

CALS NEWS

THE MAGAZINE OF CORNELL UNIVERSITY'S COLLEGE OF AGRICULTURE & LIFE SCIENCES SPRING 2009

The Complex World of Water

Also inside:

Made@CALs

Urban Welfare

Foodborne Illness

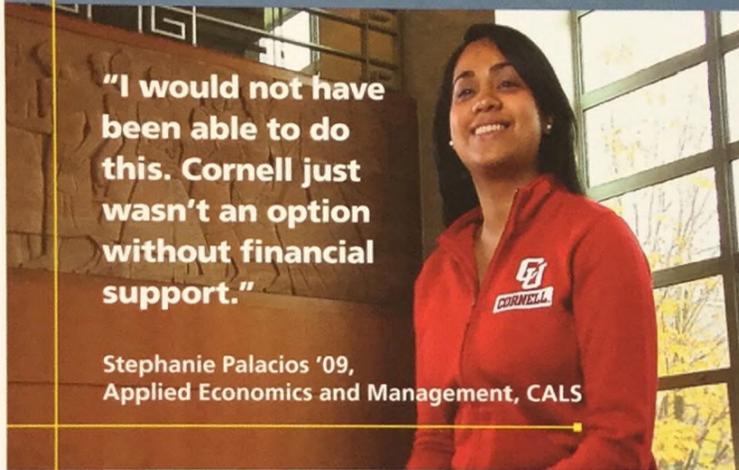
New Visions for Upstate



Cornell University



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"I would not have been able to do this. Cornell just wasn't an option without financial support."

Stephanie Palacios '09,
Applied Economics and Management, CALS

CREATE YOUR OWN

GOOD NEWS

IN UNCERTAIN TIMES



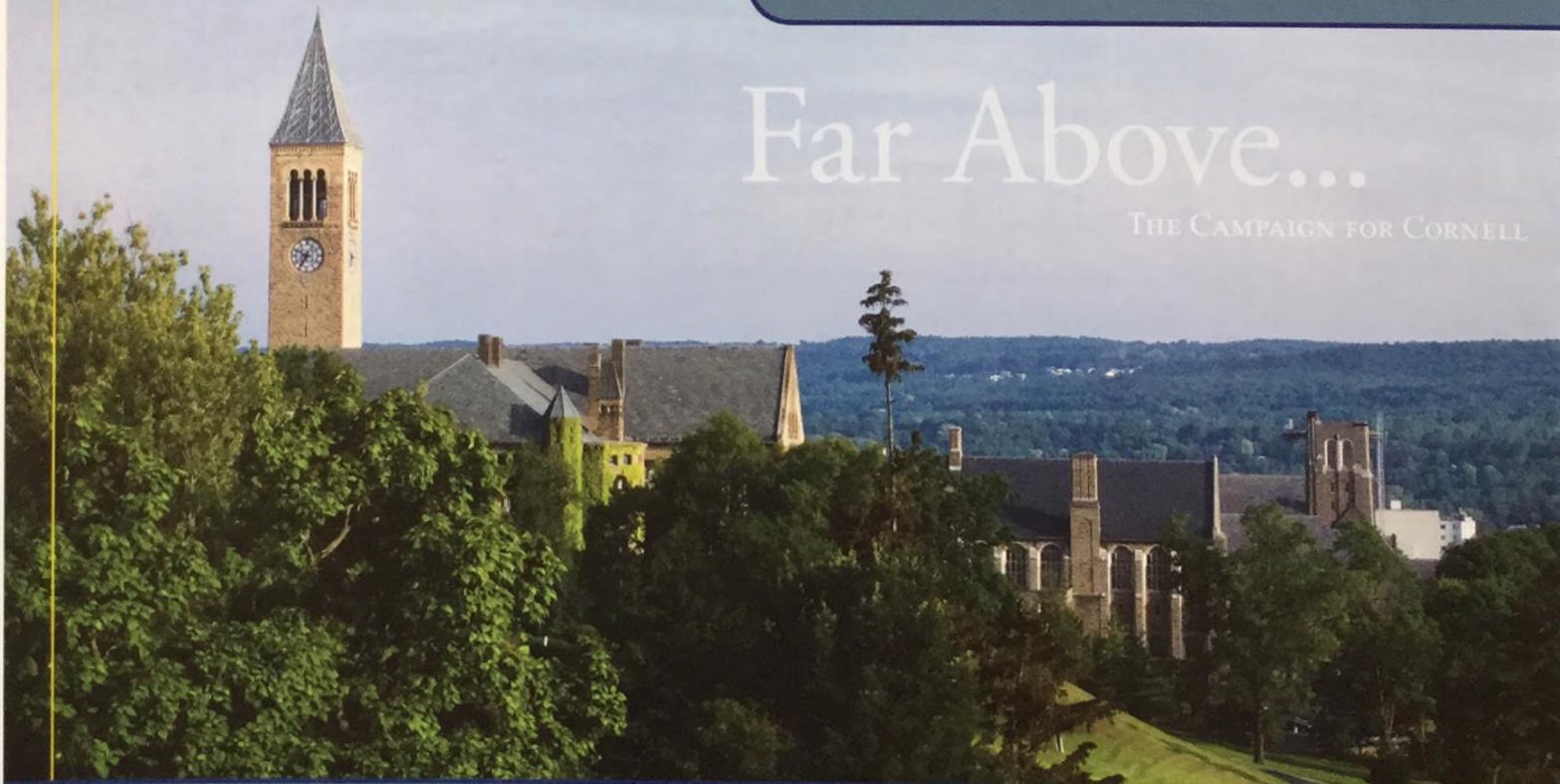
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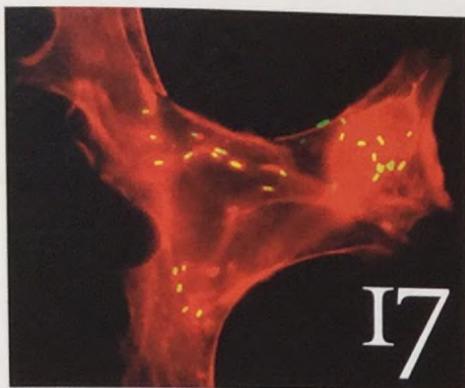
Far Above...

THE CAMPAIGN FOR CORNELL



1-800-481-1865 One of Cornell's gift planning specialists can explain the benefits.

Image of Stephanie Palacios courtesy of PhotoSynthesis Productions. All others courtesy of University Photography.



Features

ENVIRONMENTAL SCIENCES

8 The Complex World of Water

After a dozen years of cleanup, New York City's water supply ranks among the best. Now the rest of the world needs help. CALS research and extension experts tackle the rising tide of concerns about water safety, quality, and quantity.

LAND GRANT

12 CALS Fights for Urban Welfare

From greening urban spaces to spotting city-dwelling birds, CALS takes to the streets of New York's cities with innovative teaching, research, and extension programs.

LIFE SCIENCES

17 CSI: Stocking Hall Detectives Identify Lurking Killers

Bacteria can lurk undetected for years in food-processing plants before triggering sudden outbreaks of disease. CALS food scientists are using advanced sleuthing techniques—including genetic fingerprinting—to develop a low-cost test to trace foodborne illnesses to their source.

APPLIED SOCIAL SCIENCES

21 Expanding the Horizon

To help amplify rural New Yorkers' concerns and ensure good governance and economic growth, the Community and Rural Development Institute unites local officials, citizens, and business and civic leaders to work for change.

Departments

2 Message from the Dean

3 Short Reports

Sun World Grape Agreement

"10GoodMinutes" Podcast

Faculty and Students Help Emerging Markets

Dual-Degree Programs in India

Living-Learning Laboratory for Bioenergy

Support from the Toward Sustainability Foundation

6 Made@CALS

25 People

Undergrad Turns PDAs into Tour Guides

Field Work Inspires CALS Senior

Faculty Leadership Training

Stoutridge Winery

Burr Named as Goichman Professor

Professor Emeritus Supports Campaign

28 Alumni Notes

30 Reunion 2009

32 End Note

Biofuels Research Lab

www.cals.cornell.edu

Dean's Message

FACING OUR FUTURE TOGETHER

We are in the middle of one of the most challenging economic periods in recent history. The ongoing recession is marked by unsettled global markets, job loss, and plunges in consumer confidence, home values, and other important fiscal measures. No doubt many in the CALS community have been touched by the upheaval and forced to make difficult financial decisions.

Cornell and CALS are not immune to the economic downturn. President David Skorton announced in January that the university has a mid-year shortfall of approximately \$200 million in its annual budget. Deep losses on Wall Street have hurt the university's investments. A steep decline in tax revenues has diminished the New York State budget, shrinking allocations to SUNY and Cornell. Federal stimulus funds will help the state cover this gap but not completely. Thus, we are girding for more reductions in state funding. We have already trimmed \$2.8 million from the CALS current year budget, with plans to save another five percent in FY2010 to meet our target of \$6.8 million.

To maintain our focus on college priorities in these uncertain times, the CALS' financial team, with the aid of department chairs and unit directors, has developed a set of budget management principles at www.cals.cornell.edu/faculty-staff/academic-affairs/upload/Budget-Management-Principles-9-2-08.pdf. We are also calling on the wisdom of the CALS community to help the college. I invite you to suggest ways to generate revenue or control costs at www.cals.cornell.edu/suggestions.

Despite the economic strain, we continue to invest in the future. As tuition costs escalate nationwide, Cornell is committed to maintaining access to higher education for all students, regardless of need. Students represent our greatest asset, a chance to build human capital by graduating leaders for economic development in New York and beyond. Also, our researchers require resources and tools to make important discoveries to solve global problems. The college's efforts to improve food safety and sustain water resources are two examples featured in this issue, as is our commitment to preserving our land-grant mission of improving lives and growing communities the world over (see pages 8, 12, and 17).

Even in these lean times, we have reasons to celebrate. In January, CALS opened the Biofuels Research Laboratory, a \$6-million, 11,000-square-foot facility to develop the next generation of fuels to power cars, factories, and farms. There, Professor Larry Walker and other researchers are studying all aspects of biofuel production—from single-molecule analyses of enzymes at the nanoscale level to converting raw materials into ethanol in 150-liter fermentation vats. They are focused on creating efficient and economical alternative fuels derived from non-food crops like switchgrass, sorghum, willow, and other perennial grasses and woody biomass. This research holds great promise for our economic prosperity, national security, and environmental sustainability.

Not far from the Biofuels Research Laboratory, CALS' new Teaching Winery opened its doors this month at the Cornell Orchards. The 1,800-square-foot lab is the Ithaca hub of our burgeoning undergraduate major in Viticulture and Enology, a program that trains students to oversee vineyards and make world-class wines.

Research and education at the winery—with an emphasis on addressing the challenges of cool climates—will be a boon to New York State, home to the nation's third largest wine and grape industry. It will complement the many vital grape-growing studies completed and underway at the New York State Agricultural Experiment Station in Geneva. Both of these facilities exemplify CALS' commitment to teaching, research, and extension. They act as models for all that we can achieve—even in the face of a difficult economy.

—Susan A. Henry, PhD,

The Ronald P. Lynch Dean of Agriculture and Life Sciences

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Short Reports

Cornell Signs Grape Agreement with Sun World International

Cornell has formed a long-term table-grape research collaboration with Sun World International LLC.

Cornell and Sun World operate two of the world's leading fresh grape breeding programs. The venture aims to combine research strengths to develop improved varieties for grape growers in the United States and abroad.

"This agreement, a unique public-private collaboration, follows nearly a decade of research cooperation between Cornell and Sun World and is likely to bring the global fruit industry many new types of grapes," says Bruce Reisch '76, a grape geneticist at Cornell's Agricultural Experiment Station in Geneva, N.Y. Reisch will work with Sun World grape breeder Michael Striem to combine desirable fruit traits and characteristics from their programs.

Cornell's expertise, cultivated over more than a century, is in breeding flavorful, disease-resistant, cold-hardy grapes for the cool climate of upstate New York and similar regions. Sun World's genetic stock has been developed over 25 years to produce large, seedless, sweet, crunchy, attractive grapes in the Mediterranean

climate of southern California that ship and store well.

Scientists at both institutions will exchange such plant materials as pollen and cuttings and will regularly visit each other's research sites. The collaboration provides both breeding programs, which use conventional plant breeding methods, direct access to a vast collection of grape cultivars and selections. Their genetic resources will be pooled as a common source of such desirable traits as berry size, early or late ripening, flavor, color, and disease- and environmental-stress resistance.

Cornell is represented in the collaboration through the Cornell Center for Technology Enterprise and Commercialization, which is responsible for the management of the univer-



Joe Ogrodnick, NYSAES

Sun World's Michael Striem, left, and CALS' Bruce Reisch

sity's technology. Sun World, a California-based grower and marketer of a wide range of fresh fruit and vegetables, will manage the U.S. and international introduction of all new varieties produced from the combined research effort.

—Marissa Fessenden '09

AEM Student Podcasts Offer Career Tips in a Down Economy



Rachel Gordon '08 and Romi Kher, AEM graduate student, helped launch "10GoodMinutes," a new weekly podcast.

With graduating seniors and young alumni facing a bleak job market, CALS professor Deborah Streeter and two students last fall launched a weekly podcast, "10GoodMinutes," to dispense career advice.

"In years past a student may have had three job offers at graduation," says host Romi Kher, a graduate student in Applied Economics and Management (AEM). "Those days are gone for now. We use the podcast to pull in alumni

and appeal to current students to be part of the networking that is so important in this economy."

Kher describes the show as "expert advice on career issues for young professionals." He and producer Rachel Gordon '08 tap Cornell alumni as guests. In one episode, Kher questioned

Wendy Spelman '87, a program leader with Kraft Foods, about internships and interviews; another week he talked with Tiffany Norwood, co-founder of Next Generation Broadband, about salary negotiation. The podcasts are archived at <http://10goodminutes.com>—and downloadable from iTunes and other channels.

"Romi is a great interviewer," says Streeter,

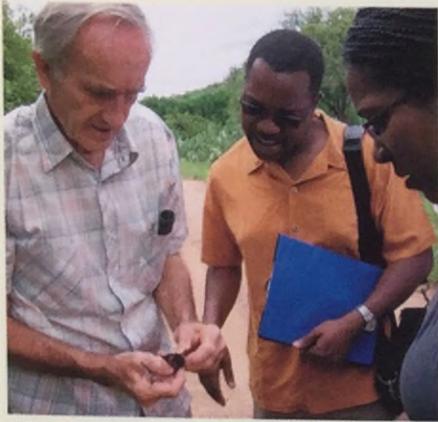
the Bruce F. Failing Sr. Professor of Personal Enterprise in AEM and the creator of eClips—<http://prendismo.com>—an online collection of 12,000 educational videos and audio reports about business and enterprise. "He has a talent for asking provocative questions and pushing people beyond talking points. He makes listening fun and engaging, not like homework."

Kher and Gordon became entrepreneurs themselves, relying on blogs and social networking sites to attract listeners since the podcast's debut in November 2008. "10GoodMinutes" has attracted more than 200 subscribers, and the podcasts—updated every Monday—have been downloaded about 4,000 times. Episodes have focused on work-life balance, nonprofits, teamwork, resumes, and other issues.

"Many people are in a negative mood right now, given the state of the economy," Streeter says. "We try to put out a positive message, the notion that there are options for people who are entrepreneurial and creative. We hope people will be inspired to take control of their careers and look beyond traditional paths."

—Ted Boscia

CALS Team Helps Emerging Markets in Africa



Provided

AEM research associate Ed Mabaya, right, and Frank Taylor, left, WildFoods' founder.

To help a fledgling natural-food products company in Botswana that produces snacks from plants in the wild while benefiting local communities, three CALS students and an applied economics and management (AEM) faculty member flew to the southern

African nation for 10 days over winter break.

The trip, led by Ed Mabaya, MS '98, PhD '03, an AEM research associate, involved working with social entrepreneur Frank Taylor, who founded WildFoods in 2007 with a commitment to sustainability and helping the local people. Taylor buys his fruits from local residents who sustainably harvest the fruits from the wild—marula, Kalahari truffles, and Bushveld melons and cucumbers—where they would otherwise rot or be eaten by wild animals. In its 8,600-square-foot factory outside of Gaborone, WildFoods transforms the indigenous plant products into jams and snack foods.

The Cornell team conducted business analyses and developed strategic plans for the company, including marketing strategies and mechanisms to streamline inventory control, costing, and bookkeeping. The students were selected for the trip by Cornell's Emerging Markets Program, which also sponsored similar field trips over break to Kenya, where students worked with an agro-chemical company, and

to South Africa, where students analyzed the natural products industry.

"The field study courses are a unique opportunity to integrate in-class learning, practical experience, and outreach service," says Mabaya.

WildFoods' products are distributed to supermarkets and craft stores and on airlines in Botswana and South Africa. Taylor hopes to increase distribution to game reserve lodges.

"We can really have a big economic impact on these small subsistence farmers," Taylor told the students.

While in Botswana, AEM senior John Castle '09 used spreadsheet software to help Taylor simplify his inventory records. "I was also able to help Frank find the costs of producing single units of his different products. This experience will hopefully add value to Frank's business, as well as help provide me with real-world experience in international development," he says.

—Susan Lang

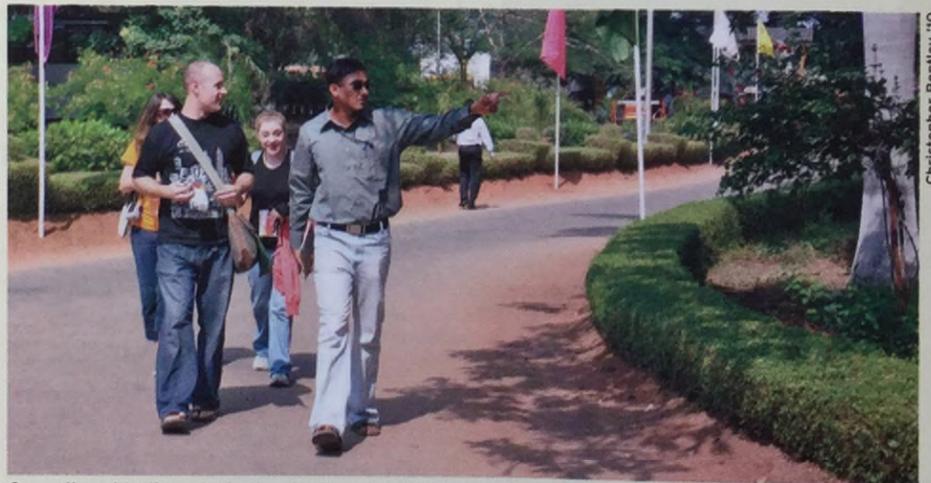
Cornell Starts Dual-Degree Programs in India

Ganesh Nawkar, a biotechnology graduate student at Tamil Nadu Agricultural University (TNAU) in Coimbatore, India, hopes to become one of the first Indian students to enroll in one of two new master's programs—plant breeding and food science—offered by CALS this summer. Cornell's role is historic, because these will be the first agricultural life sciences degrees to be offered by any U.S. university specifically to students in India.

Nawkar wants to apply CALS' state-of-the-art plant breeding research to his studies of molecular pathways of grasses. He hopes that studying different grass types may allow researchers to transfer the heat- and stress-resistance of sugar cane, for example, to wheat and rice. "Studying at Cornell will expose us to a global research environment and modern research equipment and will give us hands-on experience with new research strategies," says Nawkar.

Starting this summer, Cornell and TNAU will offer dual-degree programs in food science and plant breeding with up to 15 Indian students accepted for each program. Each of the two-year degrees will include a master of professional studies (MPS) degree from Cornell and a master of technology (MTech) degree from TNAU, with seven months of study in Ithaca.

"These degrees will provide students with a global perspective," says R. Chandra Babu, TNAU dean of postgraduate studies. "Students from India are not trained to think globally; they



Christopher Bentley '10

Cornell and Indian students stroll across the Tamil Nadu Agricultural University campus during the International Agriculture and Rural Development 602 field trip over winter break.

can't visualize. But a degree from Cornell will open up their vision."

For example, the food science courses at Cornell will teach students how to take milk and efficiently process it into such value-added and higher-priced products as fat-free milk and yogurt. Also, students will learn U.S. quality-control guidelines, which could raise the safety standards of Indian foods that compete in global markets.

"Indian agricultural production has done better than the processing sector, but processing is about to unleash and go through the roof, so there is a tremendous demand for trained indi-

viduals who can meet the demands of the food and agro-processing sector," says Syed Rizvi, professor of food science at CALS. "It will also be good for American students to learn how things are done in a rapidly developing country."

The program has been funded by a five-year, \$3 million grant from the Navajbai Ratan Tata Trust through the Cornell-Sathguru Foundation for Development, and a matching contribution of up to \$1 million from the foundation, which promotes education, agriculture, technology transfer, and rural development.

—Krishna Ramanujan

CUAES' Living-Learning Laboratory Models Bioenergy Systems

The Cornell University Agricultural Experiment Station (CUAES) has launched an ambitious plan to use 57 campus waste streams and other biomass resources to generate bioenergy to help fuel the campus. Known as the Cornell University Renewable Bioenergy Initiative (CURBI), the plan seeks to maximize the use of readily available resources from farms, forests, dining halls, and other operations in and around the Cornell campus to produce energy that is economically, environmentally, and socially sustainable.



The CURBI concept focuses on providing a leading-edge research, education, and outreach platform, as well as renewable energy production. CURBI envisions generating power and fuels from materials ranging from animal bedding and switchgrass to vegetable oil from deep fryers.

One of the technologies included in CURBI—slow pyrolysis—was recently touted by Daniel Kammen '84, a senior policy advisor to President

Barack Obama's presidential campaign, as a carbon-friendly waste-management solution that is one of the "top five" world-saving innovations that should be further developed. No commercial slow-pyrolysis operation of any size yet exists in the United States. Slow pyrolysis generates both energy and a valuable soil amendment called biochar—which, when added to soil, sequesters carbon. Johannes Lehmann, a professor in the Department of Crop and Soil Sciences, is one of the world's leading experts in biochar.

CUAES manages and operates numerous CALS research farms, facilities, and greenhouses in and around campus, including several thousand acres of diverse agricultural and forested land. It also handles the 8,000 tons of organic waste generated by Cornell annually, which is currently turned into high-grade compost. CUAES agricultural operations director, Drew Lewis, MS '03, who is spearheading CURBI, says several bioenergy technologies are being considered with the idea that housing complementary systems would offer a unique opportunity for compari-

son, demonstration, and improved efficiency, while addressing current operational, environmental, and economic issues through integrated and collaborative efforts with researchers and educators.

The CURBI feasibility study is also looking at anaerobic digestion and high-efficiency direct combustion and other "stackable" renewable energy technologies, so that waste product from one system can be utilized by the next.

"We are in a unique position to become a true living-learning laboratory, using input streams that are readily available, plus the interest of research faculty and extension experts from many different departments who see this as an opportunity to further their research, teaching, and outreach programs in bioenergy," says CUAES director Michael Hoffmann. "In partnership with others in the private and public sector, we have the intellectual and operational capacity to be a model for the state, the region, and the nation."

—Lauren Chambliss

Toward Sustainability Foundation Supports Innovative Research

For a decade, the college has bolstered its sustainability research with a steady stream of gifts from the Toward Sustainability Foundation (TSF), a Massachusetts-based organization founded by an anonymous, eco-minded Cornell alumna. Since 1999, TSF has provided almost \$550,000 in funding for approximately 75 faculty and student projects that examine the technological, social, political, and economic elements of sustainable agriculture.

In many cases, TSF funds help fledgling projects take shape until they can attract significant grants from federal agencies and other sources. For instance, the Department of Horticulture's Northeast Organic Network (NEON), a consortium of farmers, researchers, extension educators, and grassroots nonprofits that shares information on organic agriculture techniques, formed in 2001 with TSF money and later received a \$1.2 million USDA grant. NEON meets critical needs in organic farming, one of the fastest growing segments of U.S. agriculture.

"The TSF gifts provide a real opportunity to start new and innovative research programs from the ground up," says Ian Merwin, the Herman M. Cohn Professor of Horticulture.

Merwin first received an unsolicited gift from TSF in 1999 and has since overseen an annual program of competitive TSF grants for Cornell researchers. In a typical year, Merwin and a review committee—which includes CALS graduate students, organic farmers, and faculty—

awards funds to as many as 10 projects that focus on sustainability and organic farming.

The TSF program has expanded to include grants for CALS international graduate students. In 2009, five students will each receive \$5,000 in TSF funding to examine sustainability issues in their homelands in Africa and South America.

"The TSF grants are a valuable opportunity for international students to conduct field studies in developing nations," explains Merwin.

This year, for the first time, TSF awarded grant money to the Cornell Center for a Sustainable Future (CCSF), a multidisciplinary research center that encourages scientists at Cornell to collaborate on sustainability issues. CCSF used a \$40,000 TSF gift to help cover basic research expenses for two projects chosen by its Academic Venture Fund. TSF funds will also support graduate students on the projects.



Workers pick Liberty apples at Cornell Orchards as part of a TSF project comparing organic and integrated fruit production systems.

"In achieving sustainability, scientific or technological solutions alone will not be successful in the absence of social and political understanding and acceptance," says Anurag Agrawal, CCSF associate director and CALS associate professor of ecology and evolutionary biology. "TSF funds contribute to our larger communal enterprise of scholarship—especially involving students—that addresses these major issues."

—Ted Boscia

Made@CALs

GeneWeave Turns Bacteria Against Itself

Two Cornell doctoral students have developed a technology that turns bacterial viruses into informants, tapping them to analyze blood and mucus samples rapidly and inexpensively for infectious superbugs like MRSA and other toxic bacteria.



Provided

Leonard Teixeira, right, and Diego Rey are co-creators of a handheld kit to detect bacteria. What's more, the device, which is similar in appearance to a home pregnancy test, requires no electricity, allowing it to be transported into rural and underserved areas around the globe. The kit, to be marketed as MicroPhast, requires no special training, eliminating the need for expensive lab equipment and hospital space.

"Because of the simplicity of our kit, it can be used in hospitals for detection of infectious diseases but also in remote locations and rural areas," says Leonardo Teixeira, a microbiology doctoral student in CALS and co-creator of the technology.

Teixeira and PhD student Diego Rey began developing the technology in 2007 while taking Entrepreneurship for Scientists and Engineers, a course in which they started a project to develop a fast, reliable, and low-cost method for diagnosing tuberculosis, a crippling disease in many developing countries. They kept working on the invention after the class and later patented it under a startup named GeneWeave Biosciences, with assistance from the Cornell Center for Technology, Enterprise, and Commercialization. In 2008, Jason Springs, MBA '09, joined the company as CEO and has since sought to create a business plan, market the technology, and line up investors.

The product works by deploying engineered phages—viruses that only infect bacteria—to analyze bodily fluids for the genetic markers of bacteria.

The test could be sold for \$10—a significant reduction from existing methods that require skilled technicians and high-priced equipment. In the case of an outbreak, responders could quickly test patients and quarantine those with the potential to spread disease. In theory, the kits will work for any bacteria, although GeneWeave is currently focused on creating a test for MRSA, a hardy and sometimes fatal bacteria that is prevalent in hospitals, schools, and other confined areas, and tuberculosis. The company hopes to build a prototype within 18 months and, with FDA approval, release the kits within three years.

—Ted Boscia

Apple Peels Become Energy Booster

In 2008, dietitians for the U.S. Olympic Committee armed their athletes with 6,000 tubes of AppleBoost, a new energy food product inspired by the research of Cornell associate professor and world-renowned food scientist Rui Hai Liu, PhD '93.

The secret to these energy snacks resides in the peels, which contain the bulk of an apple's antioxidant, anti-inflammatory, and high-fiber properties. As Liu discovered, a peel's antioxidant properties are especially important because they may provide a promising defense against certain chronic diseases, such as cancer.

To incorporate the benefits of apple peels into a range of products from baby foods to breakfast cereals to energy enhancers—like the one consumed at the Olympics—Liu developed a patented apple-peel powdering process that retains the peel's healthful properties. As an added benefit, apple product companies can use tons of peels that are typically discarded following applesauce production.

"Using this knowledge, we can turn a waste product into a value-added product," says Liu.

When Jim Leahy, president of Leahy Orchards, and business partner Dave Copeland heard of Liu's research, they jumped at the opportunity to incorporate apple-peel powder into their pre-existing product. The result is AppleBoost, an organic, nutrient-rich blend of apples and other flavors that can be consumed chilled or frozen. Each packet contains the equivalent of a whole apple peel and is offered in two flavors: Mango-Peach and Wildberry.

Since its commercial launch at the Summer Olympics in Beijing, AppleBoost has steadily increased in sales. Copeland says he hopes to soon expand into school lunch programs nationwide.

Although AppleBoost is among the first products to utilize Liu's apple powder, the powder is a naturally healthful food source that can be infused into other foods. From school cafeterias to football fields, apple powder may soon be providing Americans with a little more of their daily recommended fruit servings.

—Isabel Sterne '10



Rui Hai Liu

University Photography

Butternut Squash Seed Oil Goes to Market

What's a farm operation to do with the tons of waste generated when their butternut squash is processed? Contact the Food Venture Center (FVC) at the New York State Agricultural Experiment Station and turn it into liquid gold, of course.

Two years ago Dave Schwartz, a consultant who works with John B. Martin and Sons Farm in Brockport, N.Y., contacted the FVC about his squash byproduct. The farm, one of the region's largest growers of butternut squash, creates a significant amount of waste, including seeds, when preparing its product for market. Through funds from the New York Farm Viability Institute's Agriculture Innovation Center Program, which focuses on adding value to agricultural products, the FVC went to work.

"The farm sent us 600 pounds of seeds and peels," says Herb Cooley, a technician at FVC. "One of our trials involved separating the seed from the rest of the waste and drying it. We then tried roasting some of the seed and pressing that in our oil press, which yielded an excellent result."

Cold-pressed, nutty-flavored butternut squash seed oil was born—perfect for salad dressings, marinades, and sautéing.

Cooley referred Schwartz to the Stony Brook Cookie Co., which is located at the Cornell Agriculture and Food Technology Park in Geneva, to see if the squash seed oil might have possibilities as an ingredient in the company's cookie recipes.

"While the oil never materialized as a cookie ingredient, we did recognize the opportunity to market it as a stand-alone product for the specialty food market," says Stony Brook co-owner Greg Woodworth



Joe Ogradnick, NYSAES

FVC director Olga Padilla-Zakour, left, technician Herb Cooley, middle, and Greg Woodworth of Stony Brook WholeHeartedFoods display bottles of butternut squash seed oil.

'94. "The recent upsurge in gourmet cooking and dining, along with the growing appreciation of locally produced and sustainable foods, made this a very timely idea."

Stony Brook WholeHeartedFoods, the name of the company's new product line, distributes Butternut Squash Seed Oil. The company made its first sale to the executive chef of the governor's mansion in Albany, who was looking to add New York-produced ingredients to his menu.

—Joe Ogradnick

Cornell Technology Makes Biogas Greener

Cornell plant scientists have invented a method that uses manure and other farm byproducts to remove toxic hydrogen sulfide from biogas.

Hydrogen sulfide can combine with water to cause acid rain and to corrode engines, so its removal makes biogas a more viable alternative fuel source. The new method, marketed as SulfaMaster, could be used to sustain small farms and treat biogas derived from landfills.

"SulfaMaster has a very large potential application for distributed bioenergy production at small sites around the country," says Gary Harman, professor of plant biology at the New York State Agricultural Experiment Station in Geneva, N.Y.

Harman and Terry Spittler, a retired analytical chemist at Cornell, founded Terreneu, a company at the Cornell Agriculture and Food Technology Park in Geneva that markets SulfaMaster.

With more than nine million dairy cows in the United States, each producing an average of more than 120 pounds of manure daily, biogas is already a key energy source for many sustainable farms. It's created by anaerobic digestion—a process where microorganisms break down manure and other organic matter in the absence of oxygen. The resulting biogas contains high levels of methane and carbon dioxide, but also a small amount of hydrogen sulfide.

Most methods for hydrogen sulfide removal require expensive industrial scrubbers that are not feasible for smaller farms. Terreneu's process uses manure as a major component of a special medium, which is placed in barrels. "The gas is then piped into the bottom of barrels, [and as it] passes through the medium, the hydrogen sulfide is removed," Harman explains. "The resulting clean methane [plus carbon dioxide] can then be used for energy."

SulfaMaster also has promise off the farm. Biogas is prevalent in sewage treatment plants and landfills, especially those that accept construction and demolition waste. These sites can capture cleaner biogas and use it to power their operations.

—Marissa Fessenden '09



Joe Ogradnick, NYSAES



Terreneu founders Terry Spittler, left, and Gary Harman show their pilot system to remove hydrogen sulfide from biogas.

The Complex World of Water

New York has water in abundance—some 4,000 lakes and ponds and 70,000 miles of rivers and streams feeding into some of the world's largest bodies of water. Cornell has water experts in equal measure.

BY LAUREN CHAMBLISS

Tracking down CALS water experts is a bit like tracing the source of the mighty Susquehanna River. There are so many diverse faculty streams all contributing to Cornell's vast pool of knowledge that it is almost easier to find someone whose work does not, in some way, involve water.

Water trickles through the resumés of more than 65 faculty members in 12 different departments and four colleges. CALS alone has more than 45 graduate and undergraduate courses on water issues.



Susan Riha



Todd Walter

"With our faculty and resources, we can be one of the premier water programs in the country," says Rebecca Schneider, PhD '94, associate professor in the Department of Natural Resources. "As a resource, oil has historically gotten more attention, but water is potentially an even bigger issue. Already, half of the world lives without adequate supplies of clean water."

Tell that to citizens of the southeastern United States, where last spring a severe drought pitted city against city and state against state for scarce water resources. Things got so heated that at the height of the dry spell, two Georgia lawmakers introduced legislation to move the state's northern border to annex part of the Tennessee River to correct what they called an 1818 surveyor's error. South Carolina sued North Carolina over plans to dip into the Catawba River, while a court ruling stopped Georgia from tapping extra water from Lake Lanier, ending what Alabama Governor Bob Riley called Georgia's "massive water grab."

Even in places where there is plenty of water, there are rising concerns about quality. A recent report in a respected hydrology journal estimated that five million Americans annually get sick from water-related diseases. Unclean water is affecting the environment, too. Efforts to clean up major water bodies—such as the Chesapeake Bay, into which the Susquehanna feeds, and the Long Island Sound—have been ongoing for years. Last year, research by the U.S. Geological Survey, as well as an investigation by Associated Press, found traces of pharmaceuticals—including antibiotics, mood stabilizers, and sex hormones—in the drinking water of at least 41 million Americans. Scientists recently discovered "feminized" male fish in the Potomac River, which some are linking to man-made estrogens, spermicides, and other drugs filtering into wastewater and on into the ecosystem.

"Water is a complex world," says Susan Riha, director of Cornell's Water Resources Institute.

"You have water transportation systems, wastewater, fish, wildlife, water treatment, groundwater, construction and development, flooding, and agriculture. All of these factors interact with each other."

"The things we do as individual landowners, farmers, and residents impact the quality of water hundreds of miles away."

—Shorna Broussard Allred

Enter CALS. Although they have many different points of entry, the faculty and staff who work on water issues have one thing in common: an overarching sense of urgency about the need to help the public, politicians, and regulatory agencies change the way they think about water management.

City Water, Country Water

Addressing watershed management issues in the New York City watershed has been a focus of CALS water projects since the early 1990s. Back then, New York City's water was a mess. Among other things, it contained too much nitrogen, phosphorous, and other agricultural nutrients. Nitrogen and phosphorus are naturally occurring nutrients that are critical to support plant life in freshwater and marine ecosystems. But too much of either nutrient, especially nitrogen in seawater and phosphorous in freshwater, causes an overabundance of phytoplankton and other organisms, which in turn use up available oxygen and kill fish and other aquatic life. Simply put, algae and bacteria thrive; fish die. High contaminant levels also require more chlorination to make water potable.

For the past 15 years, Cornell scientists—including hydrologists, bioengineers, and epidemiologists—in partnership with New York City

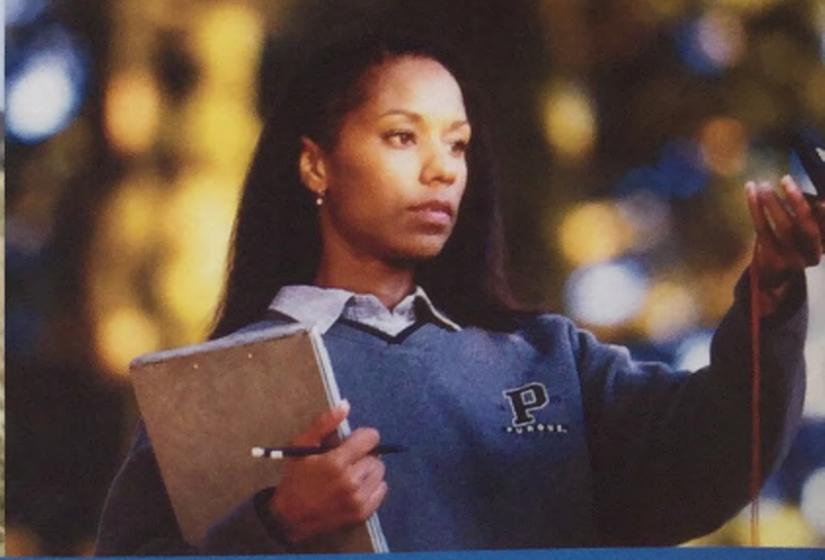


Bill Hecht

Environmental scientists at CALS address watershed issues like runoff caused by major water events.



Rebecca Schneider



Shorna Broussard Allred

watershed managers and Catskills farmers, have monitored, modeled, and constantly updated best management practices so that today the water running through 6,000 miles of pipes, aqueducts, and tunnels from the Catskills to New York City is pure and clean. The U.S. Environmental Protection Agency recently rated New York City's tap water among the highest quality in the world. That's good news for the nine million customers who tap more than 1.1 billion gallons of fresh water a day. Cornell's Soil and Water Lab, run by Tammo Steenhuis and M. Todd Walter and housed in the Department of Biological and Environmental Engineering (BEE), is on the front-line of protecting New York City's water supply.

Recently, CALS scientists identified areas on farms where runoff into streams—and thus into the watershed—is most likely to occur. BEE assistant professor Walter's research has shown that "saturated sites," areas of the landscape where water naturally collects, serve as sinks that effectively concentrate the "bad" nutrients from farms. When rains come, the runoff from these saturated sites goes straight into streams and into drinking water and coastal bays. Working with climate scientists and the New York City Department of Environmental Protection, among others, Walter and Steenhuis's lab has developed a model to help guide land-use practices in Delaware County, the epicenter of the New York City watershed.

"Figuring out that these small areas, or saturated sites, cause most of the problem, we are able to create a model for all of Delaware County," says Walter. "It is as simple as farmers not placing manure piles near these saturated sites. In many cases, we can even predict when a particular site is most likely to be a problem at what time of year."

People Power

Science can pinpoint the source of problems and propose solutions, but it takes behavioral change on the part of people—farmers, civic leaders, and residents—to make a difference.

"The things we do as individual landowners, farmers, and residents impacts the quality of water hundreds of miles away," says Shorna Broussard Allred, associate professor of natural resources. "It is much easier to regulate an end-of-pipe discharge than it is to convince residents to do something different with their lawns, or for farmers to change long-standing agricultural practices."

Broussard Allred, who studies the intersection between human behavior and the environment, is currently working with officials in Dutchess County, through Cornell Cooperative Extension (CCE), to help design strategies to motivate human behavioral change as part of massive countywide effort to clean up the Wappinger Creek, part of the New York City watershed. Dutchess County has been rapidly developing and subject to flooding in recent years. Exurban landscapes with development—roads, parking

lots, lawns, and homes, for example—create the perfect setup for floods as the Earth's natural sink, the ground, becomes covered with surfaces that increase runoff into streams and rivers during storms.

Meanwhile, in nearby Ulster County, Cornell Cooperative Extension is coordinating the development of a stream management plan for the upper Esopus Creek, above the Ashokan Reservoir, in the Towns of Olive and Shandaken. The project involves local citizens and leaders in prioritizing actions and recommendations for long-term stewardship of the stream corridor. Among other things, CCE is involving local 4-H clubs in stream monitoring.

Designer Ditches

Storm-water management is a science. For the past several hundred years, the primary engineering approach to dealing with large rains or snow



Roadside ditches are a source of river-clogging sediment and other contaminants.

Rebecca Schneider



Robert Howarth



Anthony Hay

melts has been to create systems that “move water away from the landscape as fast as you can,” says Robert Howarth, the David R. Atkinson Professor of Ecology and Environmental Biology. “But that sends nitrogen and other toxins zooming to the sea.” Howarth was among the first scientists to study the effect of nitrogen pollution in sensitive coastal rivers and bays, including the Chesapeake Bay.

Cornell research shows that a better technique is to slow down water runoff so that it has more time to sink into soil and replenish groundwater resource, rather than hasten its movement to streams, rivers, and ultimately the sea. One reason to slow water drainage is simple: less messy sewage contaminating our waters. Most wastewater treatment plants were built in lowlands or flood plains, relying on gravity to facilitate the flow of wastewater from homes and businesses to the treatment plant. That works as long as there is a controlled supply of wastewater, but as soon as there is a big storm—as little as one inch of rain—many treatment facilities, called CSOs for combined stormwater sewer overflow, are designed to dump the overflow, essentially untreated wastewater, straight into surrounding waterways.

In part because of aged infrastructures, and in part because of increasing intense periods of rainfall, the top source of pollution in municipal water is no longer nonpoint source pollution from agriculture but from water treatment facilities, says Water Resources Institute Director Riha.

Schneider says one way to avoid downstream flooding that overwhelms waste treatment facilities is to slow down water as it moves across the landscape. Roadside ditches, for example, are a critical link in the water supply chain because they act as rapid conduits for runoff and are a source of river-clogging sediment and other contaminants.

Slowing down the flow of water in roadside ditches helps prevent flooding, keeps sediment to a minimum, and protects water quality. Increasing forested canopy cover, hydro-seeding ditches so

they are not bare, and letting water be captured in basins or detention ponds—Mother Nature’s biological filters—gives the water time to absorb back into the earth, rather than rushing pell-mell toward the sea.

“As a resource, oil has historically gotten more attention, but water is potentially an even bigger issue. Already, half of the world lives without adequate supplies of clean water.”

—Rebecca Schneider

Cornell Cooperative Extension has worked extensively throughout the state, and especially in the Hudson and Delaware Valleys close to New York City, to educate transportation workers, water regulators, policymakers, and citizens about the importance of “re-plumbing” our watersheds to better manage rainfall.

Ditch management is but one aspect of the CALS water portfolio. The Water Resources Institute is currently advising the New York Department of Environmental Conservation on several hot topics, including what sort of environmental safeguards may be needed with natural gas drilling, which creates wastewater, now taking place in the Southern Tier of New York and Pennsylvania.

Thinking Big about Water

The recent drought in the South got Cornell scientists and extension educators thinking: would New York ever need to share one of our most abundant resources with our southern neighbors?

It isn’t an idle question. Under even conservative climate-change forecasts, the world is expected to experience shifting weather patterns, especially related to precipitation—how much will fall, in

what form, and when. In New York, models predict more extreme precipitation events, such as the massive rainfall in the summer of 2006 that caused flooding in the Susquehanna watershed, killing several people and costing millions in property damage.

One difficulty with even discussing whether New York could manage its rich water resources enough to share, or even sell, water to drier states is that water does not belong to any one state. Indeed, scientists say the only way to approach water policy is from a watershed perspective, which means looking at a whole ecosystem that can involve multiple states. How upstate farmers in New York State manage fertilizers and cow manure can affect the soft-shell crab count on Maryland’s Eastern Shore, some 400 miles away. That is why large bodies of water, such as the Chesapeake Bay Watershed, are monitored by regulatory bodies with multi-state representation.



Meanwhile, policy always lags behind scientific discoveries. Biogeochemist Howarth’s latest study, for instance, shows that a sizeable portion of nitrogen pollution in coastal systems can be traced to metropolitan denizens, or more precisely to their cars. This may, in part, explain why nitrogen levels in the Chesapeake Bay remain high despite changes in agricultural practices that have reduced the flow of nutrients from farms into streams.

“What we need is a master plan for water management that ties science and research to policy prescriptions and management,” says Anthony Hay, associate professor of microbiology, who is currently studying levels of pharmaceuticals in our water supply, among other things. “Our citizens depend on clean water, but we can’t assume it will be there unless we start to manage it better.”



CALS Fights for Urban Well-being

Students from Pine Hills Elementary School in Albany made bird figurines as part of Cornell's Celebrate Urban Birds project.

The charge to research, teach, and provide extension reaches beyond the fields and farms and deep into the heart of our cities. CALS students, faculty, and staff are working to restore, feed, inspire, revitalize, and educate people in urban areas every day.

BY MARISSA FESSENDEN '09

The College of Agriculture and Life Sciences has changed agriculture time and again with discoveries and groundbreaking research. Since establishment as New York's land grant institution, agricultural research and extension has been a vital part of Cornell's contribution to the world. Today CALS is creating green spaces, celebrating urban birds, ensuring food assistance for the hungry, planning the renaissance of the New York Harbor ecosystem, evaluating the effect of trees on air pollution, revitalizing urban site planning, protecting people from waterborne disease, and teaching city students how to grow their own food. Through these efforts and more, CALS is dedicated to an urban land grant mission.

Urban Greening

Keith G. Tidball, extension associate in the Department of Natural Resources, is investigating the role that nature plays in people's ability to survive, recover, and bounce back after disturbance.

More than half the world's population now lives in urban areas. This gives sustainability advocates and environmentalists a challenge to determine how the city integrates with nature.

After Katrina struck, Tidball traveled to New Orleans to help the community rebuild through the New Orleans Planning Initiative of the Department of City and Regional Planning in Cornell's College of Architecture, Art, and Planning. He has since returned many times with the support of the Ford Foundation.

"We expected people to talk about urban agriculture and gardens," Tidball says, "but what we didn't expect were people talking about how devastating it is to lose the trees. New Orleans was known as a tree-filled city. People were determined to show the world that they were bouncing back—by planting trees."

Running with this sentiment, Tidball is now helping New Orleans to revitalize through community-led urban greening efforts. He is excited to work with people passionate about their place in nature.

"People dismiss thinking about cities in terms of the environment," Tidball says. "They



Keith Tidball

CALS' Keith Tidball organized efforts to encourage urban kids to bring nature to cities by planting trees.

think that it is not natural, but humans are a part of nature. We evolved with it, and we are in cities by virtue of who we are."

After 9/11, Tidball saw an upwelling of interest in creating green spaces—memorial parks, community gardens, and tree groves. This inspired him to think about how to clear the way for community members in cities to make green projects a reality. At Cornell, Tidball teaches the Urban Environments independent

study and seminar course, service learning focused on cities and humans' relationship with the environment. The course culminates in a one-week experience in New York City, through a partnership with Cornell's Public Service Center, where students take a closer look at a topic discussed in class—it could be urban forestry, greening as in parks or gardens, wildlife and fisheries, water quality, or green building design.

Celebrating Urban Birds

The inspiration at the heart of the Cornell Laboratory of Ornithology's Celebrate Urban Birds project is to bring the wild to the child.

Karen Purcell '87, extension specialist and project leader, started Celebrate Urban Birds in 2006 to target underserved audiences in the sciences, particularly young urban Latinos.

"We wanted to bring a love of birds, science, and increased habitat awareness to people everywhere, anywhere," Purcell says. Encouraging active participation in science at a young age, she adds, opens the door to science careers later in life.

Like other citizen science programs at the Lab of O, Celebrate Urban Birds encourages participants to take a look at nature around them, jot down observations, and mail them in.

The Lab of O has been involving the public in science since Arthur A. Allen '16 first hung the lab's shingle on his door in Comstock Hall in 1915, but citizen science has blossomed via the Internet. Today the program runs a large selection of projects, with legacy data sets useful for studying impacts of global climate change.

Whether designed for research or education, each citizen science project has educational resources, data entry, visualization, and graphing tools that allow people to manipulate and see patterns in the data they contribute—see www.cornellcitizenscience.org.

"Participant numbers for Celebrate Urban Birds are fantastic," says Janis Dickinson, PhD '87, associate professor of natural resources and Arthur A. Allen Director of Citizen Science at the Lab of O. "We have 3,000 partner organizations—schools, clubs, 4-H, libraries, corporate wellness programs, rehabilitation clinics, and battered women's shelters."

Participants can host an urban bird celebration with a free "Celebration Kit" that includes an urban-birds poster, materials about birds and urban greening, data forms, and sunflower-seed packets for planting. More than 80,000 kits have been distributed.

In November 2008, the National Forum on Children and Nature endorsed 30 demonstration projects nationwide that creatively



Urban Divers Estuary Conservancy

Participants gather for a Celebrate Urban Birds event in Central Park.

reconnect kids with nature, including Celebrate Urban Birds. The program has also elicited interest in other parts of the world, particularly in India, where it could be useful in tracking declines of native birds once common in cities.

Anticipating Emergency Food Assistance



Courtesy Food Bank of New York City

Volunteers from the Food Bank of New York City hand out meals in West Harlem.

When the economy takes a plunge, food pantries and soup kitchens step up to the challenge.

Calum Turvey, the W.I. Myers Professor of Agricultural Finance, is working on a model to predict a surge in emergency food demand months before it happens. He works with Food Bank of New York City employees, who sometimes become volunteers—working without pay to make sure the hungry get fed.

“When you are working with people who are that dedicated, you can’t say no to whatever little thing you can do to help,” Turvey says.

The Food Bank cannot spare money for research, so Turvey gives them his time. He is part of the Food Banks’ Research Policy and Education advisory committee, which helps determine the demand for food pantries, soup kitchens, food stamps, or the Women, Infants, and Children supplemental nutrition program.

“At the end of the day we have a gap—the number of people in NYC that need emergency food assistance and aren’t getting it,” Turvey says.

The numbers are disturbing. “We had numbers that were very large in some areas that we couldn’t explain,” Turvey says. “We went over our methodology and decided it was good. We would rather that number go forward and be wrong than be kept back.” The group concluded that up to 1.3 million people in New York City are in need of emergency food assistance at some point during the year.

The next step is to get ahead of the curve. Now Turvey is working on a model that will predict how many people will need food assistance three months in the future. He bases the model on a number of economic indicators, including interest rates, inflation, and building permits.

“I have high hopes for the prediction model,” Turvey says. “The economy is crashing, which means that donors are crashing, but now the Food Bank has more clients. It is a pretty hard thing for them to manage. At least this will give them a three-month view. Instead of noticing on any given day they’re open that they’re out of food by 10 a.m., they will be able to anticipate an increase in demand.”

Restoring the Hudson River Estuary

The New York Harbor may not seem like the place for an environmental renaissance, but that is exactly what Mark Bain, associate professor of aquatic systems ecology, hopes to see.

Bain and eight other experts have been meeting since 2007 to set the restoration agenda. The Port Authority of New York and New Jersey, the Army Corps of Engineers, and others have already invested millions to make New York City’s waterways a world-class estuary and harbor, but they needed to figure out what that means in an urban environment.

“Even within our group of eight experts we were having a hard time coming to agreement on what needed to be done,” Bain says.

The group was divided into four segments. Some called for a restoration of nature—a return to the past. Another philosophy was to create opportunities for natural processes to happen on their own—“rewilding.” The third approach was to improve ecosystem functions, such as fisheries production. The fourth, and the eventual consensus, was to put natural elements back into a human-dominated ecosystem.

“Once we decided that the ecosystem had been irreversibly modified by human activity

and made the decision to work with that activity, it became more practical, methodical work.”

“We decided that we needed to have a mosaic of habitats for wildlife and make sure the ecosystem was still very oriented toward people,” Bain explains. “We would specify conditions—measurable, identifiable goals—called target ecosystem characteristics.”

The targets, 11 of them, include a focus on coastal wetlands, reopening connections to tributaries, restoring oyster reefs, and maintaining islands for water birds.

“We started saying that what we were doing was mapping out a renaissance in the environment. We were making anew—looking forward to a new environment.”

Bain can see that the goals are starting to be realized. At meetings with community members and policymakers, people are motivated.

“We haven’t remade the environment yet, but we have steered the ship in the right direction and a lot of groups have gotten on board.”

After the state saw the movement caused by the group’s work in New York City, they asked Bain and the other committee members to repeat the process and draw up a similar restoration agenda for the upper Hudson.



Professor Mark Bain is collaborating with environmental experts, policymakers, and citizens to rebuild the New York Harbor’s ecosystem.

Finding Out if Trees Filter Air Pollution

A tree-lined city is the urban Eden, and many believe that greenery helps cleanse the air of pollutants.

Tom Whitlow, associate professor of horticulture, knows that the correlation between more trees and cleaner air is not easy to make.

Many often-cited studies of trees as the “lungs of the city” look at the amount of particles deposited on leaves of trees. “But that tells us nothing about the particulate matter in the air that we breathe,” Whitlow says.

In wind tunnels, Whitlow measured what happens when a stream of particulates is passed through tree branch groups of varying leaf density and area. Airborne particles come in all different sizes, but the most worrisome are those of less than 2.5 micrometers in diameter, small enough to enter the lungs and cause respiratory problems. The tests showed that leaf canopies actually increase the length of time that particles are airborne. Just as water flowing in a stream swirls slowly in the lee of a rock, particles in the tunnel remained suspended longer when

blown through tree branches.

Next, Whitlow went to New York City for real-world data. Regulatory agencies often place particle detectors on rooftops and report hourly averages. Whitlow moved his to the street where people actually walk and sampled every six seconds—the rate at which most people breathe.

With research assistants attending each detector and noting events that might cause a spike in particulates, Whitlow’s study showed that distance from the road mattered more than presence of trees or even a dense hedge.

As the study progressed Whitlow realized that the issue was complicated by many factors. Each new convolution means that there will be no easy solution to urban air pollution. For example, particulates of less than 2.5 micrometers aren’t just tailpipe emissions but microscopic fragments of tires and even food.

“One of the spikes we saw correlated directly with an entry in the data book that said ‘Strong smell of barbecue!’” he says. “And I think it would be even more difficult to regulate bar-



Tom Whitlow

New York City teens watch a Cornell research assistant monitor a device to sample the city’s air for pollutants.

becue than auto emissions. It is a very complex picture. Our studies show some unexpected results that are difficult to interpret.”

One thing is clear: we can’t plant enough trees in cities to cleanse the air, even if the greens did provide the ecosystem service of filtering pollutants. But monitoring particulates where human activity occurs can certainly help us decide how to regulate for cleaner air.

Helping Plan Urban Green Revitalization

Students in Peter Trowbridge’s class, co-taught with Deni Ruggeri, MLA ’01, MRP ’01, have a chance to design a community park atop a new parking garage adjacent to the World Trade Center site in New York City. Trowbridge, professor of landscape architecture, focuses his work on creating green spaces that integrate city function and nature.

“These student projects are partnerships with architecture firms to generate ideas,” Trowbridge says. “Many times the organization follows up, takes the ideas the studio generated, and refines a concept to make it a reality.”

The new parking garage project is happening because the Deutsche Bank building adjacent to the WTC site was badly damaged and scheduled for demolition. The Port Authority sought ideas to create a neighborhood park in the area over the new underground parking garage.

Trowbridge, with wife Nina Bassuk ’74, also co-teaches Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment, a year-long landscape architecture course. Students learn how to assess a potential site; select appropriate trees, shrubs, vines, and ground cover; design the space; and install the new landscape. The course focuses on site remediation. Past projects include the CALS centennial garden behind Mann Library, a tree-planting project in Geneva, N.Y., and other work in Tompkins County.

Trowbridge’s studio classes also worked on a

LA3010, Integrating Theory and Practice Studio



CALS students sketched plans for more green space at Battery City Park in Manhattan as part of a redesign of two nearby piers.

greenway on the East River in New York City. Originally a construction bypass, the mayor’s office decided to keep the roadway and expand it into a greenway. The studio worked on ideas for the greenway to help give people a chance to relax and recreate within a natural space.

“The Hudson River Trust is redesigning two piers near Battery City Park. This year, students in a design studio taught by Jamie Vanucchi, MLA ’02 looked at how to incorporate nature and education into the space,” Trowbridge says.

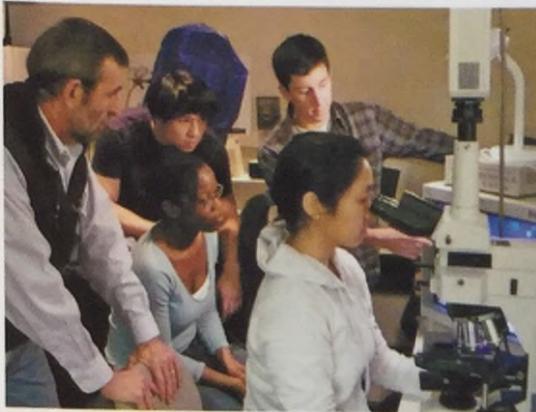
Last year, Cornell landscape architecture

students placed second in the Ed Bacon Foundation competition, Rebuild/Revive. Graduate and undergraduate students in the Department of Landscape Architecture worked on a plan for urban renewal in the once-thriving industrial neighborhood of Ludlow in northern Philadelphia.

“These projects serve the community and get students involved with public projects and real clients,” Trowbridge says. “It is a great way to teach.”

Preventing Waterborne Disease

Marissa Fessenden



Professor William Ghiorse looks on as undergraduates examine *C. parvum* oocysts through a microscope.

In his lab in Wing Hall, William Ghiorse, chair of the Department of Microbiology, studies a tiny organism that caused the largest U.S. waterborne disease outbreak. In 1993, half the population of Milwaukee, Wis. was infected by *Cryptosporidium parvum*, an intestinal parasite that spreads through drinking water. Officials didn't realize what was happening until pharmacies ran low on Imodium—400,000 Milwaukeeans got sick, and as many as 100

people died. There is no treatment for *C. parvum*, and the deaths occurred among those with severely compromised immune systems.

During the same period, New York City was under pressure from the Environmental Protection Agency to filter its drinking water. It had been long suspected that runoff from farms could contaminate the reservoirs in the Catskills that hydrate New York City, but little was known about how much risk there was and how to counter the threat. Although it is known as some of the best tap water in the world, New York City's water supply is not filtered.

The city was chlorinating the water, but chlorine does not kill *C. parvum*.

An individual infected with *C. parvum* develops watery diarrhea, stomach cramps, fever, and vomiting. Symptoms last one to two weeks in healthy people, and with each bowel movement millions of oocysts are shed from the intestinal lining. Oocyst viability is the key to *C. parvum*'s success.

Ghiorse realized unlocking that biological secret would require knowledge of how

C. parvum is able to survive outside a host for long periods of time, especially in a farm environment.

"Each oocyst is a tough-walled capsule containing four infective cells," explains Ghiorse. "The oocyst wall is waxy, impermeable, and strong, protecting it from chemicals like chlorine."

"But a January thaw will kill them," he says. "Oocysts in manure spread on a field in winter can't stand the freezing and thawing. It breaks them into pieces. Problems could occur when you have a cold winter with no thaw and the snow melts all at once in the spring."

Ghiorse helped draw up guidelines for farmers, including requirements like setbacks to keep animals a certain distance away from streams and proper drainage procedures. Now, Ghiorse is focusing his inquiries into the reason for oocyst viability.

Helping with research along the way are many undergraduate students in Ghiorse's lab.

"The students learn how to do some experimental work comparing viability with biological factors like utilization of stored starch. At the same time, we're answering important questions that have implications for human health, public policy, and basic biology," he says.

Developing a Hydroponics Learning Model

How do you teach an innercity student about agriculture, when they are surrounded by sidewalks and buildings instead of fields and farms? You give them their own mini-farm to run.

Building on more than 20 years of research in hydroponics, Philson A.A. Warner from Cornell Cooperative Extension in New York City, has developed the nutrient drip flow technique (NDFT™) hydroponics technology and the Hydroponics Learning Model (HLM) curriculum to teach science and technology to youth and adults. Students are provided with seeds to grow edible crops, such as basil, Chinese cabbage, and lettuce, while exploring fundamental concepts in applied and biological sciences, technology, and environmental studies.

"It's not just teaching the sciences and technology. It is inquiry-based and hands-on—and at the end of the experience these youngsters are engaged in economics and entrepreneurial activities," Warner says.

Teachers interested in implementing HLM attend a three-day workshop and learn the methodology behind the model. They return to their classrooms with kits, each comprised of a mini NDFT-system, educational materials, and tools to test water quality, pH, and nutrient levels.

"The youngsters are put in charge of the system. It becomes their curriculum. They monitor

everything that goes on in the plants—the environment and ecological factors for growth."

Students learn the science behind Warner's hydroponics technology. They learn how plants use the energy of the sunlight and nutrients in the water. They strategize production of the plants and learn how to make marketing decisions.

"This is a wonderful new methodology to teach the sciences," says Warner. "The curriculum fits in the New York Regents standards. The state expects that the classroom will complete approximately 22 labs, and HLM has more than 30 labs involved."

Ten high schools in New York City, such as Food and Finance High School and Brooklyn Democracy Academy, are currently learning through HLM, and more schools are adapting it. The program has also crossed over to the Rikers

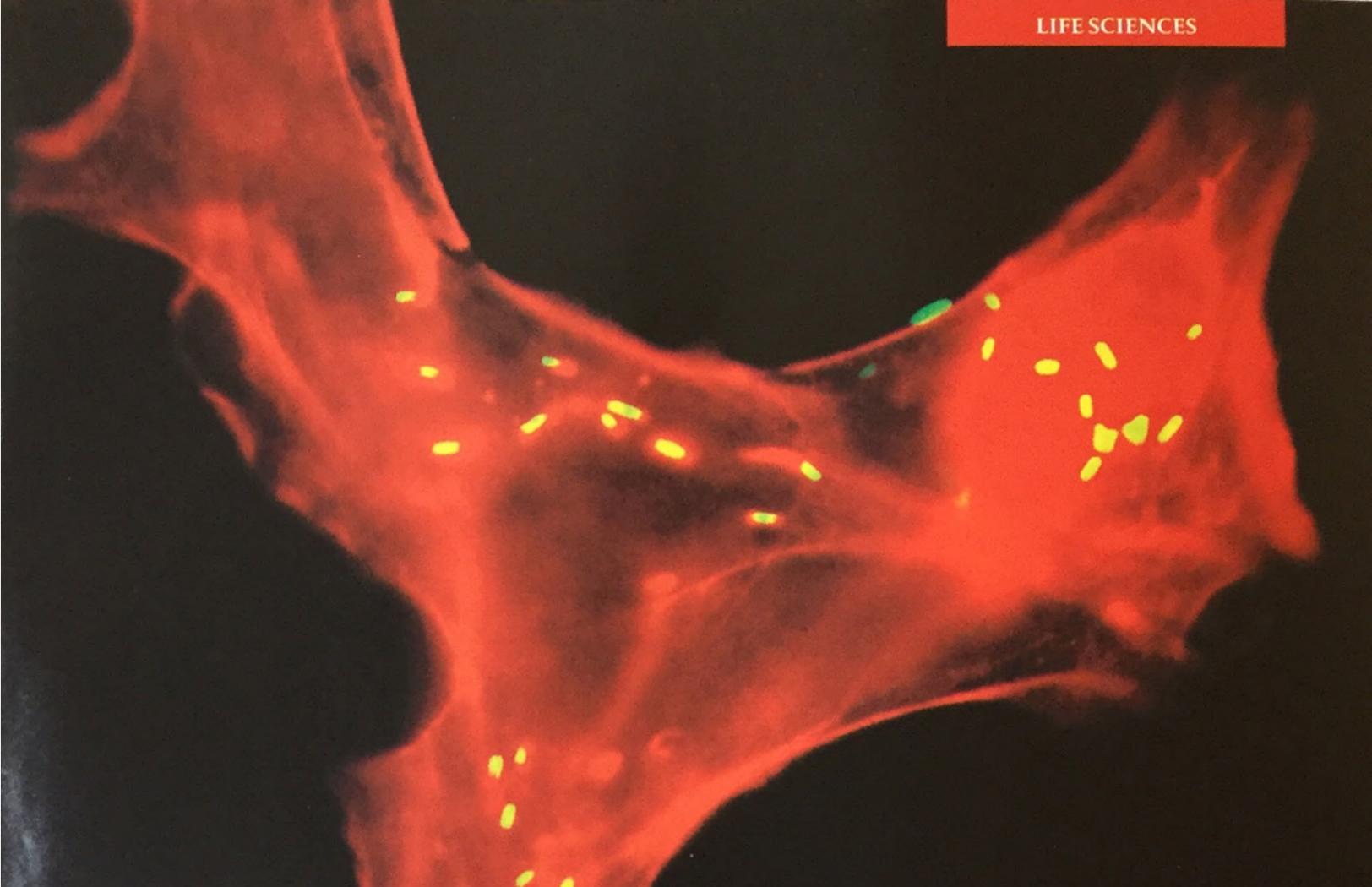


Extension associate Philson Warner, right, instructs inmate and student Carlos Miranda in the Rikers Island hydroponics lab.

Island school system and is the standard requirement for science in the two high schools there.

"Many of these youngsters live in an innercity environment," Warner says. "They don't have a clue how vegetables are produced. The program is a grabber, because it happens in real time, right in front of them. This is not just something on television. They know that the program is being utilized professionally and at Cornell. The possibilities are in front of them."

Jesse Winter



CSI: Stocking Hall Detectives Identify Lurking Killers

Food scientists at Cornell use genetic fingerprinting techniques to track incidents of food poisoning to their sources.

BY ROGER SEGELKEN

Striking first in 1988, the killer hid in a Texas meat-processing plant. Twelve years later, the killer struck again, and four people died—of listeriosis.

The weapon in 2000 was turkey coldcuts—in 1988 it had been hotdogs—but the killer was the same: an identical strain of *Listeria monocytogenes*, the food-borne pathogenic bacterium that had somehow eluded clean-up efforts after the 1988 outbreak. The strain survived a number of changes, including a change of ownership at the meat-processing plant—lurking who-knows-where in a federally inspected facility—then reemerged with a vengeance.

Immunofluorescence image of *Listeria monocytogenes* infecting a host cell. *Listeria* is in yellow, while the host-cell actin is in red.

Listeriosis and *Listeria*

Manifestations of listeriosis include septicemia, meningitis, encephalitis, and intrauterine or cervical infections in pregnant women. The onset time to serious forms of listeriosis range from seven days to two months. Gastrointestinal symptoms (nausea, vomiting, and diarrhea) may precede more serious forms of listeriosis or may be the only symptoms expressed, and they can begin within 24 hours. Most healthy people show no symptoms. At risk are people who are immunocompromised (by corticosteroids, anticancer drugs, and AIDS); cancer patients (leukemic patients particularly); pregnant women (and the fetus); and the elderly. The mortality rate for severe invasive listeriosis is 20 percent. An estimated 500 people die each year in the United States from listeriosis.

While most strains of *Listeria monocytogenes*, a Gram-positive bacterium that is motile by means of flagella, are pathogenic to some degree, recent research by Wiedmann and colleagues as well as others around the world has shown that a considerable proportion of *L. monocytogenes* show highly reduced ability to cause human disease. This research may, in the future, facilitate new approaches to focus control strategies on the most virulent *Listeria monocytogenes*. The pathogen is found in soil, silage, and other environmental sources, and it is hardy and remarkably resistant to freezing, drying, and salt. *L. monocytogenes* has been associated with foods such as raw milk, soft-ripened cheeses, ice cream, raw vegetables, and raw and cooked meats and fish.

Adapted from the FDA Center for Food Safety and Applied Nutrition's Bad Bug Book (<http://vm.cfsan.fda.gov>)



Immuno-gold electronmicroscopy picture of *Listeria monocytogenes*, labeled to detect presence of internalin A.



Martin Wiedmann, associate professor of food science, hopes to develop a \$10 genomic test to investigate foodborne-illness outbreaks.

The fact that the exact same strain of *L. monocytogenes* never left the building could not have been confirmed without a recently developed, innovative approach to genomic analysis—the genetic fingerprinting work of Martin Wiedmann, PhD '97 and his partners in crime detection in Stocking Hall.

“Of course it wasn’t the individual bacterial organisms that survived for 12 years—more like their great-great-great-great-granddaughters as direct lineal descendants. But that’s the beauty of comparative genomics and rapid, sophisticated, and relatively inexpensive genome-wide analysis,” explains Wiedmann, an associate professor of food science. “We are learning to distinguish the subtle changes across subsequent generations, facilitated by recombination and positive selection—and how to interpret changes when the vast majority or all core genes remain the same. We can tell whether a series of bacterial samples represents continuing evolution of the same strain—or very different strains altogether.”

Genomic Analysis

Indeed, the Texas meat-plant strain of *L. monocytogenes* had changed a bit, as Wiedmann and colleagues report in a recently published paper, “Short-term genome evolution of *Listeria monocytogenes* in a non-controlled environment”

But essentially it was the same bug, bad to the bone—or rather, bad to its genomic backbone.

“Our data support the hypothesis that the 2000 human listeriosis outbreak was caused by an *L. monocytogenes* strain that persisted in a food-processing facility over 12 years,” Wiedmann and 11 collaborators report in the journal *BMC Genomics*, “and show that genome sequencing is a valuable and feasible tool for retrospective epidemiological analyses.”

Case closed.

Months earlier, a key paper by Wiedmann and colleagues at other institutions (“Genome-wide analyses reveal lineage-specific contributions of positive selection and recombination in the evolution of *Listeria monocytogenes*”) laid down the principles and offered hope: “The list of genes identified as being under positive selection,” they said, “can be used by the scientific community to advance the

discovery of genetic factors” that allow organisms to adapt to diverse environments and hosts.

It is the kind of basic, enabling science that is best done at a place like Cornell, with its multifaceted approach to genomics and life science problems.

Wiedmann directs the Laboratory for Molecular Typing and the Laboratory of Food Microbiology and Pathogenesis of Food-borne Diseases—both based in the Department of Food Science at the Ithaca campus and occupying much of Stocking Hall’s fourth floor. Beyond these particular programs, there are university-wide collaborations to develop new tools to track the source of outbreaks that threaten food safety. One is the recently established Cornell Center for Comparative and Population Genomics (3CPG, for short). Faculty members of various overlapping programs depend on an array of core facilities, such as the Cornell BioResource Center in the Biotechnology Building, for specialized equipment and techniques that individual laboratories require.

“We do the basic science and, based on our findings, also try to develop new tools and find smarter ways to use existing ones,” Wiedmann says.

Searching for the \$10 Test

If the holy grail of human medicine is thousand-dollar full-genome sequencing—to inform individuals of their risk for inherited disease and to customize treatment if they become sick—the microbial-pathogen detectives’ goal is a relative bargain.

“We’d like to be able to do a rapid full-genome screen on each and every microorganism of interest, to investigate outbreaks of foodborne illness, for ten dollars apiece,” Wiedmann says.

He notes that the first attempts to sequence the human genome took years and cost more than a billion dollars. Now automated sequencing technologies and sophisticated methodologies are lowering the cost of genome-wide screens for individual humans. Likewise, the cost is coming down for sequencing the much smaller genomes of microbes. The tab for some-

Preventing Crimes of Pathogens



Jose Ojardnick, NYSAES

Randy Worobo, associate professor of food microbiology, is a co-collaborator in a new USDA grant.

If foodborne illness and death is a crime of pathogens, crime prevention could be the best remedy for the estimated 76 million cases of foodborne disease each year in the United States.

That is the strategy behind a new, \$1.67 million U.S. Department of Agriculture grant to food scientists at Cornell and five other institutions: to prevent health hazards coming from fresh fruits and vegetables as they travel from farm to fork.

Directing the initiative will be Randy Worobo, associate professor of food science at the New York State Agricultural Experiment Station at Geneva, and Martin Wiedmann, associate professor of food science at Cornell’s Ithaca campus.

Other collaborators in the Cornell-based USDA program work at the University of Florida; University of California, Davis; Texas Tech University; West Texas A&M University; and Michigan State University.

Worobo explains that the program will focus on prevention methods rather than trying to eliminate pathogens once produce is contaminated, saying: “We want to identify the critical points or factors that present high risks for produce contamination. The greatest challenge will be collecting all the research findings and condensing them into recommendations and guidance for different target audiences.”

Because pathogens can contaminate produce through fecal-tainted water sources on the farm, from wildlife, during processing and shipping, at retail outlets, or through unsafe food preparation by consumers, the Cornell team is taking a multidisciplinary approach.

Other Cornell faculty participants include Kathryn Boor ’80, professor and chair of the Department of Food Science; Carmen Moraru, assistant professor of food science; Betsy Bihn, National Good Agricultural Practices program coordinator and senior extension associate of food science; Lorin Warnick, PhD ’94, associate dean, College of Veterinary Medicine; and Olga Padilla-Zakour, MS ’88, PhD ’91, associate professor of food science and technology.

thing like *Listeria* is now around \$1,000. Next it will be \$100 apiece, then \$50, until the \$10 goal is in sight, he predicts.

The quick-and-affordable aspect is critical, considering that listeriosis patients in the year 2000 turkey coldcut outbreak were scattered across 11 different states.

Various forms of *Listeria* are found almost everywhere (see the sidebar article, "Listeriosis and *Listeria*"), and some non-pathogenic species are innocuous, like the aptly named *L. innocua*. One Wiedmann survey of urban environments found potentially pathogenic *L. monocytogenes* in 2.9 to 12.6 percent of the samples taken from sidewalks, leaves, and trash cans in four different cities in New York State.

So, in the unlikely event that listeriosis were to be blamed on the hot dogs at your favorite sports venue, rapid, inexpensive, genome-wide screens could finger the bad bug's accomplice: Was it the hotdog vendor? The hotdog factory? Or even the third guy from the aisle who passed the dog to the unwitting consumer?

Being able to track food-safety outbreaks quickly can save thousands of lives—and Wiedmann's team is frequently asked to help.

The Floor-Mat Problem

As to precisely where the Texas *Listeria* hid for 12 years, that's still something of a mystery, Wiedmann acknowledges. Food-processing plants—including the cleanest ones—are very complex places.

"Global trends in the food industry demand that we train food scientists and food engineers transnationally and transculturally to ensure that food systems worldwide are sustainable, safe, and nutritious."

—Martin Wiedmann

The best-intentioned attempts at sanitation sometimes cannot reach a *Listeria* hiding in a plant—Wiedmann says, explaining the "floor-mat problem."

Resilient floor mats are a workplace requirement of OSHA, the federal Occupational Safety and Health Administration, to relieve stress when work-

ers stand on hard (but more easily cleaned) floors all day long. Chemical sanitizers can kill pathogens on the surface of the mats, which are many layers thick. But the next time a worker steps on a "clean" mat, below-surface pathogens squish to the surface. One solution to the floor-mat problem is to substitute shoes with extra cushioning in the soles, Wiedmann adds, crossing one more hiding place off the worry list.

Careers for Food Detectives

Besides, if there were no places for pathogenic organisms to hide, there would be less work for graduates of Wiedmann's food science programs.

Cornell food science graduates who know killer bugs when they see them are much in demand at major food-processing companies (Kraft and General Mills, to name two), at federal agencies (the Centers for Disease Control and Prevention, in particular), and testing labs (such as Silliker Inc.). Alumni connections to Silliker and to Colorado State University fostered a newly developed workshop series, "Molecular Methods in Food Microbiology"—one way that Cornell's Department of Food Science reaches out to food industry professionals, scientists from government and public health laboratories, representatives from industry trade organizations, and other academic researchers. A similar workshop will be held each year in Thailand, also in cooperation with graduates of Cornell's food science program.

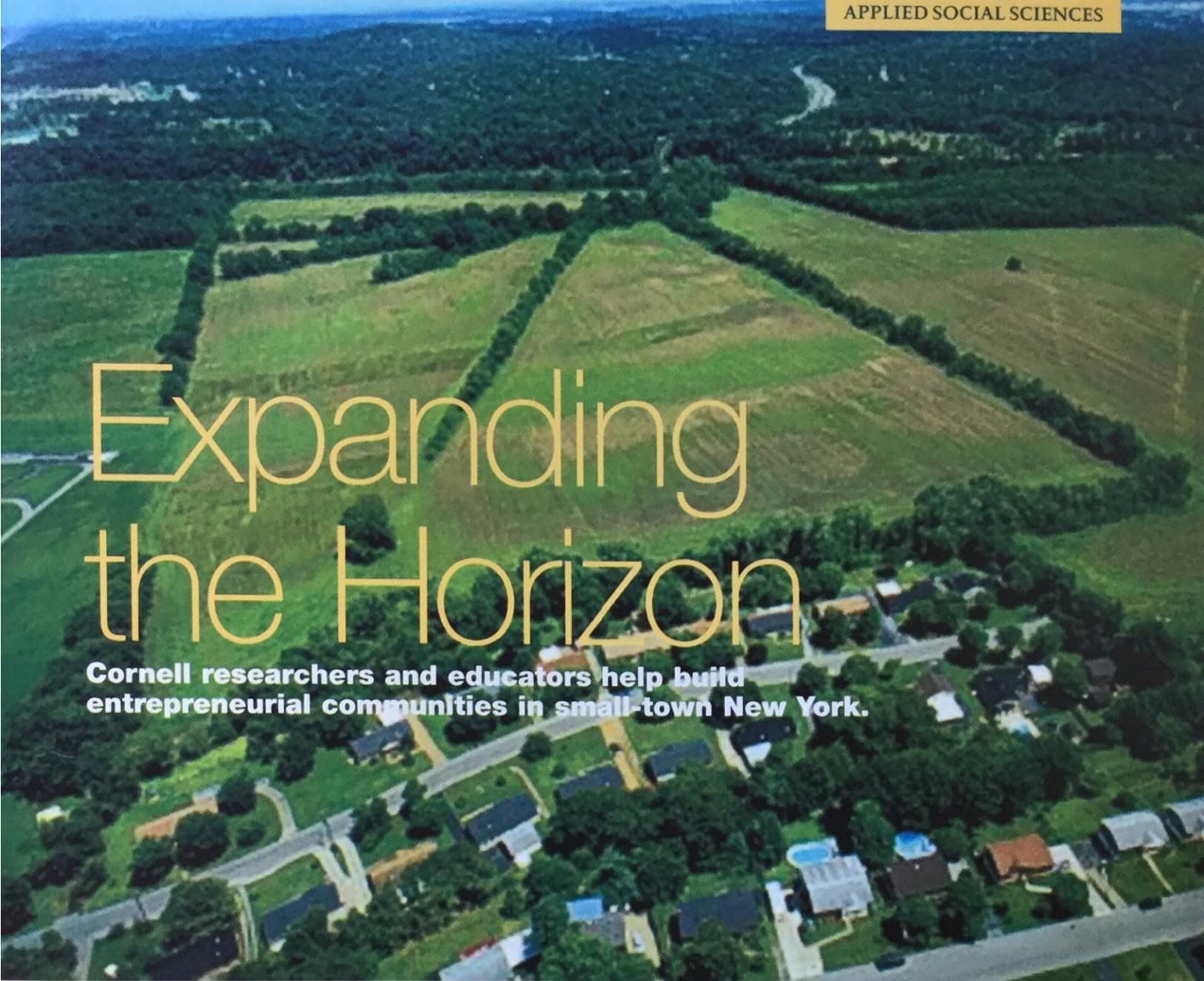
As a way of further ensuring the safety of the world's food supply, Cornell now also offers a dual-degree program in food science with Tamil Nadu Agricultural University in India. (See story on page 4.)

"Global trends in the food industry demand that we train food scientists and food engineers transnationally and transculturally to ensure that food systems worldwide are sustainable, safe, and nutritious," says Wiedmann.

When Wiedmann's classes and workshops reconvene this year, students and food-industry insiders will hear about the Texas turkey case. And they'll be learning how to genetically "fingerprint" killers that don't have fingers—only evolving flagella—to their name.



Andrea Moreno Switt, a post-doctoral fellow in Professor Wiedmann's laboratory, prepares samples for subtype analysis.



Expanding the Horizon

Cornell researchers and educators help build entrepreneurial communities in small-town New York.

BY TED BOSCIA

For the three million residents of rural New York, the recent facelift of the state's leadership raises concerns about gaining a seat at the table in Albany. After all, following the 2008 general election, New York City lawmakers now preside over the New York State Assembly and Senate, and politicians who live within a cab ride of the Empire State Building lead most major legislative committees. Of the new 32-member Democratic majority in the Senate, only two represent a rural district.

Still, upstate New York's people and communities have a strong ally. On the environmental, economic, and educational fronts, they can look to the Community and Rural Development Institute (CaRDI), an applied research and training center housed in the Department of Development Sociology in the College of Agriculture and Life Sciences that has been supporting rural development across the state since 1990. CaRDI's programs embody Cornell's founding land grant mission, with an emphasis on equipping local officials with resources for effective governance and enabling communities and individuals to gain a footing in the new economy.

"To ensure good governance and turn the state around, we need strong training programs at the local level, which wouldn't be possible without the support of CaRDI."

—Jeff Osinski

With various partners around the state, CaRDI provides research-based information and training, ranging from the nuances of land use, to economic development enterprises that span multiple counties, to the newly launched Center for Rural Schools, a first-of-its-kind venture overseen by education professor John Sipple to create a hub for information and services meant to improve New York's 356 rural school districts. CaRDI initiatives share a common vision: to promote civic cooperation that lifts a region or industry collectively; to encourage community entrepreneurship; and to empower local officials and groups through training.

"CaRDI serves as a networker, a convener, and an enabler of informed decision making," says the institute's executive director Rod Howe, a senior extension associate in development sociology. "There can be a great deal of turnover in local government, so the continuity of initiatives and strategies isn't always there. We seek to provide the connections, trainings, research, and data needed for local leaders to make sound decisions without feeling overwhelmed by the process."

CaRDI IN ACTION ACROSS NEW YORK



All photographs provided.

In the Lake Erie region, CaRDI supports a proposal to recognize the area as an agriculture-themed heritage site.



Leaders from local government, environmental groups, and business attend land-use training sessions to plan for the future of the Keuka Lake Watershed.



Jeff Osinski, left, of the New York State Association of Counties, and CaRDI executive director Rod Howe, right, recognize Debra Cobb, a graduate of the Pelletier Institute.

Fostering Informed Decision Making

Through CaRDI, rural New Yorkers also gain a subtler benefit: by uniting as a constellation of cities and towns rather than taking a go-it-alone approach, they're much harder to ignore in the corridors of Albany. At the very least, they won't suffer the "benign neglect of rural communities," in the words of Ron Brach, executive director of the New York State Legislative Commission on Rural Resources.

In 2006, Brach and his staff joined with CaRDI and Cornell Cooperative Extension (CCE) to implement the Rural Vision Project (RVP), a bipartisan endeavor to solicit upstate stakeholders about their concerns. During the course of two years, RVP administrators held listening sessions that culminated in a July 2006 symposium in Syracuse: the Future of Rural New York. At the meeting, about 200 participants representing local officials, state agencies, business leaders, nonprofits, and citizen groups



Stakeholders gather at a meeting of the North Country Regional Food Initiative, an effort to assess and market local food in production in northern New York.



CaRDI helps host forums on natural gas exploration and leasing for small communities around the state.

cial management, and other areas crucial to beginning and veteran lawmakers. In many cases, Cornell faculty lead the sessions, which have reached hundreds of elected and appointed officials.

“CaRDI serves as a networker, a convener, and an enabler of informed decision making.”

—Rod Howe

“CaRDI has been instrumental in the development of the institute and plays a major role in connecting Cornell faculty and researchers with county officials,” says Jeff Osinski, director of research and education at NYSAC. “This is a critical time for the state with the budget crisis, and that places multiple demands on local officials to make difficult decisions. To ensure good governance and turn the state around, we need strong training programs at the local level, which wouldn’t be possible without the support of CaRDI.”

Lifting Local Economies

For Howe—and CaRDI co-directors David Brown, professor of development sociology, and Max Pfeffer, chair of the Department of Development Sociology—rural development hinges on regional plans for economic vitality and community growth. As the U.S. economy continues to shift away from traditional manufacturing jobs, the distress is particularly acute in small towns as a younger, college-educated generation flees to urban centers with greater opportunities for work. “Community development and local economic development are two sides of the same coin,” Brown says. “You can’t have one without the other.”

As a result, CaRDI has made economic development a paramount concern. Last summer, the institute gained a three-year extension of its status as a New York State Economic Development Administration (EDA) University Center, a designation by the Department of Commerce. This designation enables CaRDI to build the capacity for economic growth in rural communities. Cornell will receive \$150,000 annually from

settled on 10 key concerns for rural communities—from agriculture and food systems to health care to schools and youth—and put them forth as a working agenda, which is now used to push for favorable legislation and grants to help grow rural infrastructure.

“Because of the credibility that comes along with being attached to the research and resources at Cornell, we feel secure in advancing this plan,” says Brach, who has already followed the agenda to usher along numerous laws that benefit small com-

munities. “It’s something solid to stand on, and we know we have the backing of rural people since the agenda developed directly from their input.”

CaRDI augments the RVP with a certificate program that educates local officials about the essentials of governing. The Dennis A. Pelletier County Government Institute, formed in 2003 in conjunction with the New York State Association of Counties (NYSAC), offers trainings on government ethics, consensus building, finan-

2008–2011 to develop applied research, training, outreach, and peer-learning networks in collaboration with partners in central and western New York.

As with other CaRDI projects, the EDA association emphasizes regional, entrepreneurial approaches. To achieve these goals, CaRDI collaborates with CCE's far-reaching network and other partners, including state agencies and organizations, to facilitate trainings, networking events, and community gatherings to devise long-term economic plans.

With EDA funds, CaRDI—in collaboration with CCE, the Cornell Center for Technology Enterprise and Commercialization, the Cornell Center for Sustainable Global Enterprises, other academic departments, and local business groups—helped launch Pipeline for Progress (P4P), an attempt to revitalize New York's Southern Tier, a region that shed 2,100 private-sector jobs in 2008.

"Everyone has the same concern for protecting the health of our greatest resources. We have no choice but to work together."

—Dawn Dowdle

P4P seeks to jumpstart economic development in 13 counties across the Southern Tier and Finger Lakes by highlighting the region's cultural strengths and branding it as an attractive place to live and work. In addition, CaRDI is studying why young adults stay or leave the region after completing their education.

Mike Fuller, an upstate native and local business consultant, leads the project and stresses the importance of retaining and recruiting workers, especially people under 40. P4P has hosted numerous career trainings and workshops, summits to solicit opinions about the quality of life in the Southern Tier, and networking events for young professionals. The group will soon roll out a five-point action plan for shoring up career opportunities and attracting employers and workers to the region.



Dawn Dowdle, town supervisor of Wayne, and Matt Doyle of Constellation Brands are working to protect the Keuka Lake Watershed.

"Everyone is competing for the top talent and wants to bring in the best and the brightest," Fuller says. "We're trying to create a case for the Southern Tier to be in that mix. We don't have a large city to build around, so it's critical for us that individual towns and communities pull together and promote the benefits of our area."

Partnerships to Protect Resources

Dawn Dowdle, town supervisor of Wayne, N.Y., was in her first day of Keuka Lake Land Use Local Alliance (LULA) training in 2007 when it dawned on her: for the lakeside communities, zoning and planning regulations were pointless when done in isolation. Keuka Lake sits as the centerpiece of their region—an economic engine for \$20 million in agri-tourism annually and the source of drinking water for more than 20,000 people. With its steep slopes, the lake is susceptible to runoff, so land-use decisions made anywhere in the Keuka Lake watershed could affect the lake.

"You realize quickly that we can't act alone if we want to preserve the lake for future generations," says Dowdle, also the chair of the Keuka Watershed Improvement Council. "We must have a coordinated vision if we want to get it right"

The initial LULA training, held jointly by

CaRDI, CCE, and Pace University Land-Use Law Center, brought together local officials and community leaders to learn about zoning law, a thorny area where the state cedes much control to local authorities. Because of the complexity of such decisions, the state encourages municipal officials to undergo land-use training.

Around Keuka Lake, the LULA program—funded by a two-year grant from the New York State Quality Communities Program—has been a resounding success, with more than 100 local leaders better equipped to make informed land-use choices. The group also worked toward shared solutions for the tradeoff between development and farmland, preservation of the region's rural character, and lake water quality—all issues of concern to Keuka Lake communities. Town leaders are now completing a shared planning guide for the watershed and drafting a resolution to continue working together on land-use issues.

"Wherever you live around the lake, you have a stake in it," Dowdle says. "Whether you're a developer, business owner, farmer, or local resident, you have a stake in the lake. Everyone has the same concern for protecting the health of our greatest resources. We have no choice but to work together."

Undergrad Invention Turns PDAs into Tour Guides

Museums can be overwhelming sometimes, with visitors unsure where to begin and too many displays to choose from. A CALS undergraduate has solved the dilemma with a new web-based tool that allows a visitor to use an iPhone or Blackberry to discover points of interest tagged by previous patrons as especially worthy of attention. Created by Jonathan Baxter '09, a senior Information Sciences major, the MobiTags system is specifically designed for displays at Cornell's Herbert F. Johnson Museum of Art.

"If you want to find an item in the museum someone labeled as 'cute,' there is a tag for that," says Baxter.

With this user-driven system, it is museum visitors and not curators who make suggestions and provide information about items and exhibits. Museum visitors can forgo, for example, the antique spoons exhibit and instead draw on the recommendations of others to locate displays that match their interests.

"The information provided at many muse-

ums can be hard for the average person to understand or take interest in," says Baxter. "With MobiTags there is a diversity of opinions. This bridges the gap between curators and visitors and offers a forum for describing art in very different ways."

The idea for MobiTags came from Baxter's work in the Human Computer Interaction (HCI) Lab, where students are encouraged to design and test computer applications that work to solve social issues. Baxter's faculty advisor Geri Gay, MPS '80, PhD '85, the Kenneth J. Bissett Professor and Chair of the Department of Communication, sees many opportunities for students working in the lab.

"Students gain a firsthand understanding of the impact of social media on interactions, communications, and other areas," says Gay.

Baxter, who entered Cornell as an environmental engineering major, says working in the HCI Lab helped define his career goals. "Undergraduate research is a great tool to figure out whether you like a certain discipline,



Jonathan Baxter

because it gives you hands-on experience with the work you would be doing in either graduate school or the work force," he says.

Baxter hopes to extend the MobiTags technology to other realms. Next up: a MobiTags campus tour.

—Isabel Sterne '10

Field Work Inspires CALS Senior in Career

As a child growing up in Ontario, N.Y., Jessica Walden '09 spent most of her days with *National Geographic* or roaming her large backyard in search of turtles, snakes, and frogs. Now, as a CALS senior with a double major—in neurobiology and behavior, and entomology—Walden hopes to turn her long-held fascination with the outdoors into a life studying the natural world.

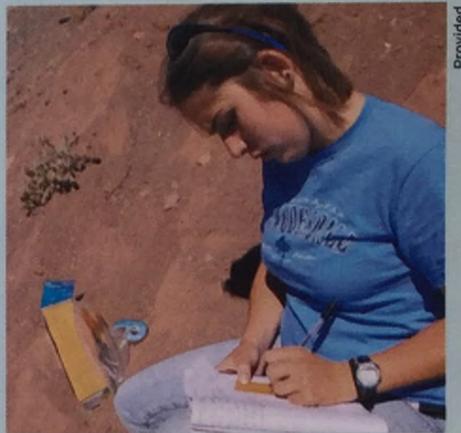
"I came to Cornell as a pre-med or pre-vet with a secret desire to be in the pages of *National Geographic*," says Walden, who transferred to Cornell after a year at George Washington University. "At Cornell, I realized that my dream of being a professional bird- or flower-watcher is a real career. I have seen more than one familiar name in *National Geographic* in the past year."

Walden realized she had a future as a naturalist during a summer internship at the Smithsonian Institution National Museum of Natural History. There she conducted an independent study of dinosaur eggshells, and she has worked in research labs ever since.

In 2008, Walden earned a fellowship from the Howard Hughes Medical Institute and designed a summer trip to Wyoming to study the ecology of a specific insect-plant interaction in the Bridger-Teton National Forest. The study grew out of similar research in the laboratory of Robert Raguso, associate professor of neurobiology and behavior, where Walden has worked for two years.

She spent her days watching tiny moth caterpillars no larger than a grain of rice infest evening primroses. At night, she camped among the buffaloes. By summer's end, Walden had gained insights into how the bugs neuter the flowers and use them as protective structures for their growth and development.

"It was an opportunity to study the intertwined life histories of two organisms," Walden says. "I learned that these tiny insects have a great impact on the reproductive success of the infested plants. I also learned that these tiny moths have a great deal more to teach me than I could learn in one field season."



Jessica Walden

After graduation, Walden wants to become a lab technician but ultimately hopes to earn a PhD in chemical ecology or biology. One thing she's certain about is her passion for research. "Undergraduate research is time consuming, pays less than waitressing, and is at the bottom of the academic pecking order. But it's worth each minute and every penny," she says.

—Ted Boscia

Learning Leadership: Faculty Training Supports People Skills

It's 11 a.m. on a Thursday morning and 14 CALS faculty members have just been confronted with a sticky personnel drama that is a distressingly familiar situation in office politics.

As part of a week-long training in leadership skills, the faculty, including economists, plant breeders, and engineers, apply their considerable brainpower to a simulated organizational drama in which a normally high-functioning staff member is suddenly underperforming on the eve of a fictional department's big annual conference.

The faculty divides into small groups and discusses different approaches. Then an associate professor sits down at a desk for a conversation with the distraught "employee"—an actress from the Cornell Interactive Theater Ensemble—while colleagues observe and offer suggestions on how best to manage the uncomfortable situation.

This is the stuff of nightmares for many aca-

demics, typically hired for their expertise in research, teaching, outreach, and visionary thinking.

But whether it is mentoring students, becoming chair of a department, leading a large grant with multiple researchers, or dealing with stakeholders and constituencies, faculty members are constantly confronted with organizational demands that require a level of personal interaction skills that are not necessarily inherited but learned, says Pam Strausser, MIL '87, senior human resources consultant with Cornell's Office of Organizational Development, and one of three program facilitators.

The leadership program, offered twice a year, is designed to enrich faculty members' understanding of their strengths and weaknesses as personal communicators, conflict managers, team builders, and change leaders. Participants say one of the benefits is engag-



In a team-building exercise, CALS faculty members try to erect a tent while blindfolded.

ing in free-flowing conversation and problem solving with peers from different CALS departments, which breaks down the "silo" mentality and opens their eyes to new opportunities and collaborations.

—E. Lauren Chambliss

Stoutridge Winery: Capturing the Flavor of the Hudson River Valley



Marissa Fessenden

Kim Wagner and Steve Osborn

Like parents with an unassuming but brilliant child, Kim Wagner '85 and Steve Osborn '84 are proud of their cloudy wine. Visit their winery overlooking the Hudson River, sip the wine, listen for a few minutes, and the reason for the couple's enthusiasm becomes clear.

"It's like with food," Osborn says. "You take a tomato and puree it, and it doesn't taste like a tomato anymore. Unrefined and unfiltered—in our wine, you can taste the grape."

Stoutridge Winery, and soon to be distillery, is an agritourism destination located 90 minutes from Manhattan. The winery offers

a unique product in an excellent location. The wine is unfiltered, gravity-pumped, solar-powered, made without added chemicals or acidity adjustment—and from a consciously sustainable operation.

When asked their secret, Wagner says, "Minimal processing—we want to make the wine that the grapes want to make. We never really wanted to be organic or sustainable or any of those catchwords. We just wanted to be smart business people."

Much of Osborn and Wagner's story has been shaped by events. At Cornell, Osborn was a biology major planning on med school until he met roommate Chris Stamp—now of Lakewood Vineyards in Watkins Glen, N.Y. Osborn joined the food science program and traveled to California after graduation to learn winemaking. Wagner majored in biochemistry and went on to study for her PhD at Harvard. She works as a management consultant as well as at the winery.

They bought the farm in Marlboro, N.Y., in 2001. "We were just going to put in a few acres of grapes and make a little wine," Wagner explains. "We were those crazy people you read about—it was an abandoned apple orchard at the time."

But Stoutridge is built on the foundation of a pre-Prohibition winery; the site has been used for fruit for decades. Close to the river, the vineyard slopes in a sunny southeastern direction while a ridge shelters the vines from the prevailing winds, and alkaline soil nurtures the vines. In a 2006 Cornell survey of the Hudson River Valley, Stoutridge had some of the prime vineyard sites in the region.

Wagner and Osborn built the winery into the hillside. Harvested grapes come in at the top and the juice flows down one level at a time for each step of the winemaking process. There are no pumps to mind, and no filters. Eventually the wine ends up in large oak barrels in the underground aging room, where it is kept at 55–60 degrees Fahrenheit by the natural geothermal effect of the surrounding earth. The sustainable practices add up to a tasty wine with a minimal carbon footprint.

"Non-processed winemaking has a huge effect on the wines—much more than I had expected," Osborn says. "It doesn't taste this way because of an idea I had, it's the idea this land has. I'm trying to show people the flavor of this area."

—Marissa Fessenden '09

Burr Named as Goichman Professor

Larry Goichman '66 is an oenophile through and through. His love of wine runs so deep that for many years he tried his hand as an amateur vintner. He'd research and buy grapes and set about fermenting and aging them. He even made handmade labels with the help of his kids. The end product, Goichman says, was often "drinkable, but sometimes not the greatest."

Now retired from his hobby, Goichman has decided to "leave the wine business to the experts" by endowing, with his wife, Jennifer, the Goichman Family Professorship of Enology and Viticulture at Cornell's New York State Agricultural Experiment Station (NYSAES) in Geneva. The expert, in this case,



Thomas J. Burr

Joe Ogradnick/NYSAES

is Thomas J. Burr, CALS associate dean and NYSAES director, who was recently named as the first Goichman professor.

Burr, a Cornell faculty member since 1977, has made seminal contributions to the understanding of the biology and the control of two devastating pathogens of grapevines. Furthermore, he has led NYSAES since 2005 and grown its support of the grape and wine industry, including helping in the creation of an undergraduate major in enology and viticulture in CALS and with adding a number of new faculty experts in vineyard management, grape production, and wine quality.

"I could not think of a better person for this professorship than Tom," says Goichman, who went on to found a successful equipment-leasing business after graduating from the Department of Agricultural Economics (now the Department of Applied Economics and Management) and later served two terms

on the CALS Advisory Council. "He is a committed scientist, a committed Cornellian, and a tireless advocate for the experiment station. The work he does with grapevines benefits not just growers in New York, but growers everywhere. The world of wine has been greatly improved by his research and leadership of the station."

Burr plans to use the Goichman endowment in part to continue his fundamental studies of *Agrobacterium vitis*, a bacterium that can infect grapevines with damaging crown gall. Grapes grown in New York and other cold-weather climates are particularly susceptible because crown gall often sets in after freezing temperatures weaken the vines.

The Goichmans' gift will boost the visibility of NYSAES and its enology and viticulture program, says Burr. "We are very fortunate to have alumni like the Goichman family," he adds. "They are greatly supportive of Cornell."

—Ted Boscia

Professor Emeritus Supports *Far Above ... the Campaign for Cornell*



Provided

Professor Emeritus Ed Oyer, left, with Professor Ronnie Coffman

A long-term commitment to the mission and values of the college and university is, perhaps, the most defining characteristic of faculty in the College of Agriculture and Life Sciences. CALS faculty significantly influence the college over time—its programs, students, and prestige. For Professor Emeritus Edwin Oyer, the commitment to

develop leaders and improve lives is one that extends far beyond the responsibilities of a professor. Even in retirement, he continues to serve the college through his generous support of CALS International Programs and the Department of Horticulture.

Through a recent gift of \$10,000, shared equally between the Department of Horticulture and IP-CALS, Professor Oyer and his wife, Mary Ann, have provided critical support to the college in a time of financial uncertainty. For a couple that has already devoted so much of their lives to CALS and Cornell, this gift is truly noteworthy.

Both graduates of Purdue University, the Oyers first came to Ithaca in 1955 from West Lafayette, Ind., when Ed Oyer took a position with the Department of Vegetable Crops at Cornell. Oyer served as the chair of the Department of Vegetable Crops, was the former director of the International Agriculture Program in CALS, and was a director for the Center for the Analysis of World Food Issues.

Since 1955, they have lived around the world—from France to the Philippines, Indonesia, and elsewhere—fulfilling Cornell's land-grant mission on an international scale. Oyer also has served as a consultant and

advisor to such institutions as the Asian Vegetable Research and Development Center in Taiwan, the Agency for Agricultural Research and Development in Indonesia, and the U.S. Joint Council on Food and Agricultural Sciences. He also spent one year as the resident faculty member of the Cornell in Rome program sponsored by the College of Art, Architecture, and Planning.

The Oyers now split their time between Ithaca, N.Y. and Fort Collins, Colo. When in Ithaca, they keep busy as active members of the Cornell and Forest Home communities—attending lectures and events on campus, and around town. Ed Oyer serves on the board of Forest Home Chapel and, previously, the Cornell Association of Professors Emeriti. Mary Ann Oyer is a beloved member of the Delta Gamma Ithaca Alumnae Chapter, is active with the Cornell Campus Club, and spends much of her time managing the Meisen-Jones Farm LLC, a Hoosier Century Farm that has been in her family since the mid 1850s.

—Amy Jacobson, MA '07

ALUMNI ASSOCIATION PRESIDENT MESSAGE



CALS Alumni Association Marks Centennial Anniversary



Congratulations on being part of the College of Agriculture and Life Sciences Alumni Association's 100th anniversary of service and leadership to Cornell University. During the meeting of our board of directors in November 2008, we reflected on the purpose, mission, and values of our alumni association in relation to the college. Following is a synopsis of our discussions.

Alumni and friends are valued by Cornell University and the college for many reasons. We are all richer and fuller because of the strong ties that Cornell has developed with alumni through the years. The worlds of academia, research, and industry collaborate and make things happen. When students connect with alumni in their chosen vocational fields, they develop the knowledge and skills for early career success. There is no better avenue for positive public relations than alumni. Each alumnus offers a personal perspective on his/her experiences at Cornell, which often helps prospective students determine whether Cornell is a good match for further education. Our alumni provide valuable support through legislative lobbying, grant funding, and private philanthropy.

Alumni also receive many benefits of the Cornell education beyond graduation. The opportunity to network with fellow Cornellians allows us the opportunity to further friendships, enjoy fellowship, and pursue employment opportunities. Continued research and development conducted at the university enables alumni to advance their personal and professional lives through life-long learning opportunities. Cornell University's strong reputation reaps many benefits for alumni.

The CALS Alumni Association is fortunate to have the support of staff from the Office of Alumni Affairs and Development who help our members maintain strong ties with the college. These dedicated individuals support alumni networking and travel throughout the United States, making visits to companies and alumni. They create opportunities for alumni to network with each other and help each of us gain insight into how we can best support Cornell and the college.

On April 18, the Alumni Association will sponsor an on-campus event to celebrate the association's centennial and highlight how the college is "Making a World of Difference" in the areas of renewable energy; climate change; international agriculture; food, economic, and environmental systems; cell and structural biology (new life sciences); science and business; and information sciences. These pursuits have real-world connections that significantly impact our society today and in the future.

The CALS Alumni Association has been flexible and open-minded in its support and advocacy for the college throughout the years. Let's stay active in promoting the vitality of our Alumni Association. Help us continue to make a positive impact on the life of the college.

We thank you for your continued enthusiasm and support. Now more than ever, we need to be here for the college and our CALS students. As alumni, we have the potential to be associated with something greater than ourselves and to impact future generations by strengthening our Cornell connections.

Sandra J. Gardner '84
2008-2009 CALS Alumni Association President

1940s

Y. Joshua Tsujimoto '49 of Elma, N.Y., was one of many Japanese living in America at the start of WWII who were kept in internment camps. After being released, he came to Cornell as an undergraduate student. Since graduating, he has many wonderful life-changing experiences including doing missionary work and showing people in poverty-stricken areas how to grow food and how to resurrect the soil that had become infertile. He attended Empire Farm Days last August and reiterated how grateful he was for the education he received from Cornell.

1950s

John H. Foster '50, PhD '57 of Northampton, Mass., retired for 18 years, recently moved to a retirement community there. He has written a history of water-powered mills in his small town in the 1800s and the story of soybeans coming to India as a new and highly successful crop.

Robert J. Williams '51 of Goose Creek, S.C., retired from The Citadel in 2000. He enjoys traveling to many Elderhostels - most recently traveling to St. Petersburg in January; Natchez, Mass., in April; and the Hudson Valley in June.

George J. Conneman '52, MS '56 of Ithaca and his wife, Diane, recently "right-sized" to a condo. George continues to work part-time for the FarmNet/FarmLink program, counseling farmers interested in the transition of the farm business to the next generation.

Irving R. Starbird, MS '54 of Manassas, Va., and his wife, Carolyn, have been happily married for 57 years. They enjoy their family, travel, and volunteer work. They frequently travel to Maine and in the past two years have toured Spain and Ireland. They hope to attend more Elderhostel U.S. programs.

Alan Fox '57, MS '62, PhD '73 of Lake Oswego, Ore., retired from consulting in natural resource economics in 2005. Since then, he and his wife, Jeanne, have spent time traveling, golfing, fishing, and gardening. Their three daughters and their families all live close by in the Portland area.

1960s

Lawrence A. Loewan-Rudgers '64 of Winnipeg, Manitoba, Canada, is a development consultant. He enjoys music, singing in choirs, and playing the piano. He keeps fit by jogging. He and his wife, Erma, have three grown children.

Alan S. Walter, MS '69, of Overland Park, Kan., retired in December 2007, but then worked on a USAID project evaluating the need for and feasibility of agricultural insurance in Palestine for ACDI/VOCA. In retirement, he enjoys golf, travel, and service as a licensed lay minister with the Evangelical Lutheran Church in America.

1970s

Frank W. Miller, PhD '72, of Kitchener, Ontario, Canada, retired in July 2006 from Wilfrid Laurier University in Waterloo, Ontario as professor emeritus of economics. His wife, Elsie, is studying for her master's degree in theology. They have two sons in college and one son who is married and lives nearby in Toronto.

John Foti, MS '73 of Naples, Fla., retired from the USAID some time ago and enjoys playing golf and volunteering for Habitat for Humanity. He and his wife also travel to southern Italy almost every year and visit grandchildren in Washington, D.C.

ALUMNI NOTES

Willard C. Hunt, MS '73 of Honeoye Falls, N.Y., is manager of Xerox Global with Xerox Corporation. He spends his free time gardening and mentoring the FIRST Robotics team at the Honeoye Falls Lima High School. His son, Andrew, is in his second year at Northeastern University; daughter, Jessica, married this past July.

Steven G. Pueppke, PhD '75 of Okemos, Mich., is director of the Michigan Agricultural Experiment Station and director of the Office of Biobased Technologies at Michigan State University. He came to MSU from the University of Illinois, where he served as associate dean for research in the College of Agricultural, Consumer, and Environmental Sciences (1998-2005).

James R. Sollecito '76 of Baldwinsville, N.Y., is the president and owner of Sollecito Landscaping Nursery, LLC. While on a trip to Panama last year, he packed some extra school supplies and passed them out to children in several villages. Judging from the smiles on the faces of the children, he writes, the giving spirit of Cornell does extend across all borders.

1980s

Zoann J. Parker '83 of Quarryville, Pa., was appointed dean at Harrisburg Area Community College. Parker will direct the college's departments of Workforce and Economic Development, Community Education, and Public Safety Training. She received the 1,000 Points of Light National Award from President George H.W. Bush in 1994.

Joanne M. Bartkus, PhD '84 of Washington, D.C., was recently named a certified diplomate of the American Board of Medical Microbiology. To earn the credential, Bartkus first met rigorous educational and experiential eligibility requirements and then passed a comprehensive written examination.

Kenneth C. Carraro, MS '84 of Portland, Ore., is happily living in the Northwest, where he enjoys pursuing the great outdoors, skiing, hiking, camping, and "working only when absolutely necessary."

Kevin Mahaney '85 of Ithaca is the assistant dean for alumni affairs, development, and communication at Cornell's College of Veterinary Medicine. In September 2008, he assumed additional vice presidential duties for the Association of Veterinary Advancement Professionals. Mahaney will support the president and advance the organization's mission to promote the success of veterinary medical education through the professional development of its membership.

Mauro Mariani, MS '85 of Brussels, Belgium, works at EuropeAid, as the directorate general for cooperation of the European Commission, as head of sector for Central America and Mexico. He and his wife, Francesca, married in October 1995, live in the countryside, not far from Waterloo.

Fabio Arruda Mortara, MS '86 of Sao Paulo, Brazil was named president of the Brazilian Printers Association in 2007 and in fall 2008 named president for the Association Latino Americana de Aticulos de Libreria y Papeleria. Fabio's wife, Patricia, teaches professional ethics for the Department of Psychology at Catholic University.

Jeffrey A. Conrad, MS '88, of Boston, Mass., is president of Hancock Agricultural Investment Group, which is based in Boston. They are an investment subsidiary of Manulife Financial, with \$1 billion of farm properties under management for institutional investors. They are a leading grower of cranberries, almonds, walnuts, apples, pistachios, wine grapes, and macadamia nuts. Their assets are located in the United States, Canada, and Australia.

1990s

Michael J. Montesano, MS '92, MA '92, PhD '98 of Singapore, is now with the Institute of Southeast Asian Studies after spending nine years at the National University of Singapore. He is currently working on a book about commerce and society in pre-1997 Thailand.

Amy R. Zarrin '93 of Brooklyn, N.Y., completed training in neurology with a specialty in neuromuscular disorders and electromyography. She recently began as an attending physician at New York Methodist Hospital in Brooklyn.

Jack R. Clarcq, MPS '96 of Victor, N.Y., is a professor at Rochester Institute of Technology's Saunders College of Business. He is also currently president of the Cornell Alumni Association of Greater Rochester.

Parke E. Wilde, MS '95, PhD '98 of Arlington, Mass., is an associate professor in the Friedman School of Nutrition at Tufts University, where he continues research on the economics of food assistance. Wilde also writes a blog that includes news and links on U.S. food policy. He and his wife, Sarah Huber, and children, Isaac and Keziah, enjoy hiking and cross-country skiing.

Maurice A. Doyon, MS '96, PhD '97 of Sainte-Foy, Quebec, Canada, has been a professor since June 2008 in the Department of Agricultural Economics and Consumer Service at Laval University, as well as director of graduate studies. He spent 2005-2006 in France on sabbatical at the Grenoble Applied and Experimental Laboratory.

2000s

Koji Kotani, MS '01, PhD '05 of Tokyo, Japan is an assistant professor at the International University of Japan.

Nicole D. LaDue, MAT '01 of Arlington, Va., is an earth science teacher at John Jay High School and was one of 15 teachers selected from a nationwide pool of applicants to receive a 2008-2009 Albert Einstein Distinguished Educator Fellowship.

Mark E. Pisoni, MS '01 of Gonzales, Calif., and his wife, Quinn, are expecting their first child in January 2009. Mark owns and operates Pisoni Vineyards and Winery.

Anne Agonis Space '01 of Colchester, Conn., married J. Sean Space on November 17, 2007 in Branford, Conn. She graduated in May 2006 with an MBA from Cornell's Johnson Graduate School of Management.

Wichai Turongpun, PhD '01 of Bangkok, Thailand, is on leave from School of Development Economics to assume a manager position in economics and research at Arab Petroleum Investments Corporation, located in Saudi Arabia and Bahrain. He and his wife have one son and one daughter.

Rivka Shoulson '03 of New York, N.Y., and Marc Wiznia were married on November 23, 2008 in New Windsor, N.Y. Shoulson is currently a second-year laboratory-animal medicine resident and masters in public health student at Columbia University.

Prepared by Mary Alo

Cornell Sheep Program Blankets

www.sheep.cornell.edu (click on the link at the top of the page for "Blankets")

Created from the wool of Cornell Dorset and Finnsheep breeds and their crosses, these blankets are ideal for football games and cold nights, and as gifts for graduation, wedding, birthday, Christmas, and other occasions. Red stripes near each end and red binding accent the 100% virgin wool. Your purchase of blankets helps to support the Cornell Sheep Program, and \$10 from each sale goes to an undergraduate scholarship fund.



Each blanket is individually serial-numbered on the Cornell Sheep Program logo label and comes with a certificate of authenticity.

The blankets come in four sizes:

Lap robe (60 x 48 inches, 1 stripe), \$80

Single (60 x 90 inches, 3 stripes), \$111

Double (72 x 90 inches, 3 stripes), \$122

Queen (78 x 104 inches, 3 stripes), \$149

Add 8% New York State sales tax and \$8 per blanket for shipping.

Purchase at:

Cornell Orchards; Cornell Dairy Store; Department of Animal Science, 114 Morrison Hall, Cornell University, Ithaca, NY 14853-4801, or via telephone (607-255-7712), fax (607-255-9829), or email (csplankets@cornell.edu)

Auction for Serial Number 2009 Blanket

The Cornell Sheep Program extends an invitation to bid on a special blanket: one queen-sized blanket with serial number 2009, which was graciously donated by the original purchaser. This blanket would make an excellent gift for a 2009 graduate. The blanket includes the original label as well as the new embroidered label.

Bids can be placed through 5 p.m. on May 15 by contacting Victoria Badalamenti by phone at 607-255-7712 or by email at vb65@cornell.edu.

www.sheep.cornell.edu (click on the link at the left of the page for "Bid for 2009 CSP Blanket")

Cornell Reunion 2009

Join CALS
for Reunion
Weekend
June 4–7, 2009

Thursday, June 4

Tours of the New Mann Library

3:00, 3:30, and 4:00pm, Mann Library lobby
The renovated Mann Library has been drawing rave reviews. Come check out the buzz with a tour of our fabulous new library spaces, designed to facilitate creative modern scholarly research and interaction while retaining the beauty of the original Art Deco building.

Friday, June 5

Chats in the Stacks: Book Talk

10 am, Room 102, Mann Library
“For the Rock Record: Geologists on Intelligent Design” by Warren Allmon, professor of paleontology and director, Paleontological Research Institution
The talk is part of the library’s celebration of the 200th anniversary of Charles Darwin’s birth.

Earth and Atmospheric Sciences 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.

Earth and Atmospheric Sciences Display Booth

11:00 am–2:00 pm, Barton Hall
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.

All-Alumni Affair, CALS Display Booth

11:00 am–2:00 pm, Barton Hall
Discover what’s happening at the college in classrooms, admissions, career development, and alumni programs. Enjoy the sights and sounds of Barton Hall—music, alumni of all ages and great food (lunch tickets available on site).

Admissions Information Session

2:30 pm, 102 Mann Library

Saturday, June 6

CALS Reunion Breakfast

7:30–8:45 am, Trillium in Kennedy Hall
Enjoy fellowship with Dean Susan Henry, alumni, faculty, and friends of CALS. Sandra J. Gardner ’84, CALS Alumni Association president, will host the association’s annual meeting at this event. Reservations requested (*see form in this section*).
Online reservations: alumni.aad.cornell.edu/event/register/index.cfm?e_id=14258.

Larry P. Walker, PhD, Liberty Hyde Bailey Lecture

9:00–10:00 am, Call Alumni Auditorium
Managing Diversity and Complexity in the Evolving Biofuels Industry
With a new President and Congress taking the lead on energy and climate change issues, there will likely be more attention and resources



directed toward developing renewable energy resources to meet a portion of future domestic energy needs. Bioenergy will be one of the strategic renewable energy options on the table.

Walker, professor in the Department of Biological and Environmental Engineering, and his colleagues are exploring ways to integrate biological diversity and methods for managing complex, highly coupled activities to address barriers to bioenergy development. He is also the principal investigator for Cornell’s Biofuels Research Laboratory, a new state-of-the-art industrial biotechnology laboratory that mimics all the essential steps in a cellulosic bio-refinery. Walker has been involved in a number of biomass-to-energy projects while at Cornell, including an assessment of NYS biomass resources for ethanol production, farm-scale methane production and co-generation, the application of nanotechnology to discover and study important biocatalysts for biofuels and industrial biotechnology.

Guided Tours of the Cornell Plantations

Experience the Cornell Plantations—the arboretum, botanical garden, and natural areas.

Earth and Atmospheric Sciences 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.

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11:00 am–2:00 pm, Barton Hall
Discover what’s happening at the college in classrooms, admissions, career development, and alumni programs. Enjoy the sights and sounds of Barton Hall—music, alumni of all ages and great food (lunch tickets available on site).

Plant Biology Alumni Gathering

11:30 am–12:30 pm, Mac Daniels Room G37, Plant Science Building

Join us for light refreshments while visiting with fellow Plant Biology alumni and current and former faculty and staff. Photos from the department's history will be on display.

Department of Horticulture Alumni Gathering

11:30 am–12:30 pm, Room 22, Plant Science Building

This gathering will involve the departments of Vegetable Crops, Pomology, Floriculture, and Ornamental Horticulture. Join us to share your reminiscences about Cornell and your school days 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

1:00–2:00 pm, Room 1120, Snee Hall

A seminar presented by the Department of Earth and Atmospheric Sciences

Wine Tasting

1:30–3:30 pm, Trillium in Kennedy Hall

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.

Tour 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 PRI's Museum of the Earth, 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. Collect fossils from the Devonian seas of Ithaca. Fun for all ages.

Allan Hosie Treman '21 Memorial Concert

2:30 pm, F.R. Newman Arboretum (Flat Rock entrance), Cornell Plantations
Featuring the Hangovers

Admissions Information Session

2:30 pm, 102 Mann Library

Department of Communication Alumni Gathering

3:00–4:30 pm, underpass between Kennedy Hall and Roberts Hall

Join us for light refreshments while you enjoy visiting with fellow Communication alumni and former and current professors. Come and see the exciting research and learning opportunities that the communication faculty, graduate students, and

undergraduates are working on, such as mobile health games, environmental issues in the media, mobile social networks, effects of cancer news, online identity building, and media literacy.

Natural Resources Alumni Gathering

3:00–4:30 pm, breezeway between Fernow and Emerson halls

Join us for wine tasting and light refreshments while you enjoy visiting with fellow Natural Resources alumni and former and current professors. There will be opportunities to share recollections of your days in Fernow and at field sites. The department chair, Marianne Krasny, will provide a brief update on the department and its programs. There will also be displays of our collection of historical photos, posters of recent projects by faculty and graduate students, and information on programs at the Arnot Teaching and Research Forest.

Ongoing Events

Guided Tours of the Cornell Plantations

Experience the Cornell Plantations—arboretum, botanical garden, and natural areas.

Celebrating Charles Darwin

In celebration of the 200th anniversary of Charles Darwin's birth and the 150th anniversary of publication of his book, *On the Origin of Species*, Mann Library is offering these ongoing events:

- Exhibit—"Written on Our Faces: Darwin's the Expression of the Emotions in Man and Animals," May 15–September 15, lobby
- Gallery exhibit—"Sculpting Our Hominid Past: Photographic Views of Works by PRI Artist-in-Residence John Gurche," May 15–July 31, 2nd floor

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

For CALS Reunion Events please visit www.cals.cornell.edu/alumni-friends.

Breakfast Registration Form

Register online at www.cals.cornell.edu/alumni-friends before May 21, 2009.

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 21, 2009.

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

\$16 for members of the CALS Alumni Association and each guest.

\$20 for non-members 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		
<input type="checkbox"/> VISA	<input type="checkbox"/> MasterCard	<input type="checkbox"/> Discover Card
Expiration Date		
Account #		
Signature of Cardholder		

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 21, 2009.



End Note

Larry Walker, professor of biological and environmental engineering, right, and Steve Kresovich, vice provost for life sciences, second from left, examine a bag of sorghum with a group of students. (inset) Hanna Smith, a junior, works with a robotic arm that automates analysis of the steps in cellulosic conversion of plant material into bioenergy.

Developing Renewable Energy at the New Biofuels Research Laboratory

In his inaugural address, President Barack Obama pledged his administration's commitment to a diversified energy future. "We will harness the sun and the winds and the soil to fuel our cars and run our factories," he said.

Cornell's \$6 million, cutting-edge Biofuels Research Laboratory (BRL)—which opened in January, the same month as Obama's speech—will go a long way toward fulfilling the president's promise for next-generation renewable fuels that are environmentally sustainable and economical.

Inside the 11,000-square-foot space, Larry Walker, professor of biological and environmental engineering, and a team of engineers, scientists, and students across Cornell are studying every phase of biofuel production, a method that frees sugars from perennial grasses and woody biomass and biologically converts them into fuels like ethanol, butanol, and hydrogen.

"Under a single roof, we can perform all the major steps required to transform plant matter into biofuel," Walker says. "Other schools have bits and pieces of the process or specialize in pretreatment, chemical conversion, or cell-wall analysis. In this lab, we can do it all."

The BRL, funded by a \$10 million grant from the Empire State Development Corporation, replaces a former agricultural engineering and machinery lab in the east wing of Riley Robb Hall. At its north end, the facility accommodates large bales of raw material from non-food crops—plant matter like switchgrass, sorghum, willow, and other feedstocks that thrive in the Northeast climate and soils. There, the material is size-reduced and pretreated with thermochemical reactors that liberate some of the sugars and make the remaining solids easier to convert to additional sugars. After pretreatment, the feedstocks move south through the lab to undergo enzymatic conversion, which captures the remaining simple sugars. All of the sugars are then fermented into ethanol or other biofuels. In the BRL imaging laboratory, near the southern entrance, researchers employ sophisticated microscopes, cameras, and computer equipment to analyze single enzyme diffusion on cellulose fibers, and, in turn, to better engineer enzyme cocktails essential to converting plants into bioenergy.

With dozens of researchers dedicated to surmounting the scientific, technical, and economic barriers to sustainable biofuels production, Walker says Cornell is the ideal home for the Biofuels Research Laboratory.

"The highlight of the new lab is that multiple departments and multiple colleges are using it," Walker says. "That's been a philosophy from the very beginning. We have a range of faculty across many disciplines involved—and it will take this level of collaboration to make biofuels development a reality in New York and beyond."

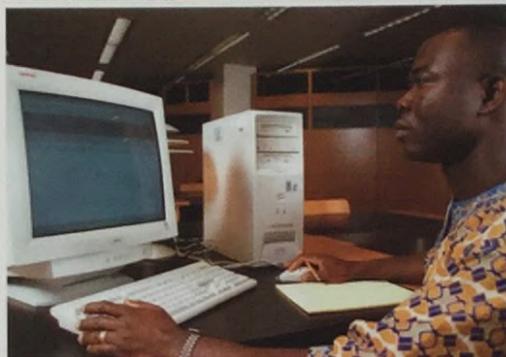
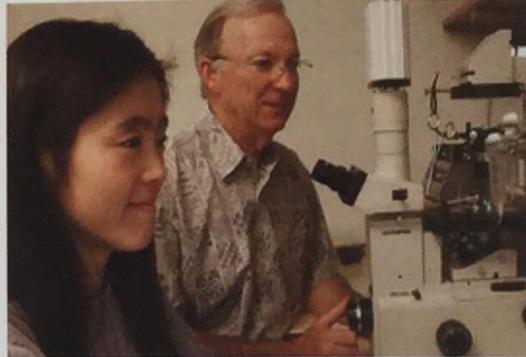
SWBR Architects of Rochester, N.Y., designed the facility, and LeChase Construction Services, also of Rochester, performed the renovations.

—Ted Boscia



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 discuss various giving options, including gifts of stocks, securities, planned giving opportunities, and to answer your questions about gifts to endowment. 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 (607) 255-7635 or mpr2@cornell.edu.



CALS Annual Fund

The College of Agriculture and Life Sciences relies greatly upon the generosity of alumni and friends, and gifts of all sizes are important to providing critical budget and program support. Dean Henry has set a bold new goal for the 2008-2009 CALS Annual Fund—our first year for a goal of \$1 million! Join us in showing your support for faculty, students, and programs. Give now!

Where Have All the Bees Gone?

Support for a graduate student to study Colony Collapse Disorder of honey bees.
\$20,000 (Entomology)

Support a Food Science Summer Scholar!

High-potential undergraduate students from around the world are brought in to conduct 10 weeks of research with a faculty mentor in the Cornell Institute of Food Science. The funds would support one summer scholar stipend and funds for field trips to food industries and governmental agencies.
\$5,000 (Food Science)

On the Road Again.

Fund travel by a graduate student presenting a paper at the annual summer meeting of the American Agricultural Economics Association meeting.
\$800 each (Applied Economics and Management)

I Can See Clearly Now.

Provide 10 laptops to be linked to a new "virtual drawing board," a large vertical flat-screen computer on which students can load drawings and electronically work.
\$18,000 (Landscape Architecture)

Organically Grown.

Fund field trips for a new Organic Agriculture course to visit local organic farms as part of the course requirements.
\$1,000 (Crop and Soil Sciences)

High School Teachers Workshops.

Help support hands-on summer training for high school teachers to provide them with cutting-edge tools and educational materials for their classrooms—and help them provide their students with excellent career development guidance!
\$12,000 (Food Science)

Technology Needed.

Install a ceiling projector in Nutritional Sciences' main conference room in 131 Savage Hall, a room used by graduate students in meetings with their faculty committees. This equipment would facilitate presentation of their thesis material to committee members.
\$8,000 (Nutritional Sciences)

A Life-Altering Experience.

Support the participation of a student in IARD 602, Agriculture in the Developing Nations, which includes a field trip to the student's choice of India, Mexico, or Thailand.
\$5,000 (International Agriculture)

Garden Support.

Support summer students to maintain the campus gardens installed by horticulture and landscape architecture classes.
\$5,000 (Horticulture)

Technology Needed!

Provide a server for undergraduate research in the Department of Communication.
\$3,000 (Communication)

Don't Let the Bedbugs Bite!

Help summer interns and graduate students get a good night's rest by furnishing 10 rooms in the renovated dormitory at the Cornell Biological Field Station with beds and mattresses.
\$10,000 (Natural Resources)

Search Team.

Purchase a flat-bottom boat to support the Cornell Laboratory of Ornithology's ivory-billed woodpecker field team.
\$20,000 (Lab of Ornithology)

Book Award for Minority Scholar.

Provide a book award for a historically underrepresented minority student in the Biology Scholars Program.
\$500 (Biology)



Cornell University
College of Agriculture
and Life Sciences

ALUMNI AFFAIRS, DEVELOPMENT, AND COMMUNICATIONS

274 Roberts Hall

Ithaca, New York 14853-5905

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