maps, images, music, the spoken word, and web links. This program is in collaboration with the museum and the Human Computer Interaction group, part of the Department of Communication.

Open House in Air-Conditioned Snee Hall Atrium

10:00 AM–2:00 PM

Visit the Timothy N. Heasley Mineral Museum; see the new mastodon exhibit and view the earthquake seismograph. Enjoy the stroll and self-guided tour through the Engineering Quad Rock Parks.

CALS Display Booth

Barton Hall, 11:00 AM–2:00 PM

Discover what's happening at the college in classrooms, admissions, career development, and alumni programs.

Earth and Atmospheric Sciences Display Booth

Barton Hall, 11:00 AM–2:00 PM

Hands-on exhibits will feature a tornado in a bottle, minerals and fossils, and a seismograph to demonstrate how seismic waves generated by earthquakes are detected. Faculty members and students will be on hand to answer questions.

"Obesity Prevention: A Challenge for the 21st Century"

Human Ecology, G-73 Martha Van Rensselaer Hall, 1:15–2:45 PM

Join Dean Lisa Staiano-Coico and Human Ecology faculty and alumni as they share the college's multidisciplinary approach to challenge the "ecology of obesity." Presenters include Carol Devine PhD '90, associate professor, Division of Nutritional Sciences; Kate Dickin MS '86, PhD '03, research associate, Division of Nutritional Sciences; and Christina Stark, extension associate and program leader for Cornell NutritionWorks, Division of Nutritional Sciences.

Admissions Information Session

177 Roberts Hall, 2:30 PM

"Caught between the Pages: Treasures from the Franclemont Collection"

Comstock Memorial Library of Entomology,

Comstock Hall, 2nd floor, 3:00–4:30 PM

Butterflies and moths have been called the celebrities of the insect world. Ephemeral and often brilliant-hued, their beauty has inspired passionate collecting and introduced many to the subject of entomology. This special reunion program will showcase treasures from the personal library of the late Cornell professor John G. Franclemont, who taught entomology at Cornell from 1953 to 1982 was a renowned lepidopterist, leading teacher, and scholar in modern field biology and systematics. Please join us for the display and reflections by Professor James Liebherr on the importance of these works for the study of modern entomology, and a reception.

Saturday, June 9

CALS Reunion Breakfast

Trillium, Kennedy Hall, 7:30–8:45 AM

Enjoy fellowship with Dean Susan Henry, alumni, faculty, and friends of CALS. Laurey Mogil '76, CALS Alumni Association president, will host the association's annual meeting at this event. Reservations required (see next page).

Brian Wansink: Liberty Hyde Bailey Lecture "Mindless Eating: Why We Eat More Than We Think"

Call Alumni Auditorium, Kennedy Hall, 9:00–10:00 AM

Professor Wansink's expertise is focused on the psychology and consumption of foods, leading ABC News to refer to him as "The Food Psychologist." He directs the content of www.FoodPsychology.com and focuses his research on ways that ads, packaging, and personality traits influence the usage frequency and usage volume of healthy foods. His studies on consumption volume have won national and international awards for their relevance to consumers. Wansink's findings have also been widely featured on *20/20*, BBC News, The Learning Channel, all news networks, and on the front pages of the *Wall Street Journal* and the *New York Times*. He is the author of four



books, *Asking Questions*, *Consumer Panels*, *Marketing Nutrition*, and *Mindless Eating*. Wansink is the John S. Dyson Professor of Marketing and the director of the Cornell Food and Brand Lab in the Department of Applied Economics and Management.

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Plant Biology Alumni Gathering

Mac Daniels Room G37 Plant Science,

11:30 AM–12:30 PM

Join us for light refreshments while visiting with fellow Plant Biology alumni and current and former faculty.

Department of Horticulture's Alumni Gathering

Room 22 Plant Science Building,

11:30 AM–12:30 PM.

This gathering will involve the former Departments of Vegetable Crops, Pomology, and Floriculture and Ornamental Horticulture. Join us to share your reminiscences about Cornell and to share pictures and stories about family and friends. Room 22 will be open on Friday and Saturday to display our "history." Light refreshments will be served.

Views of Sustainability: Natural Changes, Anthropogenic Changes, and Natural Resources

1120 Snee Hall, 1:00–2:00 PM

Presented by the Department of Earth and Atmospheric Sciences.

Tour of the Paleontological Research Institution (PRI), Museum of the Earth

2:00–4:00 PM. Bus leaves Snee Hall at 1:45 PM. Join us on the bus for free admission into the museum for a tour of PRI's Museum of the Earth to celebrate the 75th anniversary of PRI, which is affiliated with Cornell's Department of Earth and Atmospheric Sciences. A right whale skeleton suspended in the atrium welcomes you to the beautiful new museum, in which the major transformations of life through the ages are displayed through fossils and videos. Observe the newly acquired seismograph and research by EAS faculty and students. You also can collect fossils from the Devonian seas of Ithaca. Fun for all ages. (Feel free to sneak out of the seminar to catch the bus).

Reunion Forum: "Distinguished Cornell Women Faculty"

101 Phillips Hall, 1:30–3:00 PM

Experience the commitment of women faculty and staff members who are striving to meet the changing needs of human society around the globe. Cornell has an unusual breadth and depth of top programs and faculty, a deeply rooted interdisciplinary research culture, and nationally and internationally recognized research centers and facilities. Please join us for this joint college panel, hosted by Kent Fuchs, Joseph Silbert Dean of Engineering, and featuring Drew Harvell, professor, Department of Ecology and Evolutionary Biology for CALS.

Plantations

Zucker Shrub Sampler and Plant Production Facility Tour, Newman Arboretum, 1:00 PM. Allan Hosie Treman '21 Memorial Concert featuring the Hangovers, Newman Arboretum (Flat Rock entrance), 2:30 PM. Various garden tours throughout the weekend.

Wine Tasting

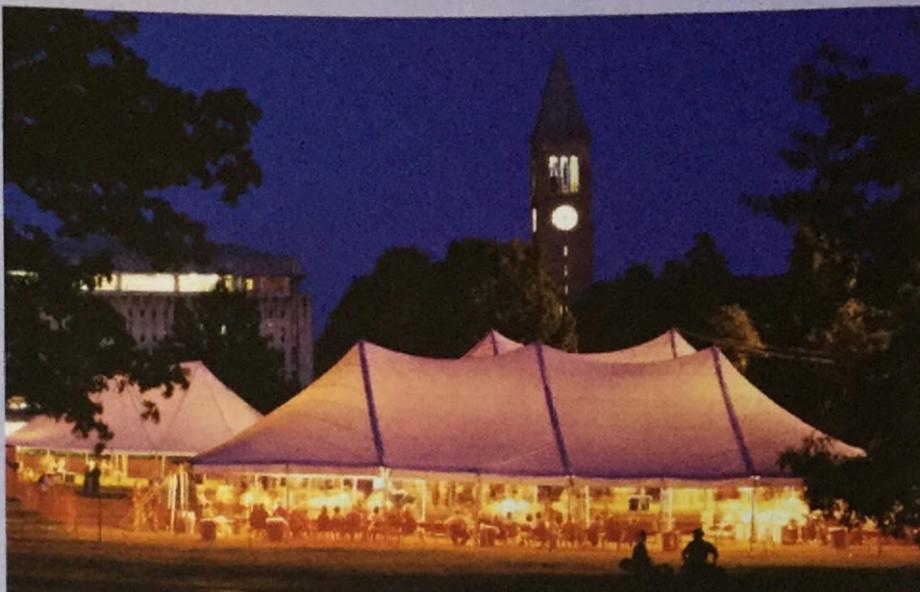
Trillium, Kennedy Hall, 2:00–4:00 PM. Savor the flavor of New York State wines. Sample wines from more than a dozen of New York State's finest wineries. All alumni and guests, 21 years of age and older, are welcome.

Natural Resources Alumni Gathering

304 Fernow Hall, 3:00–4:30 PM. Join us for wine tasting and light refreshments while you enjoy visiting with fellow Natural Resources alumni and former and current professors. Share recollections of your days in Fernow and at field sites. Department chair Marianne Krasny will provide a brief update on the department. There will be displays of historical photos, posters of recent faculty and graduate student projects, and information on programs at the Arnot Teaching and Research Forest.

For more Reunion Information please visit: www.alumni.cornell.edu/reunion

University Photography



Breakfast Registration Form

Register online at www.cals.cornell.edu/alumni-friends

Registrations are recorded on a first-come, first-served basis. Please note that your registration is not complete until the breakfast fee is paid.

Registrations should be received no later than May 31, 2007.

A name tag will be given to each registered guest upon arrival at breakfast.

\$16.00 for members of the CALS Alumni Association and each guest.

\$20.00 for nonmembers and each guest.

Name

(Print exactly as to appear on name tag)

Class Year/Major

Address

City

State/Country

Zip/Postal Code

Telephone

Reunion Year

Guests

Class

Class

Membership Expiration Date

Number of Registrations

Total Amount Enclosed \$

Please make your check payable to the CALS Alumni Association or pay with

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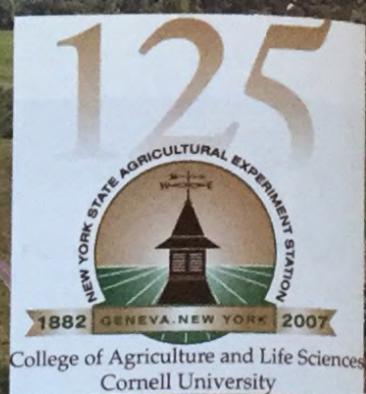
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Mail to CALS Reunion Breakfast, Cornell University, 274 Roberts Hall, Ithaca, NY 14853-5905; Phone: 607 255-7651; E-mail: alsaa@cornell.edu; Fax: 607 254-4690. **Must be received no later than Thursday, May 31, 2007.**



Healthy Plants, Healthy Planet, Healthy Food, Healthy People

The New York State Agricultural Experiment Station Turns 125

The opening of the New York State Agricultural Experiment Station in Geneva, New York, was big news in 1882. It was the year Robert Koch discovered the tuberculosis bacillus, the Hadfields and McCoys began their feud, Jesse James met his end, Franklin D. Roosevelt was born, and the Rockefellers and Vanderbilts controlled almost all petroleum and railroad industries.

E. Lewis Sturtevant, a successful farmer and a scientist with an impressive record of accomplishments in animal and plant agriculture, assumed the directorship of the Experiment Station on March 1. Charged by the act of the state legislature to promote agriculture in New York through scientific investigation, scientists at Geneva have been working to promote food and agriculture in New York for 125 years.

In 1882, the Geneva Experiment Station consisted of 130 acres of land and an orchard of 695 apple trees. E. S. Goff was the horticulturist, S.M. Babcock the chemist, and J.H. Comstock of Cornell University, a part-time entomologist. That first year, they put in an experimental cattle barn, a greenhouse, a Springfield gas machine for furnishing gas for laboratory use, and conducted field evaluations related to beans, peas, lettuce, wheat, potatoes, corn, and forage.

Over the years, the Geneva Experiment Station has gained national preeminence as a center for research focused on the production, protection, and utilization of fruit and vegetable crops. Researchers work closely with agricultural, food, and bio-based industries—a partnership that furthers Cornell's land grant mission, and has generated many millions of dollars for the New York state economy.

In 2007, the Geneva Experiment Station consists of 46 Cornell University faculty members located in four departments in horticultural sciences, entomology, plant pathology, and food science and technology. They work closely with their sister departments on Cornell's Ithaca campus, as well as the Cornell University Agricultural Experiment Station. The Geneva campus includes 864 acres of farmland for research, 1 acre of greenhouse space, and 623,000 sq. feet of building space. Two outlying laboratories serve eastern and western New York—in Highland and Portland, respectively. A new facility for grape research in Portland is in the process of being built.

In 2007, the Geneva Experiment Station partners with industries in the fruit, vegetable, seed, turf, wine, and food processing sectors of the economy. Partnerships with the Agricultural Research Service (the USDA's chief scientific research agency), and Cornell's new Agriculture and Food Technology Park help make the Geneva Experiment Station a world leader in advancing sustainable agriculture and food systems through innovative research, education, and extension.

"We are in the middle of a great year," says Thomas J. Burr, the current station director. "Our 125th anniversary is giving us the chance to get out in front of many consumers and stakeholders to remind them about the important work we do in support of New York State agriculture, and our impact—today, and in the future—for turning challenges into opportunities."

The 125th anniversary will culminate in a campus-wide Open House at the Geneva Experiment Station on September 15, 2007, from 10 a.m.–4 p.m. "All are welcome," says Burr. "Please come." Hands-on activities, lab and field tours, a butterfly house, and farmers' market are planned. Link to www.nysaes.cornell.edu for more information.

Linda McCandless

CALS CREATIVE WAYS TO GIVE

Charitable gifts provide essential support for the College of Agriculture and Life Sciences each year. The following examples show opportunities to support the College by addressing tangible needs such as equipment, travel funds, scholarships, furniture, and more.

The CALS Development Office is available to help you explore creative ways to meet your personal and philanthropic goals while making a significant impact on the College. For more information or to make a gift in support of one or more of these priority needs, please contact Mike Riley, Associate Dean for Alumni Affairs, Development, and Communications, College of Agriculture and Life Sciences, at calsgiving@cornell.edu or (607) 255-7635.

Dean's Discretionary Fund.

Dean Henry relies greatly upon unrestricted gifts of any amount to meet critical needs and support emerging priorities across the college.

We will meet you there!

Sponsor a class field trip to various New York state gardens and nurseries. \$3,000 (Horticulture)

Seeds, blight, and fungus.

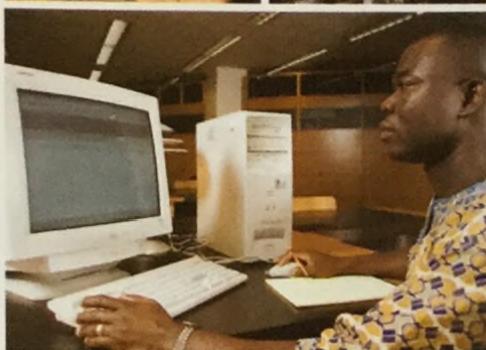
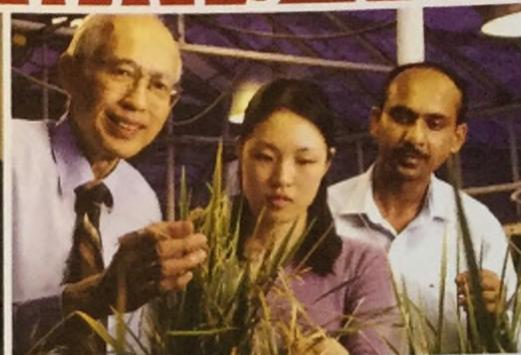
Purchase a controlled environment seed germination chamber for studying seed transmission of fungal diseases in plants. \$12,000 (Plant Pathology)

Shepherd-in-training.

Sponsor a student sheep-farm internship for a semester. \$1,000 (Animal Science)

Aim for the big screen.

More and more student projects are going digital, and Mann Library's new Student Expo program needs new technology to showcase work in this medium. Funding for an oversized LCD monitor dedicated to student project displays will give this work the spotlight it deserves. \$5,000 (Mann Library)



Minority talent.

Sponsor the student-led orientation program, SUMMIT—Session for Undergraduate Minorities in Management: Investment in Talent. \$500 (Applied Economics and Management)

It's raining, it's pouring!

Support a summer undergraduate research internship for the study of interannual rainfall variability over West Africa. \$3,000 (Earth and Atmospheric Science)

Here we go again!

Help CALS Admissions upgrade their traveling exhibit for use in recruiting at agricultural events across the country. \$3,000 (CALS Admissions Office)

Doctor, Doctor, what's wrong with my plant?

Help plant doctors teach and diagnose at public outreach events such as Fun on the Farm, NY State Fair, 3rd-grade summer science camps, and more. Microscopes enable the viewing of the microbes that rot, spot, and spoil plants. Three stereo microscopes. \$500 each (Plant Pathology—Geneva)

Weave it!

Help the Cornell Plantations Education Department teach elementary school children how to weave together straw and other organic material in order to learn about weaving during our plant-based projects, with the purchase of two hand looms. \$300 (Cornell Plantations)

Teach municipalities about IPM.

Purchase and distribute 1,000 manuals, written by the NYS Integrated Pest Management Program, that teach superintendents how to decrease pesticide use in municipal buildings. \$3,000 (Integrated Pest Management)

Moving images.

A digital video and two digital still cameras for the department to record student projects, community presentations and workshops, art events, and other ephemera. \$2,200 (Landscape Architecture)

Ohh, my aching back.

Purchase new beds and mattresses for students and adults who visit the Arnot Forest Field Campus. \$19,200 (Natural Resources)

Get me there!

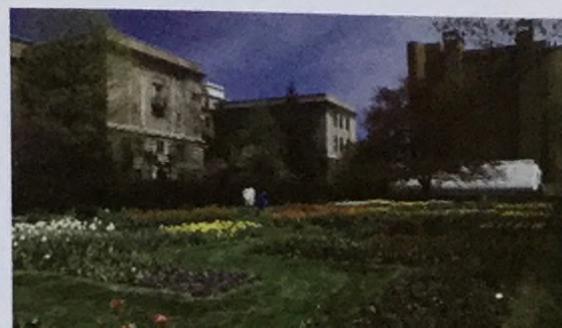
Support for an enology student to attend one of the annual meetings of the American Society for Enology and Viticulture or the American Wine Society. \$3,000 (Food Science)

Let's go wireless.

Install Red Rover on the first floor of Morrison Hall to provide wireless internet access to undergraduate students. \$3,000 (Animal Science)

A hub of activity!

Help support our graduate and undergraduate students with travel and research funding as they design experiments, analyze data, and publish academic papers. \$3,000 (Communication)





The Clement Gray Bowers Rhododendron Collection at Cornell Plantations

STAY CONNECTED VIA E-MAIL!

- Are you interested in receiving updates and the latest news from CALS and Cornell?
- Would you like to receive invitations to local alumni events via e-mail?

If so, please send an e-mail to us at alsaa@cornell.edu and we will send you a link to update your e-mail and address information for us.

Visit the college's new web site at
www.cals.cornell.edu



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