CALS NEWS
THE MAGAZINE OF CORNELL UNIVERSITY’S COLLEGE OF AGRICULTURE & LIFE SCIENCES
FALL 2010

Tales from the Deep

Drilling Deep for Natural Gas
Diving Below the Surface in the Gulf
Revealing Plants' Deepest Secrets
Unearthing the Benefits of Biochar
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Dean Kathryn J. Boor

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College of Agriculture and Life Sciences at Cornell University • Fall 2010 1
Dean’s Message

New Role Stirs Excitement for the Future

As the leaves blanket the Ag Quad in beautiful autumnal hues, I feel privileged and honored to enjoy the scenery from my new office in Roberts Hall. Adjusting to the new responsibilities has been challenging, but it has also been incredibly exciting. Luckily, my predecessor Susan Henry steered the college on an excellent course during her 10 years at the helm and that has made my job that much easier.

Under her leadership, the college took a strategic approach to planning for the future. Our books are balanced, we are well on our way to “Reimagining CALS,” and recent mergers among eight sister departments are encouraging even closer collaborations across the Ithaca and Geneva campuses.

Our incredibly successful applied economics and management program continues to grow, and I was delighted to attend the celebration of its official designation as the Charles H. Dyson School of Applied Economics and Management last month. It was one of several of our graduate programs to rank among the top 10 in the nation according to a long-awaited study by the National Research Council, proving what we have long known: CALS is one of the best places in the world to conduct research in agricultural, environmental, and applied social sciences.

From my second-floor windows I am able to watch CALS students lunching on the lawn, lounging on the new sod sofa, or rushing to class, and it serves as a daily reminder of why we are all here: to educate our students, to give them the tools they need to help solve critical societal problems, and to send them out as leaders.

Before I became the Ronald P. Lynch Dean of the College of Agriculture and Life Sciences, before I established the Food Safety Laboratory and served as chair of the Department of Food Science, I was an undergraduate student at Cornell. I left with a B.S. in food science in 1980 and returned 14 years later, drawn back to my alma mater because of its appreciation and commitment to problem-solving research that spans discovery to application.

In my new administrative role, I will strive to ensure that CALS continues to attract the best and brightest faculty to Ithaca and Geneva to conduct their research and teach our students. This also has been identified as a priority at the university level, with the recent launch of the Cornell Faculty Renewal Initiative. A $100 million fund is being established to accelerate the hiring of faculty over the next five years to attract more people like burgeoning biochar expert Johannes Lehmann and our young innovator award winner Ruth Ley, who are both featured inside these pages.

I have gained my entire education at land grant institutions. I firmly believe in the concept of public engagement and its practical application, and I look forward to ensuring that mission is reflected in everything we do here at CALS.

Many of the most important issues that we face today—climate change, food security, economic and environmental sustainability—are complex questions that require multidisciplinary solutions. By taking advantage of the amazing depth and breadth of academic resources we have here at CALS, we can form natural collaborations that make a big difference. By continuing to work closely with our outreach partners locally and around the globe, we can amplify that impact and truly become a land grant university to the world.

Kathryn J. Boor, Ph.D.
The Ronald P. Lynch Dean of Agriculture and Life Sciences

To learn more about Dean Boor’s background and vision for the college, turn to pages 6–7.
Short Reports

CALS Is Walking the Energy-Saving Walk

When it comes to walking the walk, CALS staff, faculty, and students are putting one foot firmly in front of the other to achieve energy conservation.

Administrators have been talking the talk since the release of Cornell’s comprehensive Climate Action Plan last year, and professors have been chalking the chalk in ecology, natural resource, and atmospheric science lectures for much longer.

On October 20, Campus Sustainability Day, the college launched CALS Green, an energy conservation and sustainability initiative to promote environmentally conscientious behavior among students, faculty, and staff.

“Our goal is not only to help Cornell achieve climate neutrality by 2050, but to also help all of us adopt a culture of sustainability at work and in how we live day to day,” said Kathryn Boor, the Ronald P. Lynch Dean of Agriculture and Life Sciences. “It is really inspiring to see the many partners who have come together to ensure the success of this initiative. We hope this will be a model for the rest of Cornell and well beyond.”

With 370 faculty, many of whom conduct research in growth chambers, greenhouses, and laboratories, and more than 4,000 students occupying classroom space, it is perhaps no surprise that CALS has the highest energy consumption of any college at the university.

The college hopes to reduce its energy consumption by as much as 5 percent, by making lots of little changes and stirring up a bit of friendly competition.

The one-year pilot will start in six buildings: Comstock, Bradford, Morrison, Plant Science, and Wing on the Ithaca campus and the Barton Lab in Geneva. The occupants of each will be challenged to compete for maximum participation and minimum energy consumption, and the winning team will be rewarded with a party.

Individuals also will be asked to register online at www.green.cals.cornell.edu to make commitments to actions such as turning off lights and closing unused fume hood sashes, which could save a whopping $3,000 a year and reduce CO2 emissions by 34,000 lbs.—the equivalent of 10 cross-country road trips made by the average car in the U.S., which emits 1 lb. of CO2 for every mile it travels.

Pfeffer adds that the feedback has been overwhelmingly positive. “The spirit of the way we’re approaching this is lots of faculty input and careful consideration of different possibilities.”

Marvin Pritts, chair of the newly formed Department of Horticulture, views the reorganization as a valuable and logical evolution: “Geneva and Ithaca have been getting together on a regular basis for years for retreats and curriculum planning and extension coordination. Formally merging didn’t scare anybody because they’ve been collaborating for a long time.”

No stranger to department mergers, having experienced three in his 26 years at CALS, Pritts feels that a larger department not only has the advantages of flexibility and adaptability, but that faculty will have new opportunities for collaboration in research and outreach.

But the new possibilities for teaching excite Pritts most: “The Geneva faculty, traditionally, have not been able to be as involved in teaching as their Ithaca counterparts. But with newer technologies they will be able to take a more active teaching role, benefitting the students since they will have a greater breadth of faculty to learn from and courses to engage in.”

—Ellen Leventry ’95

Ithaca–Geneva Department Mergers Strengthen CALS Mission

The establishment of the Charles H. Dyson School of Applied Economics and Management wasn’t the only big news to come out of the College of Agriculture and Life Sciences this summer. The Ithaca- and Geneva-based sister departments—Entomology (Ithaca and Geneva), Food Science (Ithaca) and Food Science and Technology (Geneva), Horticulture (Ithaca) and Horticultural Sciences (Geneva), and Plant Pathology and Plant-Microbe Biology (Ithaca and Geneva)—merged as of July 1, 2010.

The four new departments will be known as the Department of Horticulture, the Department of Entomology, the Department of Food Science, and the Department of Plant Pathology and Plant-Microbe Biology.

Although the Ithaca departments and New York State Agricultural Experimental Station in Geneva departments have been working collaboratively for many years and developed strategic plans in concert, the college’s “reimagining” effort provided an opportunity to unite the programs and resources offered on both campuses for full advantage.

“When we looked at the number of faculty and staff in these various programmatic areas, they represented perhaps the largest concentration of personnel in each of these areas of nearly any place in the world,” notes CALS Senior Associate Dean Jan Nyrop.

“It made sense to capitalize on the fact that the departments were already planning together and that the distinctions between the two locations were blurring a bit in terms of teaching and the types of research being done. We wanted to build on that and come out with an even stronger entity by formally saying it’s one.”

CALS Senior Associate Dean Max Pfeffer believes the simplified structure will be “less confusing to potential students and to others looking to partner with Cornell. They’ll look from the outside world and now find one, unified Department of Entomology or one Department of Food Science.”

The mergers make the organization of CALS more like the structures of similar land grant institutions, but Pfeffer explains that the college is not concerned with imitating its peers.

“We want to be in a position of intellectual leadership,” he says. “We are thinking less in terms of following a model [that] somebody else has put in place than . . . how we can be leaders in areas that are key to our mission, and that’s where we really want to be in the long term.”

For more information, visit www.green.cals.cornell.edu

—Stacey Shackford
Bee Database Creates Buzz

Cornell’s Bee Collection—part of the Cornell University Insect Collection—was started in 1870, just five years after the university was established. Soon, its data will be available online to researchers, growers, and backyard naturalists alike.

Bryan Danforth, professor of entomology, along with colleagues at major entomological research collections across the country, received a share in a $1.47 million grant from the National Science Foundation (NSF). As a member of this three-year project, Danforth will create a database of Cornell’s 300,000-specimen Bee Collection.

The bee databasing project is part of an initiative by the NSF in partnership with the American Museum of Natural History to pool 12 major North American bee collections from across the country into one, accessible resource, via the Discover Life Website (www.discoverlife.org). When the site is completed, visitors will be able to access information on thousands of bee species, including their typical host plants, the population’s global distribution, and how this distribution has changed over time.

While bee enthusiasts and entomologists will be consulting the database for personal interest or study, growers may find the various features of the database valuable, as well.

“If we don’t have bees, we don’t have fruit,” says Rick Reisinger, owner of Reisinger’s Apple Country, a fruit farm in Watkins Glen. “For most of the fruit that I grow—apples, pears, plums, cherries, peaches, and berries—we bring in hives at a cost of about $50 to $60 an acre.”

Roughly 30 percent of the human diet depends on pollination by bees, according to Danforth. While domesticated, non-native honey bees are the most widely used type of bee for agricultural functions, they have been declining over the last 50 years, focusing recent interest on native North American bee populations.

“What the database will do is provide growers and others with information on, first, what bee species are present in their area and, second, what bee species are likely to be important pollinators of any given crop,” Danforth explains. “Bringing in honey bee colonies is costly to growers . . . . By understanding more about the native bees, we may be able to help growers reduce the costs associated with pollination.”

Aside from agricultural reference uses, the database will aid in identifying future species and may have implications for conservation initiatives.

“Our insect collection is an incredible resource for understanding the biodiversity of North America and how it has changed over the past 150 years,” Danforth says. “Cornell’s involvement in the grant clearly illustrates the valuable resource that we have here.”

—Molly Cronin ’11

Big Red—and White—Being Bottled at Teaching Winery

Breeding and research in wine grapes has taken place at Cornell for over 100 years, but there’s now a new batch of vintners in town: Students are producing the premier big reds—and whites—at the Viticulture and Enology program’s new state-of-the-art, million-dollar teaching winery on campus.

“The beauty of the teaching winery is that we get more hands-on experience,” says Mari Rossi ’11, one of the students in the program. “It’s almost like our labs that we do in the teaching winery are mini internships, because everything that we learn helps us realize which parts of the industry we are most passionate about.”

Students carry out all activities related to grape handling and winemaking in Professor Ramón Mira de Orduña’s Winemaking Theory and Practice courses I and II. In the fall, students taste and analyze grapes and monitor their maturation. After harvesting, they move on to crushing, pressing, and fermenting through October and November. In the spring, students resume work on the wines, refining, blending, balancing, stabilizing, and eventually bottling their vintages.

“This year’s varietals are Pinot Gris, Riesling, and Chardonnay for the whites; and Pinot Noir, Lemberger, and Cabernet Franc for the reds. Students are split into winemaking teams that treat their varietals of choice according to various methods to achieve different wine styles and compare them,” explains Mira de Orduña.

The student winemaking is the yield of a 30-year effort by CALS to expand the viticulture and enology program in keeping with the pace of growth in the industry itself. From the early 1990s, when just two courses were offered in viticulture and enology studies, the program has become a stand-alone undergraduate major, complete with its own teaching facilities. In April 2009, the new teaching winery, located in the Cornell Orchards, officially opened, and students began making wine in the only university facility of its kind in the eastern U.S.

“The New York wine industry has been growing rapidly since the late 1970s,” says Professor Ian Merwin, MS ’88, PhD ’90, referring to the establishment of more than 350 wineries in the state in the last 35 years. “The need for well-trained and creative leaders to support and guide that industry was a key factor in the formation of Cornell’s grape and wines program.”

And are students able to taste the final product after a year of work?

“For an experiment, we did a blind taste test” says Victoria Mariani ’10. “Because we were so familiar with the wines, I was able to identify them. I felt really proud to see the wine finally make it into the bottle.”

—Molly Cronin ’11
Local Beef Served at Campus Eateries

When it comes to burgers, the question is no longer, “Where’s the beef?” but rather, “Where’s the beef come from?”

Cornell Dining staff can now give a clear answer.

Since March, they have been purchasing three steers a week from farms within a 250-mile radius of Ithaca and taking them to the Cornell Teaching and Research Center in Dryden, where the animals spend three months munching on natural feed. Most come from even closer—within 75 miles of campus—and travel only 60 miles to a small, family-owned plant, Leona Meats, in Troy, Pa, for final processing.

That means fewer food miles and a safe, healthy product, according to Cornell Dining director Gail Finan ’69. The cattle are raised without hormone growth implants or daily antibiotics, and each can be traced to their farm of origin. Cornell also inspects the plant where the meat is processed and applies its own tests beyond what is required by the USDA.

Knowing that farmer-owned beef was being finished in Dryden, Matt LeRoux, MPS ’08, agricultural marketing specialist with Cornell Cooperative Extension of Tompkins County and a member of the Cornell Dining Local Foods Advisory Council, saw an opportunity. He contacted Mike Baker, PhD ’03, beef extension specialist in the Department of Animal Science, and the two made the proposal to Cornell Dining administrators in December 2009.

CALS Leads Fight against Emerald Ash Borer

CALS is leading efforts to manage outbreak populations of the emerald ash borer (EAB), a beetle that has the potential to devastate ash trees in the Northeast. The new invasive species first showed up in western New York last August in Cattaraugus County and is already in Steuben and Ulster counties.

“What we discovered last year were some rather heavily infested ash trees,” says John Vandenberg, research entomologist with the USDA Agricultural Research Service and CALS adjunct professor of entomology, who discovered the EAB in New York. He says he hopes that the new detections have been discovered early enough to prevent disastrous infestations.

Vandenberg, along with Mark Whitmore, a Cornell forest entomologist, and Melissa Fierke of the SUNY College of Environmental Science and Forestry, are working extensively with Cornell Cooperative Extension offices throughout New York to raise public awareness about the EAB.

While the bright green beetles cause no direct harm to humans, they can kill a North American ash tree in two to three years. The beetles threaten the Northeast’s hardwood forests and are a major potential liability to communities, Whitmore points out, because removing dead or infested trees costs $2,000 to $3,000 per tree. He recommends that communities conduct an urban tree inventory and lay out realistic plans for the eventual arrival of the EAB.

To keep the borer from spreading, the team has been strategically killing and removing infested ash trees to decrease the EAB population and to use the trees for research. With expected emergency funding from the Farm Bill, the team is considering identifying potential high-risk areas and perhaps importing several natural predator species of Chinese parasitic wasps if research proves them effective.

The EAB, a native of Asia, is believed to have made its way to the United States through wooden shipping crates. First detected in North America in 2002 near Detroit and southern Ontario, the EAB has since spread, likely via infested ash firewood, to 13 states and two Canadian provinces, killing hundreds of millions of ash trees. To discourage such spread of invasive species, New York enacted firewood regulations in May 2009 prohibiting the transport of untreated firewood beyond 50 miles. Consumers should only use firewood from local sources and never move firewood from dying trees.

—Molly Cronin ’11
**Q & A**

**with Dean Kathryn J. Boor**

*Interview by Linda McCandless ’74*

On July 1, 2010, Kathryn J. Boor, chair of the Department of Food Science, became the 13th Dean of the College of Agriculture and Life Sciences. *CALS News* sat down with Dean Boor to discuss her new role, her local roots, her research, and her aspirations for the college.

Tell us about your background and how it makes you uniquely qualified to be the Robert P. Lynch Dean of the College of Agriculture and Life Sciences.

I was interested in becoming dean as a consequence of my broad experience and training across the agricultural and the life sciences.

I grew up on a small dairy farm in upstate New York, in Horseheads, that my grandfather purchased in 1926. Over the years, the farm evolved into a considerably larger enterprise run by my father, and now by my brother, who also is a CALS graduate in what was known as agricultural economics at the time. In the 70s I came to Cornell as an undergraduate student interested in learning various aspects of food production, so I found food science as a major.

I have gained my entire education at land grant institutions: Cornell University, then a master’s degree in food science from the University of Wisconsin–Madison, and finally a Ph.D. in microbiology from the University of California–Davis. And so my background is in understanding the land grand mission, the concept of public scholarship, and the integration of agriculture and life sciences for solving real-world problems. This is the set of ideas that has shaped my entire career and brought me back here to CALS.

What attracted you to CALS as a young faculty member?

I was attracted to CALS as an assistant professor back in the mid-90s because of my understanding of the appreciation here at Cornell for work that spans discovery right up through application, and a true commitment to work of that nature.

The faculty in the Department of Food Science, when I was interviewing, made it...
very clear that problem-solving research that focused on dairy microbiology issues would be valued here at Cornell, and that made it clear to me that I would have a comfortable place where my work would be appreciated.

**What has been your research focus and what impact has it had?**

My research has focused on the factors that enable bacteria to be transmitted through food systems. I work on bacteria that nobody wants in their food systems. They’re not necessarily ones that will make people sick, but they certainly can include bacteria that can cause spoilage, so they can cause economic problems. I focus on keeping bacterial spoilers out of dairy food products to ensure that those products are as tasty and wonderful as possible for human consumption.

In my other research program, I focus on factors that are intrinsic to a bacterial cell that enable it to respond to environmental cues in a way that enables survival of the cell and allows it to become a better human pathogen, more likely to create infection in the human body.

One particular success story involved tracing the full ecology of the *listeria monocytogenes* organism across food systems, starting on the farm and going through foods that are present in the retail environment. My team discovered a link between specific foods that were available on the market and the microbes that were making people sick. That enabled us to identify a nationwide outbreak of food-borne listeriosis, remove the food from the market, and prevent others from becoming ill. It was exciting.

**What are some of the challenges facing CALS and how is CALS positioned to meet those challenges?**

We have a long and wonderful history at Cornell University of striving to be, I’ll say, all things for all people, while still creating opportunities for people broadly across academic disciplines. A challenge that we face, then, is to make sure we focus on where we are best suited and best able to have an impact. That means making some decisions about areas in which we will be the best in the world, where we will make investments and really focus our efforts.

Here at CALS, those include the life sciences, food and energy systems, the environmental sciences, and applied social sciences.

We also simultaneously have a greater understanding of the fact that many of the most important issues that we face as a globe—climate change, food security, economic and environmental sustainability—are complex questions that require multidisciplinary solutions. We aim to build upon our history of providing a comprehensive network of faculty members so that when we address these particularly complex questions, those collaborations are natural, and we have the entire team in place. That is one of the aspects that drew me to Cornell in the first place: the understanding that we had outstanding chemists here, for example, as well as outstanding nutritionists and others who really could bring power to the element of food science in which I was interested.

**Tell us more about how CALS faculty, staff, and students carry out the college’s land grant mission.**

The land grant mission here at Cornell University is based on a philosophy and a practice of public scholarship, and so we embed this throughout our entire process, whether it’s education, research, or outreach. Horticulture is a really good example of a program where there is true clarity from the point of fundamental discovery up through problem-solving—not only in research, but in outreach.

If you have visited New York City and you have enjoyed urban trees, you have enjoyed the benefits of some of the work of Nina Bassuk in the Department of Horticulture. She studies and understands how trees and other plants can thrive in urban settings, which certainly makes those settings much more pleasant for all of us. We have a chair in that department, Marvin Pritts, who still personally delivers outreach programs for those who are interested in growing berries, whether those are at the individual level or at the larger level.

And we have students who work with both of those faculty members to ensure not only that they will carry this information on to the next generation as they enter their own careers, but they can also enact a lot of the work in practice at the time.

**You’re a mentor to many students and have had numerous advisees. What excites you about working with students?**

I think the most wonderful thing about being at any university anywhere in the world is the opportunity to continuously work with people who are excited about ideas. The beauty of this particular job is I can continue to age but the students stay young, and that keeps everything fresh.

I have had, over the years, more than 50 undergraduate students who have conducted research in my laboratory, and it has been tremendously rewarding to watch those students go on to success in their careers, whether in medicine, research, or in food companies around the world. Graduate students who have come through my program have become epidemiologists, for example, for the state of California. One of my former graduate students now runs the Public Health Surveillance System for all of Canada.

It is tremendously rewarding to be able to help people get started toward the pathway of attaining their own dreams. It’s one of the most rewarding aspects of what we do.

**What is one of your favorite places to spend time on campus?**

When I tell you my favorite place to spend time on campus, you’ll realize that I am truly a geek. My very favorite place on campus is my research laboratory. It is located on the fourth floor of Stocking Hall, which is a wonderful place. It overlooks the track and the soccer fields, so if I need to take a break from research or working with my students or writing, I can look out there and watch people enjoying those athletic facilities.

On the other end of my laboratory, I look out over Cornell Plantations. One of my true pleasures in life is to be mindful of the seasonal changes, to look down to see the lushness of the green in the summer, the glorious colors that emerge in the fall, the starkness of the snow in the winter, and the rebirth of life in the spring. I also love my laboratory because of the excitement of the people who work there, the staff and the students who are truly dedicated to discovery.

**What makes you excited to come to work in the morning?**

I think anyone who is lucky enough to do what they love never feels like they have to go to work, and I feel very lucky to have been able to do what I love throughout my entire career.

I truly believe in the mission, not only of CALS, but also of Cornell University, which is to ensure that we create students who are trained to be leaders when they leave, that we do research that is designed to enact changes and improve people’s lives, and that we have outreach that is designed to support and translate our research so it reaches its intended target audiences. Because I believe in the functions that we serve here in CALS and at Cornell, it makes every day an exciting challenge.

WEB EXCLUSIVE

More about Dean Boor
See the full interview, including web-only questions and answers. calsnews.cornell.edu
Secrets of the dark, fertile Amazonian soils reveal ways to sequester carbon and slow climate change.

Deep in the heart of the Amazon rain forest in Brazil is a centuries-old substance of mysterious origin that some scientists believe could play a leading role in saving the planet.

Known variously as “black gold,” “Terra Preta de Indios,” or “dark earth,” it is a particular type of fertile Amazonian soil. Its claim to fame is biochar, the charcoal-like substance that is in it. Biochar is igniting the interest and passion of scientists around the globe, including those at the White House.

“Biochar is capturing attention because it offers opportunities for discovery at the frontiers of science,” says CALS soil scientist Johannes Lehmann, one of the world’s leading terra preta experts and co-founder of the International Biochar Initiative (IBI). “In the past five years there has been an explosion of interest from politicians, NGOs [non-governmental organizations], the business sector, and the scientific community.”

By way of example, at the first IBI international conference five years ago, about 100 people attended and 40 papers were presented. At the last annual meeting this past September in Rio de Janeiro, about 500 people attended and 100 researchers from around the globe presented their findings.

So what’s all the fuss about biochar? This highly porous, dark-chocolate-looking substance with a granular feel is considered by many scientists to be a potential “black gold” for agriculture. What a Swiss army knife is to a penknife, biochar is to regular charcoal—a multipurpose tool with numerous applications for agriculture, bioenergy, waste disposal, and atmospheric detox.
First, it’s a great way to get rid of agricultural waste. Biochar can be made from crop residue, wood chips, cow manure, and other biomass, as long as it is cooked at low heat in the absence of oxygen, a process called pyrolysis. Second, in the conversion process, energy is produced in the form of syngas, which can be converted to heat and power. Third, after the syngas has been driven off and converted to energy, carbon-rich biochar remains, which, when returned to the earth, helps soil retain water and nutrients and, ultimately, increases crop yields, especially in poorer-quality soils. Lastly, biochar is a natural carbon sink—sequestering CO₂ and locking it into the ground, for hundreds of years.

“With biochar you have multiple sustainability outcomes—waste management, energy produced, soils improved, and carbon sequestered,” says Lehmann, associate professor in the Department of Crop and Soil Sciences. “This is what has people so excited.”

And here’s where saving the planet comes in: From a carbon sequestration standpoint, think of biochar as a two-way filter. It helps clean the air by preventing rotting biomass (for example, crop residue or wood refuse from harvested forests) from releasing CO₂ into the atmosphere by converting it into biochar instead. When it is added back into the soil, it locks in carbon in a stable form and helps plants to thrive, storing additional CO₂ they pull out of the air during photosynthesis.

**Biomass to Biochar**

In fact, Lehmann’s latest research collaboration shows that biochar could help slow the increase in total human-caused greenhouse gas emissions (GHG) believed to
be the leading culprit behind global climate change, according to the Intergovernmental Panel on Climate Change (IPCC) and the vast majority of leading scientists, including those at Cornell.

Detailed in the August 10 issue of *Nature Communications*, Lehmann’s research posits that the use of biochar has the potential to mitigate climate change on a much larger scale than combustion of the same sustainably procured biomass used for energy output alone. In other words, if you took all of the available sustainably harvestable biomass (which means not taking food crops out of rotation or clearing land for new crops) and used it to replace fossil fuel, that would still not be as beneficial from a sustainability perspective as growing on marginal lands. Such a shift in biomass use is not practically feasible, and would require enormous policy and infrastructure changes. In addition, pyrolysis technology is not yet advanced enough to be built at the commercial scale necessary for mass energy/biochar production.

“I first became interested in biochar 12 or 13 years ago while working in the Central Amazon. You can’t help but notice the fertility difference in the landscape between the terra preta soils and the surrounding areas.”

—Johannes Lehmann

Private investors and energy companies are just beginning to invest in breakthrough technology. Lehmann himself is in the process of securing a research-scale unit that would be the first of its kind in the Northeast, giving Cornell the first biochar-producing pyrolysis technology north of the Mason-Dixon line and one of only a handful of such research units in the United States.

But the study was not trying to measure the practical application of pyrolysis. The research was designed to show whether or not pyrolysis and biochar as an energy/ GHG mitigation system is worth pursuing as part of a viable solution to the global climate crisis. And that, the study clearly showed, is a giant “yes.”

“What we wanted to know is how much biochar can contribute in a sustainable way and is that number high enough to justify pursuing this technology,” Lehmann says. “There are a lot of challenges—technical, economic, and political—that are not probed here. But it is exciting to see what is possible with biochar.”

Findings like these have publications as diverse as *Rolling Stone, National Geographic, Time Magazine*, and the American Society of Agronomy touting biochar’s benefits. In Washington, D.C., biochar is creating buzz, as well. Lehmann was recently asked to brief the President’s Council of Advisors on Science and Technology, and Senator Harry Reid (D-Nevada) has introduced a bill in Congress to support further exploration.

**Indigenous Groundwork**

The next steps are clear. According to Lehmann, many detailed pieces of information have to be gathered. But the most important goal is to “test biochar at work”
Researchers work in the Amazon where biochar laid down centuries ago enriches the earth.

on a farm or in a community to really know whether it can deliver.

Still, there remain a lot of unanswered questions about the mysterious matter, including how it got into the Amazon soil in the first place.

Pockets of “terra preta” have existed for centuries along the banks of the mighty Amazon, where indigenous populations thrived for centuries until Spanish and Portuguese explorers arrived in the mid-1600s with infectious diseases against which native populations had no immunity.

The tribes that once lived there were efficient farmers who grew cassava and corn, among other things, in soil made rich with smoldered plant matter. Whether they did so by design—purposefully creating biochar by burning crop refuse in underground (oxygenless) pits and adding it to soil—or it ended up there as a byproduct of the way they lived, is a question scientists debate today. Lehmann is one of the growing number who believe these early Amazonian growers knew what they were doing. Farmers through the ages have utilized “slash-and-burn” on fields as a way to improve crop performance, but Lehmann is convinced these indigenous farmers went one better and found a way to create a particularly rich and long-lasting carbon-rich form, today’s biochar.

“I first became interested in biochar 12 or 13 years ago when working in the Central Amazon,” he says. “You can’t help but notice the fertility difference in the landscape between the terra preta soils and the surrounding areas. When you dig deeper you see these soils are built on chars laid down a few hundred to several thousand years ago and they have maintained their fertility over the centuries.”

It is only in the last few years that biogeochemistry has begun to unlock the secrets of the soil, and show how biochar differs markedly from other soil organic matter and why it is especially valuable for soil fertility and carbon capture.

Biochar is even more loaded with carbon—about 80 percent or more can be pure carbon—than regular humus, and it has an incredible sponge-like surface, which traps nutrients and waters and creates a veritable “playground” for beneficial microbes that aid plant growth, according to Lehmann. It is a much more stable, meaning enduring, fertility-enhancing substance than, say, rotting plant stems, manure, compost, or other forms of uncharred biomass often added to soil to improve it.

The phrase “ancient wisdom” takes on new meaning as one of our newest hopes for saving the planet comes from one of the earth’s oldest agricultural practices.
Heartrending photographs of oil-soaked birds and stranded dolphins drove home the scale of the environmental and ecological disaster called the Deepwater Horizon oil spill. When the leak was capped in August, some may have breathed a sigh of relief, but the clean-up effort continues. The damage goes beyond what television and photographs are capable of showing. Cornell researchers are among those working to understand and mitigate the oil’s devastating effect. They are striving to save wildlife in realms difficult to capture on film, working for the whales and corals deep beneath the surface, studying marine viruses and microorganisms in our groundwater too tiny to see, and even enlisting bacteria to help break down the brown slicks of oil. They are joining in the fight to protect the world from humankind’s mistakes.
Listening to the Ocean

In the ocean’s depths, where the light dwindles to near darkness, marine creatures rely on their sense of sound to envision their world. Far from silent, the sea is filled with a chorus of communication. Whales sing month-long serenades, shrimp click to hunt and socialize, fish boom and bark to mark territory, and lobsters rasp their carapaces to attract mates. Sounds like these intrigue the researchers who listen to them.

Christopher W. Clark is one of those researchers. As head of the Bioacoustic Research Program (BRP) at the Cornell Laboratory of Ornithology, Clark sees the biological world in a unique way. “We’re interested in the how’s and the why’s of life in all its different forms,” Clark says, “how animals make sounds, how they communicate, how they make a living, and why populations of animals behave the way they do and interact the way they do.” BRP researchers listen to the singing world, Clark explains, to gain insight into the behaviors of birds, bats, elephants, fish, insects, and whales.

As the Deepwater Horizon disaster unfolded in the Gulf of Mexico, scientists and citizens alike worried about the toll the oil would take on the marine ecosystem.

This past July, Clark’s team of researchers deployed 21 marine autonomous recording units (MARUs) along a path about 75 miles off the coast and stretching from Louisiana to Florida. The research is led by scientists from the National Oceanic and Atmospheric Administration (NOAA), in collaboration with Oregon State University and Scripps Institution of Oceanography, as part of a vast effort to understand the effects of the oil spill.

The MARUs are eavesdropping on the sounds of marine life, from dolphins and fish, to sperm whales hunting for deep-water squid. The units will be collecting data from sites both far from and close to the Deepwater Horizon wellhead. It is hoped that the distant sites will provide an approximate picture of the acoustic ecosystem before the spill, while sites close to the oil will reveal the extent of the disruption. The devices likely will hear much more than whales. After retrieval, the researchers will analyze the data collected from the units.

Originally inspired by some of the tools that the U.S. Navy uses to listen for Soviet submarines, the MARU technology was further developed by Clark’s team of engineers and scientists. “I call them pop-ups,” he says, “because they are placed on the ocean floor, and when they are finished recording they travel to the surface at about a meter per second and pop up when they reach the surface.” The MARUs currently in the Gulf will listen throughout the fall, and researchers will collect them at the end of this year’s hurricane season. Clark emphasizes the need to redeploy the devices and listen further to the creatures in the Gulf.

“Unfortunately, we have not as a society done a good job of paying attention to the Gulf of Mexico,” Clark says. “We do not have good baseline data on how that ecosystem works when it is healthy. We take an enormous amount from the Gulf in terms of resources, but we have not given back.”

Researchers are scrambling to understand what lives in the Gulf and what may need saving from plumes of oil. Clark explains that even decades of experience listening to the ocean might not give the BRP a good idea of the creatures threatened by the spill. “Every time we go to a new location we are surprised,” he says. When Clark deployed MARUs off Long Island and New York Harbor he was shocked to hear six species of whales within the first few hours of recording. “We heard blue, fin, humpback, minke, right, and sei whales. We have a population of fin whales just outside of New York Harbor, in an area visible from the top of the Statue of Liberty if you looked out into the ocean. And they are singing there all year long.”

As with any environmental conservation effort, researchers need to know what animals are there before they can figure out how to protect them. In Massachusetts Bay, a string of MARUs is part of the Right Whale Listening Network. The MARUs gather data that is then analyzed by researchers at the Lab of Ornithology. If the rare right whale is heard, ships are alerted and change their course to avoid harming the creature.

Though his work reveals vital information about marine ecosystems, Clark never loses sight of the beauty of his job. “As scientists we analyze the songs of whales and extract all of these measurements, but when you sit down and listen, you aren’t thinking of measurements, numbers, tables, and histograms. You’re immersed in and overwhelmed by the experience of listening to the majestic symphony of these giant ocean animals.”

For more on the Right Whale Listening Network and to explore whale sounds, visit www.listenforwhales.org.
Climate Change and Corals

Coral reefs are called the rainforests of the ocean, home to the beautiful, the colorful, and the diverse. These ecosystems are built on the interaction between the tiny invertebrates that make the calcium carbonate structure of the coral and the algae that live within them. The algae use sunlight to photosynthesize, providing the coral polyps with carbohydrates, while the corals build a protected home for the algae.

Corals are extremely sensitive to the effects of climate change. Acidification caused by rising carbon dioxide levels and warmer ocean temperatures conspire to make corals more susceptible to disease. This vulnerability is one of the research foci of Drew Harvell, professor of ecology and evolutionary biology and the new associate director of the Cornell Center for a Sustainable Future.

Harvell’s work with gorgonian corals, or sea fans, follows the melanization response. Corals have specialized cells that identify pathogens and literally wall the disease off by laying down a barrier of melanin. The invading pathogen or fungus is trapped on the other side. A sick sea fan displays lesions of infected coral surrounded by a bright purple ring, visible evidence of the melanization response.

What Harvell does not yet know is exactly why warmer waters and acidification lower coral disease resistance. “We have made amazing advances in the past five years towards understanding how coral immunity works,” Harvell says, “but it is desperately understudied compared to other species. We just now have a coral genome sequenced that can allow us to understand the genetics of immunity.”

Even if we somehow manage to curtail carbon dioxide emissions, we are still committed to several decades of warmer climate. The best hope for coral reefs is to help them shore up their defense against pathogens by giving them as healthy an environment as possible. “We think that excess nutrients in the sea-water can weaken the immune system,” Harvell explains. “Zones of the ocean where there are excess nutrients—such as from fish farms or sewage runoff—can also be a source of new pathogens.” Local management strategies can reduce the pathogenic load and help protect the fragile coral ecosystems.

The Deepwater Horizon disaster in the Gulf is a source of concern for nearby coral reefs. “Even the change of the water chemistry associated with the oil dispersants could seriously compromise coral immunity,” Harvell says.

The Ocean’s Tiniest Inhabitants

The ocean is teeming with a vast diversity of life, all the way down to the microscopic level. In a single milliliter of sea water there may be millions of zooplankton, algae, bacteria, and even smaller denizens of the deep: viruses.

“There are a lot of viruses out there,” says Ian Hewson, assistant professor of microbiology. “If you counted all of the viruses and stacked them up, they would reach to Alpha Centauri and back. The biomass of marine viruses is about equivalent to 30 million blue whales.”

Viruses and other microorganisms play a big role in the elemental cycles of the earth. They move inorganic elements like carbon, sulfur, and nitrogen in and out of the food chain. For example, cyanobacteria are like microscopic plants, sucking up carbon dioxide and making it accessible to other creatures. Viruses that infect cyanobacteria release the carbon into the ocean when they kill their hosts. This cycle helps to sequester excess carbon dioxide in the atmosphere, but marine viruses' influence on our planet go much further. Infection rates of microscopic ocean life could have effects that researchers are only just beginning to realize.

Each virus is very specific, perhaps infecting only one or two different species. This means that viruses have a profound sway on the structure of microbial communities. Hewson has observed that terrestrial viruses can be found at sea, miles from where freshwater rivers mix with salt water and where runoff from terrestrial rainfall enters the ocean. These disturbances change marine virus populations and, in turn, the microbes that they infect.

“Every day there is a battle between the bacteria and the viruses killing them,” Hewson says. “There is constant turnover.”

To understand what the changing viral load may signify, Hewson filters ocean water samples down to the smallest creatures—viruses—and looks at the genetic material. The DNA reveals the viruses present and their role in elemental cycling. The RNA provides information about the proteins and enzymes the bacteria use to respond to viral threats.

Hewson has found that microorganisms and viruses are extremely important in the marine ecosystem.
Microbes in the Groundwater

Below the surface of a gently sloping forested hill above the Hudson River, billions upon billions of living creatures are busy at work, breaking down pollutants and purifying the soil and groundwater. This site is one of more than 2,000 in the Northeast contaminated by coal-tar waste from an old coal gasification plant.

For over 16 years, Eugene Madsen, MS ’81, PhD ’85, professor of microbiology, has studied how microorganisms are able to digest toxic compounds like naphthalene, the key pollutant at the South Glens Falls site.

This method of pollution management is known as natural attenuation. For sites that pose no immediate health or ecosystem threat, it is the best strategy to combat contamination. Understanding the process is necessary for effective management, and Madsen’s site is shedding light on the key players.

“When a tree falls in a forest, microorganisms are there,” Madsen explains. “The tree disappears and nutrients within its biomass are converted to inorganic compounds. If that didn’t happen, all of those nutrients in the fallen tree would not become available to the next generation of trees.”

The same process happens to organic pollutants like coal-tar waste and oil, says Madsen. “Unquestionably for the bulk of the oil recently spilled in the Gulf of Mexico, natural attenuation is going to be the major means by which the contamination is eliminated.”

These ecosystem services are performed by tiny, overlooked heroes who purify the water we drink and the land we cultivate.

“It is a longstanding mystery,” Madsen says. “We know that microorganisms are responsible for the cycling of nutrients in soil, in groundwater, in oceans, in sediment, and in sewage. They are everywhere, but only rarely have we deciphered the identities of ecologically important microorganisms.”

One gram of soil contains approximately one billion microbial cells and perhaps greater than 10,000 bacterial species, but determining which ones are active, consuming and recycling nutrients, detoxifying pollutants, is a huge challenge. Madsen used a stable isotope of carbon—carbon 13—to figure out which was digesting the naphthalene. He was able to isolate and characterize Polaromonas naphthalenovorans, a bacterium that can now be properly acknowledged as an environmental hero.

Eco-friendly Oil Absorbents

Gary Harman, professor of plant biology at the New York State Agricultural Experiment Station in Geneva, has helped to develop a product from recycled dairy cow manure called OilMaster, a successful ecologically friendly oil absorbent.

“The OilMaster concept came about because we were interested in the chemistry of lignins,” Harman explains. “Lignins are extremely effective because they have hydrophobic and hydrophilic groups, so they take up either oil or water.”

When cows consume plant material, they digest the cellulose and leave the lignin. “For OilMaster’s purposes, a cow’s digestive tract is a lignin factory, exposing the lignin while leaving the cellulose structure. The result is material that is essentially little sacks—the empty cells—that soak up oil,” Harman says.

The OilMaster product is manufactured by Terrenew (www.terrenew.com), a company headquartered at the Cornell Agriculture and Food Technology Park, with production facilities in Seneca Falls. The CEO of the company is Thomas Bourne, and Harman serves as the Chief Scientific Officer.

Terrenew’s OilMaster can be made into booms that will soak up oil before it reaches the marshes, or scattered as loose material to bind oil and makes it less harmful.

But absorption is only one aspect of the product’s abilities. Because OilMaster is derived from dairy cow manure, and although it has been treated to remove pathogens, the microbial activity of the product can break down the captured oil. The large surface area of the product makes it an ideal habitat for the oil-degrading biofilms formed by microorganisms.

“We need to look more in depth at the microbial interactions and learn how to enhance the bioremediation abilities and oil degradation,” Harman says. “It is extremely promising. Without adding any additional microorganisms, we already see 20 to 30 percent degradation within a week.”

The product is manufactured in several forms, as granular absorbents and as pads. Harman is currently securing funding to develop a version that could be used to clean up oil spills.

“We’re now ready to go to the next phase, which is large-scale production of our products,” Harman says.
Whether it’s a local crop failure, chronic malnutrition, or regional famine, unpredictable food production is a barrier to prosperity. While many factors play a role in food security, the foremost factor is agricultural production itself, which is based on plant varieties that thrive—or at least survive—even in difficult seasons. It’s a tough world for plants, with unpredictable weather, pressure from insects and diseases, and no means to retreat from challenges.

How do you build a robust wheat plant or a tolerant apple tree? For plant breeders, the answer lies in harnessing the diversity in crops and their wild relatives. Contained in each and every cell of a plant is DNA, which until recently was as cryptic as creatures on the bottom of the sea. However, with breakthroughs in technology, Cornell scientists are turning the promise of genomics into the reality of food security by using genetic markers to breed crops for disease resistance and other traits.

Genetic markers are tools for targeting differences in DNA, such as a change in size or coding on a particular chromosome. They become useful to breeders when they are near an important gene, such as those for yield and disease resistance. Once a link between a specific marker and a specific trait has been established, breeders can rapidly use that marker to predict a seedling’s potential for traits like yield, disease resistance, or drought tolerance. By comparison, classic breeding would require testing plants for weeks, months, or years in the field or greenhouse. Molecular markers allow breeders to track their most important genes, decreasing guesswork and improving efficiency.

Cornell researchers are working to improve food security both locally and globally with new and disease-resistant varieties of apples, potatoes, maize, and wheat. With the genomics tools on hand, the next generation of solutions for disease may not emerge from the nozzle of a sprayer but from unleashing the potential encoded in the plants’ own DNA.
Global Wheat Threat

In a Ugandan wheat field in 1999, a scourge of the 1950s reinvented itself. Brick-red pustules on wheat stems in a plant-breeding nursery signaled the return of wheat stem rust. Wheat breeders around the world thought the problem of stem rust had been solved through aggressive breeding for resistance, but this new strain—named Ug99 for Uganda 1999—trumped previously rust-hardy varieties.

Since its first sighting, Ug99 has spread from Africa eastward to Iran, resulting in severe crop losses and raising concerns for the wheat fields of China, India, America, and Russia. Plant breeders around the world are in a race against the fungus to generate new, resistant varieties, and Cornell small grains breeder Mark Sorrells is using genomics to speed the pace.

Because large-scale wheat failure could jeopardize the global food supply, the response by the wheat-breeding community has been rapid and well-coordinated. Sorrells credits the Bill and Melinda Gates Foundation with keen foresight for funding the Durable Rust Resistance in Wheat Project led by Cornell. “Without their support, this ambitious, urgent project would have been difficult to fund,” he says.

“Our role in the project is not the variety development itself, but rather to provide tools, materials, and strategies to breeders in Africa, Canada, Mexico, Syria, and other countries,” explains Sorrells, chair of the Department of Plant Breeding and Genetics. Sorrells has already contributed his own breeding lines, reinforced with three and four different resistance genes.

In addition, they are providing strategic support to the international breeding programs. One strategy is to assist breeders in “pyramiding” genes—incorporating several resistance genes into a single variety—which is feasible using molecular markers. To start, Sorrells’s group tested and verified all known molecular markers for Ug99 resistance genes, putting over 20 tools in the hands of wheat breeders. If they can build several resistance genes into their varieties, this will be a greater challenge to the fungus and buy time for growers in high-risk regions of Africa.

The second approach is called genomic selection—a technique new to plants but already used commercially in the dairy industry to identify the best breeding animals. A similar application is in the DNA testing kits for people, to predict disease risk.

Researchers probe the DNA of seedlings at thousands of sites, compare the results with DNA from plants known to be resistant, and confidently predict which seedlings will be resistant, but with a key improvement. This high-tech approach allows them to track for the first time genes with small but significant roles in fighting disease. With enough of these genes in a variety, breeders can expect resistance that is more durable. Sorrells’s goal is to put this emerging, powerful method into the hands of breeders around the world.

Although the situation is dire, Sorrells admits it is an exciting opportunity to make a significant difference in global food security using the latest genomics technologies. He says, “This was simply not possible before, but now advances in genomics have caught up with needs of breeders and farmers.”

Progress in Potato Genomics

For such a diminutive worm, the golden potato cyst nematode has a knack for longevity. Microscopic females produce cysts with hundreds of eggs, which are viable for up to 30 years in the soil. Feeding on potato roots by the females causes massive decreases in yield, and benefits from soil fumigation are short-lived. For associate professor of plant breeding and potato breeder Walter De Jong, genomics is key to the future of managing this pest.

“The only real solution we have is breeding for resistance,” he says. “But to fight the nematode we have to move genes from wild species of potato from the Andes of South America into our domesticated potatoes without displacing their desirable traits.”

In New York State, potatoes are an important commodity for the potato chipping and fresh market niches. Two races of golden nematode are found in New York, yet they are distinct enough that different genes are required for resistance in the field. Race 1 was found on Long Island in the 1940s, possibly introduced from contaminated European soil on military equipment after World War I. To guarantee resistance in his varieties, De Jong developed a simple marker for a gene—called H1—that confers resistance to Race 1. Each year, he and other breeders around the world use this marker to select Race 1 resistant varieties.

However, a second race has recently been found in New York, and breeding for this is not as simple as screening with one molecular marker. De Jong explains, “It takes several genes to provide resistance to this pathogen. Our research suggests it requires two or three genes. And we are still looking for markers for them.” Although Race 2 is not yet widespread, the fact that it takes 12 to 15 years to release a new potato variety gives urgency to the task of finding markers.

He concedes that, at the moment, the use of molecular markers is the exception rather than the rule in potato breeding, though it’s not from lack of interest. “Potato genetics have been stymied by the fact that potatoes are autotetraploids—they have four copies of each chromosome rather than the two copies that are the norm in many organisms, including humans,” De Jong says.

Potato genomics is on the brink of change, though. De Jong is a leader on a project which has already developed more than 8,000 new markers for cultivated potato. The markers—called SNPs for single nucleotide polymorphisms—will finally provide the genomic coverage they need to connect markers to traits. His first target is finding markers for resistance to golden nematode Race 2. That, in addition to markers for the traits that produce quality chipping potatoes, such as high starch and low sugars, will allow De Jong and other breeders to select only the most promising seedlings in their breeding program.

“The potato community is excited—we anticipate much more rapid progress in finding markers for key traits in the next five to 10 years,” De Jong says.
Improvements for Apples

A n apple farmer plants an orchard to last for decades, through winter cold, variable summers, and persistent diseases. Apple breeders aim to develop apples worthy of generations, but can they do so in less than a generation themselves? With more than 50 acres of apples under evaluation, Cornell horticulture professor Susan Brown’s apple breeding program is one of the largest in the world. (Brown is the Herman M. Cohn Professor of Horticulture.) While breeding new apple varieties may never be as rapid as breeding annual crops, Brown is using genomics to take the guesswork out of choosing the best parents for breeding.

“We use markers routinely to screen potential parents before making crosses, to ensure that they have resistance to our most pressing diseases—apple scab, fire blight, and powdery mildew,” Brown says. “The markers allow us to test their genomes for strengths and weaknesses before committing their genes to the next generation of apples.” She now tracks seven different scab resistance genes in her breeding program, as well as genes that affect fruitfulness and yield.

A good apple variety demands a lot from its genetics: the buds, branches, and trunk must survive cold winters and spring frosts; the flowers, leaves, and roots need resistance to multiple pests and diseases; and the abundant fruit should appeal to consumers even after months of storage. Since its inception in the 1890s, the Cornell apple breeding program has released 68 varieties to address these challenges, but recent developments in apple genomics promise major breakthroughs in combining the best of traits in new varieties.

Brown credits two significant developments in genomics with feeding the momentum. In August 2010, the sequence of the apple genome was published, giving apple researchers a complete roster of the genes in the apple genome. In addition, Brown is part of the RosBREED project, an international alliance of researchers committed to increasing the rate at which genomics research is translated into supermarket-worthy varieties.

The link between genomics and new varieties is marker-assisted selection, which requires researchers to identify markers that can reliably predict from an apple seedling’s DNA the kind of tree and fruit that it would produce when mature.

With her RosBREED collaborators, Brown has set her sights on key traits that lack markers, shifting focus away from disease resistance and onto the fruit itself. Her students are currently tracking genes that affect fruit quality—fruit texture, acidity, and sugar accumulation—as well as the genes that keep these stable during storage.

“When I started breeding apples 20 years ago, molecular genetics didn’t have an immediate, practical application,” Brown says. “Now it is the bridge from imagining the next great new apple to delivering it.”

Durable Resistance in Maize

T o survive in sub-Saharan Africa, corn must weather both drought and chronic disease infestations. Breeders have responded to specific threats by breeding in resistance to one disease, only to find their varieties susceptible to a new pathogen strain or emerging disease.

Professor of plant pathology and plant-microbe biology Rebecca Nelson is searching for a different kind of resistance, one based on more modest but reliable genes.

She explains that in the past, breeders relied on “major genes” or “qualitative resistance”—individual genes that strongly and specifically target a particular pathogen strain. However, given sufficient time, these genes are eventually outwitted by the pathogen and cease to protect. Their complement is “quantitative resistance,” which relies on genes that build tolerance to pathogens, rather than immunity to one.

“Quantitative resistance is a big, practical issue in agriculture, but most genomics research has been on qualitative resistance,” Nelson says. “There are only a few ways to completely shut down an infection through qualitative resistance, but there are more ways to slow down or impede pathogens. This is our goal for longer-term, durable resistance.”

Nelson’s tactic is to seek the genes in corn’s general defense plan, regardless of which pathogen is attacking. In reality, farmers here and abroad face several diseases, including grey leaf spot and northern leaf blight, which can cause annual yield losses and intermittent crop failure. Sub-Saharan Africa has the additional threat of aflatoxin, a carcinogen, liver toxin, and anti-nutritional that is produced in grain contaminated with the fungus Aspergillus.

In collaborative work with Ed Buckler, a research geneticist with the USDA in Ithaca, N.Y., Nelson’s lab is targeting genes for quantitative disease resistance. High-throughput genomics combined with field screening for disease resistance quickly led them to a molecular marker for resistance. It boosts resistance to three pathogens: northern leaf blight, Stewart’s wilt, and common rust—the broad-spectrum resistance they were seeking.

“It’s gratifying that we are beginning to understand the mechanisms of how plants fight back—finding genes that work at different stages,” she says.

For example, she now has a marker linked to early defense, when the fungus is initially puncturing through the leaf. Another marker predicts which plants effectively deploy chemical deterrents once the fungus had breached the cell wall, like sandbags piled against a leak.

Nelson’s enthusiasm for the molecular mechanics is matched by her determination to make real progress toward African food security through collaboration with James Gethi, PhD ’03, a maize breeder with the Kenyan Agricultural Research Institute and an alumnus of the Cornell plant breeding and genetics program.
Concerns Ignite about Drilling Deep for Gas

Researchers unearth the benefits and hazards of ‘hydrofracking’ for communities in the Marcellus Shale.

BY SHERI HALL

A rock formation known as the Marcellus Shale—and proposals to extract its large, untapped natural gas reserves using a process called hydraulic fracturing—have ignited a political firestorm in the state of New York, with many communities organizing vehement protests.

Faculty members in the College of Agriculture and Life Sciences have mounted an unprecedented response to the issue. They have stepped up their research and extension efforts to help individuals and communities make decisions about the benefits and dangers of this new form of natural gas drilling and to think about broader energy development scenarios.

“This has been a best-example of a land grant university at work,” says Rod Howe, assistant director of community and economic vitality for Cornell Cooperative Extension and executive director of the Community and Regional Development Institute.
The Scientific Evidence: Cornell and PRI Partner to Create New Resources

The Paleontological Research Institution (PRI) in Ithaca received a $100,000 grant from the National Science Foundation to pull together the scientific evidence on natural gas drilling. The Department of Earth and Atmospheric Sciences and Cornell Cooperative Extension are partnering with PRI on the project.

The rapid response grant—which was awarded to PRI within months of their application—will distill information available on the Marcellus Shale and the environmental impacts of hydraulic fracturing. The information will be disseminated in communities underlain by the Marcellus Shale in New York, Pennsylvania, West Virginia, and Ohio.

PRI will cover the earth science aspects of natural gas drilling, while Cornell Cooperative Extension will focus on information about water and land use impacts, leasing, economic development, local and state regulations, and rural development.

“Our outreach campaign strives to provide objective information, not for or against gas development, but rather aiming to help stakeholders make scientifically informed decisions,” says Robert Ross, associate director for outreach at PRI. “It’s clear that we need more comprehensive, evidence-based resources to aid public understanding of these complex issues.”

Specific plans for outreach efforts include a user-friendly guide to the earth science of drilling in the Marcellus Shale, available online and in print, a comprehensive source for the scientific information with an emphasis on geology and hydrology research.

After the first generation of resources, there will be several programs in communities in the Marcellus Shale region.

For the most current information, see
Natural Gas Resource Development Center: http://cce.cornell.edu/Community/NaturalGasDev/Pages/default.aspx

Museum of the Earth’s outreach page: www.museumoftheearth.org/outreach.php

Susan Riha leads an open meeting on Marcellus Shale drilling.

Howe is a development sociologist by training. With urging from county-based educators, he was instrumental in creating the Cornell Cooperative Extension Natural Gas Resource Center two years ago when it became evident Marcellus Shale drilling would be a major issue in New York.

Today, the team comprises approximately 12 faculty members from a wide array of disciplines—including sociology, environmental sciences, and geology—and 20 extension educators who dispatch information to individuals considering leasing their land, community groups, and local governments. They have also briefed state and federal officials on the issue.

“Our goal is to communicate the evidence that’s available and help people evaluate the risks involved,” Howe says. “We’re not making a recommendation either way. We are about providing accurate and, when possible, research-based information.”

That means understanding diverse interconnected issues like the economic benefits of drilling, the environmental implications, how drilling will change the character of communities, and what it will mean for local farmers.

“It’s not just a simple equation of economic benefit versus environmental risk,” points out Rich Stedman, MS ’93, associate professor of natural resource policy in the Department of Natural Resources, and an environmental sociologist by training.

“There are broader quality of life issues at work as well like crime, congestion, noise, and taxes. All of these elements impact one another. We constantly hear concerns about whether these communities will be good places to raise families.”

“There are questions about whether water quality will be impacted during hydrofracking, but there is a low probability of that happening. A more likely problem will come from chemical spills on the surface.”

~Susan Riha

Environmental Effects

Energy companies have known about the gas in the Marcellus Shale for more than 100 years, but have only began drilling for it in the past 20 years since the development of new technologies and the depletion of conventional gas deposits.

Drilling into the Marcellus Shale is more complicated, costly, and potentially hazardous than conventional gas drilling because the gas is trapped in the rock instead of pooled in a reservoir. To release it, companies must push water, fine
sand, and chemicals horizontally into the Marcellus layer, creating fine cracks that allow the gas to escape. This requires more land, equipment, and labor than conventional gas drilling.

The risks involved are difficult to assess and quantify, explains Susan Riha, the Charles L. Pack Professor in the Department of Earth and Atmospheric Sciences and director of the New York State Water Institute.

Riha is one of the founding members of the Cornell Cooperative Extension Natural Gas Resource Center. Two years ago she organized a meeting on the possible environmental impacts of hydraulic fracturing, also known as “hydrofracking,” for the New York governor’s office state guidelines for drilling. “There are questions about whether water quality will be impacted during hydrofracking, but there is a low probability of that happening,” she says. “A more likely problem will come from chemical spills on the surface.”

The challenge, Riha says, is communicating levels of risk to the public. For example, some people are concerned about high levels of salt in the water used in drilling that will flow back to the surface after hydrofracking. “But that level is hazardous to our water supply far less than the salt that is used on New York roads in the winter,” she says. “When you’re talking about an issue that people are passionate about, it can be difficult to convey risks accurately.”

Transforming Communities

Other likely consequences of drilling deal with its impact on communities. That’s where sociologist Stedman comes in. His work focuses on how rural communities make decisions about their natural resources. Stedman came to Cornell from Pennsylvania State University, where companies are already drilling into the Marcellus Shale.

“We have learned a lot by watching Pennsylvania go through this,” he says. “Although the process is still emerging there, we also have data from other states like Wyoming that show increased drilling is linked to more demand for emergency services like ambulances, as well as higher rates of crime.” As part of their outreach efforts, Stedman and his colleagues are helping communities gain a foothold with model ordinances that will help local communities control some of these factors.

Another outstanding question is how much economic benefit communities will reap from drilling.

“There are many factors at work,” Stedman says. “It’s hard to predict how gas will be converted into dollars in communities. There will be some new jobs, certainly, although the number will vary according to the phase of the development. Other money will come to the landowner through leasing payments, but the real impact to communities may depend on whether this money is spent locally or ‘leaks’ out. There’s an old saying: It might be raining money, but does the community have any buckets to fill?”

Stedman is working with colleagues at Penn State to assess the perceptions of communities impacted by drilling. They’ve conducted qualitative interviews and a survey of 6,000 property owners in communities in Pennsylvania and New York that are or could be impacted by drilling.

“Our results, among other things, show very low levels of trust—of both companies and of the government,” Stedman says. “Trust of academic institutions is slightly higher, but still not where we’d like to see it.” Interestingly, trust is no higher or lower in places where gas extraction is further along, suggesting that—despite the rhetoric—outcomes aren’t consistently worse or better than what people are expecting headed into the process.

Future of Energy Development

As communities in New York wait for the state to issue its final guidelines on drilling, Cornell Cooperative Extension is expanding its focus to help communities make decisions on broader energy development scenarios.

“We keep getting told we are going to need to make some major energy transitions, but at a local level, it’s clear we’re not ready for that,” Riha says.

The Cornell researchers have launched a major project, funded by the Cornell Center for a Sustainable Future, to study the impact of energy development on rural community sustainability.

“We’re essentially looking at how to measure energy transitions from a system perspective,” Howe explains. “What are the cumulative economic, social, and ecological impacts of green energy-based initiatives on a regional level?”

The idea is to work ahead to gather evidence on various scenarios before any more specific proposals or local controversies arise, Stedman says. “In the meantime, we are trying to work with community task forces to keep updated on all of these issues,” he says. “We want them to be as prepared as possible to make informed decisions when the time comes.”

What’s Next? The Environmental Impact Statement

Communities in New York are waiting for the state’s Department of Environmental Conservation to issue a Supplemental Generic Environmental Impact Statement that will define the guidelines for drilling in New York. The document will spell out specific requirements like monitoring water, inspections, and providing public information on accidents. Once it is released, companies can begin drilling in New York.

The state issued a draft statement in September 2009, which was open for public comments. Faculty members from the College of Agriculture and Life Sciences contributed comments recommending a variety of changes including monitoring of private wells, land use, and minimizing environmental risks.

To read faculty members’ comments to the draft statement: http://blogs.cornell.edu/nyswr
Organic Corn Designed Especially for New York

One segment of the New York dairy industry is actually growing organic. To produce organic milk, however, the cows must be fed crops that also have been grown organically. Until now, the only organic corn seed available has been developed for farmers in the Midwest, where the soil and climate is much more forgiving than in the Northeast.

Margaret Smith ’78, PhD ’82, professor of plant breeding and associate director of the Cornell University Agricultural Experiment Station, has developed two new organic corn hybrids specifically designed with the New York growing season in mind—a first for the area. Their names may be unexciting, but the possibilities represented by M1821 and D2901 certainly are exciting for organic crop producers and dairy farmers.

Crops grown from the first seed, a modified single cross produced from two closely related parents crossed to an unrelated parent, mature in just 82 days, grow relatively uniformly in the field, and have a slightly higher yield potential.

The second seed produces crops in about 90 days. Because it is produced by crossing two hybrids involving four unrelated parents, it is vigorous and easy to grow. It also seems to be resistant to many diseases and shades the ground early. This is especially important to organic seed producers, who have a harder time controlling weeds because they don’t use chemical herbicides.

It can also be produced cheaper, thanks in part to bigger seed ears.

“That’s why I think we might really have a role to play and particularly in a market like New York, where corn yields are not as high as elsewhere, and we struggle with soil conditions, shorter season, and pest pressures,” Smith says. “I think anything we can do to help reduce input costs for farmers is helpful.”

The benefits of the new breeds might eventually extend beyond the Northeast. The seeds are being tested on other farms across the country, and Smith says there is potential for wide-scale marketing.

Their value goes well beyond their price and regional adaptation, according to Mary-Howell Martens, MS ’82, who has been selling the seeds at Lakeview Organic Grain in Penn Yan since the 2009 season.

In an industry where biotechnology is now the norm, genetic diversity has become limited. By bucking against this trend, Smith and her team are ensuring organic farmers still have some selection.

“This is going to be very important as new diseases come along, or climate conditions change,” Martens adds.

Mary-Howell Martens and husband, Klaas, produce and process the seeds on their 1,400-acre organic farm and feed facility. Initial sales were sluggish as they tried to convince farmers that the new hybrids are worth a try, but she said the crops have been performing well under organic management conditions.

“The quality of these seeds is phenomenal, equal to or better than what comes out of the big seed companies,” Mary-Howell Martens adds.

—Stacey Shackford

Sweet Harvest, Healthy Future for Apples

As this year’s early apple harvest rolled in from orchards around New York, consumers were bringing especially sweet, high-quality apples home to their kitchens. Thanks to the introduction of two new, extensively tested and highly promising varieties and an innovative partnership with New York Apple Growers, LLC (NYAG), CALS will continue to play a critical role in ensuring the production of top-quality fruit for years to come.

Last April, CALS and NYAG agreed to terms to license the firm to offer the soon-to-be named varieties “New York 1” and “New York 2” to be grown by all interested apple producers in the state. A percentage of the royalties from the sale of these varieties will be returned to CALS’ breeding program. Growers benefit from a targeted marketing program to promote these new varieties, and consumers benefit by having more rapid access to new, superior varieties.

In August, growers traveled to Geneva to join New York Commissioner of Agriculture Patrick Hooker and Dean Kathryn Boor to reaffirm their commitment to the agreement.

The new varieties have proved popular with growers. Some 143 orchard businesses have made plans to plant 900,000 trees for both direct and wholesale markets on 948 acres across New York, between 2012 and 2015.

CALS and industry leaders will promote the two varieties from Susan Brown’s breeding program in the marketplace. The new apples are characterized by reliable annual productivity, uniform ripening, good color development, high-quality retention in storage, crisp texture, and distinct, pleasing flavors. New York 1 has many qualities of the highly popular Honeycrisp without the production challenges that limit the number of marketable fruits. New York 2 offers consumers a sweet/tart balance that is a hit with younger consumers.

Good science and market sense, wide access to producers, high-quality products, and strong collaborative efforts among growers, researchers, and state government point to a healthy future for New York’s managed variety initiative.

—Marc Smith ’76
Ruth Ley Wins NIH Award to Study Microbes and Metabolic Syndrome

Ruth Ley studies how the immune system shapes microbe communities within the body, and its role in either encouraging or discouraging metabolic syndrome.

For her research in chronic disease and its relationship with microbes in the gut, Ruth Ley, assistant professor of microbiology, was awarded a National Institutes of Health (NIH) New Innovator Award 2010. “We have co-evolved with our microbial partners: the microbes in our gut constitute a metabolic organ,” says Ley. “I’m fascinated by the idea that the microbes that make up this organ are acquired from the environment from birth onwards, and are generally beneficial, but there’s a real possibility that having the wrong mix can be detrimental to health.”

The NIH award will provide $1.5 million to Ley’s lab over the next five years. The award, which is given each year to scientists with highly innovative research ideas at an early stage of their career, will fund the young scientist’s study of a metabolic syndrome model in mice and its correlation with certain gut microbe communities.

Metabolic syndrome, a condition represented by a mixture of health factors such as heightened blood pressure, elevated insulin, and excess body fat, may lead to major health concerns such as heart disease, stroke, and diabetes.

Ley’s research will examine how the adaptive immune system shapes microbe communities within the body, and its role in either encouraging or discouraging the presence of metabolic syndrome.

In finding these answers, Ley hopes to develop a route of “vaccinating” against or treating microbe communities that lead to the development of metabolic syndrome in mice—and eventually humans as well.

“A growing number of chronic diseases are linked with an imbalance in gut microbial communities,” Ley says. “The aim of this research is to find a way to manipulate the composition of microbial communities to promote health. If we can do it in the context of this animal model of metabolic syndrome, perhaps we can do it in other disease contexts too.”

Ley became interested in microbiology after completing her undergraduate studies at University of California at Berkeley in 1992, working in the forests of Hawai‘i.

“It became clear to me that a lot of the action was in soil, in microbial processes,” Ley says.

After completing her graduate degree at Colorado University at Boulder on soil microbes, Ley’s study of microbes took her from Baja, Mexico to the Washington University School of Medicine in St. Louis, Mo. Ley joined the Cornell faculty in the fall of 2008 as an assistant professor, and since has established her lab, where she studies the microbiome of mammals and plants.

—Molly Cronin ’11

Bed Bug Expert Jody Gangloff-Kaufmann Offers Advice to Afflicted City

With the recent resurgence of bed bugs in New York City, almost every other phone call she receives is about bed bugs, says Jody Gangloff-Kaufmann, PhD ’99, senior extension associate for the New York State Integrated Pest Management (IPM) Program and chair of the New York City Bed Bug Advisory Board.

Bed bug complaints to New York City housing officials skyrocketed to almost 11,000 in 2009, up from fewer than 500 in 2004; city officials recorded a 240 percent spike in bed bug violations in private rental housing from 2006 to 2009.

The pesky bugs do not carry dangerous diseases, and only about 30 percent of people react to their bites. But bed bugs can trigger sleeplessness and anxiety in those combating an infestation, Gangloff-Kaufmann says.

The key to eradication is awareness. “Awareness is prevention, prevention is the cure,” says Gangloff-Kaufmann, who was one of 20 experts who helped develop guidelines for New York City, which include a bed bug task force and a broad education campaign.

To get rid of an infestation, one must “be absolutely vigilant,” Gangloff-Kaufmann emphasizes. She recommends intensive cleaning, informing the landlord, and communicating with neighbors. For serious problems, an exterminator may be necessary. The only way to know for sure if the bugs are gone is to sleep in the bed and not get bitten, a test no one wants to conduct.

Gangloff-Kaufmann discourages New Yorkers from picking up discarded furniture on the street. What seems like a great freebie is actually a direct route to infestation, she says, adding that in Ithaca, for example, “there is this whole culture that embraces recycling, and that is great, but this is one of the avenues that bed bugs can use.”

Gangloff-Kaufmann stresses that there is no single solution to an infestation, not even pesticides, and that an integrated, tailored approach to each situation is needed.

Despite the magnitude of the problem, Gangloff-Kaufmann is optimistic. “I think we’re going toward heightened public awareness spearheaded by the media,” she says.

—Erica Rhodin ’12
CALS Alumnus Gene Resnick Elected Cornell Trustee

Gene D. Resnick ’70, MD ’74, began a four-year term this past July as an alumni-elected member of the Cornell Board of Trustees. He is already hard at work with committee responsibilities and the other duties of the job, which include reaching out to alumni, attending events, and participating in university governance.

“It’s daunting,” Resnick says. “All of us who have been elected have been involved over the years. You think you know a lot of things that go on, but there’s surely a lot more to learn.”

Resnick is chief medical officer for Averion International Corp., a leading clinical contract research organization that supports global clinical trials for pharmaceutical and biotech companies. Earlier in his career, he spent a decade as an assistant attending physician at Weill Cornell Medical Center in New York.

Resnick says he hopes to lend his perspective as a double-red alumnus, particularly when it comes to efforts to enhance collaboration between the Ithaca campus and Weill Cornell Medical College. Otherwise, he intends to spend at least a year gaining broad experience across the university board committees, getting to know the other trustees, and doing what he can to ensure the quality of the student experience.

“If we continue to make the student experience special, then I think the university will be successful,” he says. “Each of us that has been through Cornell has a few things that we’ll always remember. For me, you can drill down to Lynah Rink, professors Louise Daniel and George Murphy, or playing rugby for the medical college team. The student experience really drives the tremendous enthusiasm that people who are away from the university for 40 years continue to have.”

Adds Resnick: “There are hundreds, if not thousands, of ways for alumni to engage. Those kinds of interactions make the university stronger in ways you can measure way beyond dollars and cents.”

The other new alumni-elected trustee is Sheryl Hilliard Tucker A&S ’78. Tucker is a media consultant for Time Warner and the former executive editor of Time Inc. (the parent company of Time, Fortune, Money, Sports Illustrated and Essence).

—Bryce T. Hoffman

PhD Student Gets Top Prize for Instant Test of Sore Throats

A doctoral candidate in biological and environmental engineering has won the top CIMIT (Center for Integration of Medicine and Innovative Technology) Primary Healthcare Prize.

Mark R. Hartman ’07, MEN ’08, received the $150,000 top honor for his instant-diagnosis test of sore throats, a project that applies DNA-based fluorescent “nanobarcodes” to provide accurate results on whether the sore throat is caused by strep, flu, or other diseases.

In announcing the awards, Ronald Newbower, chief technology officer and co-founder of CIMIT, said, “We are delighted with the passion this prize competition has elicited amongst engineering students. They are clearly eager to develop innovative technologies to address our national challenges in primary care. The winners of our major awards are headed toward terrific careers and may well serve as role models for others in their field. CIMIT is proud to be able to support their efforts.”

Hartman graduated from Sayre High School, Sayre, Pa., and earned a bachelor’s degree in chemical engineering and a master’s degree in biological and environmental engineering at Cornell.

Another Cornell doctoral candidate, Mark Hartman’s instant test uses DNA-based “nanobarcodes” to determine the cause of a sore throat.

George K. Lewis Jr., MS ’08, in biomedical engineering in the College of Engineering, won the $100,000 second-place award with a low-power ultrasound device—the size of an iPod—to promote pain relief and healing.

The Massachusetts Institute of Technology won third place and a $50,000 prize.

CIMIT, a nonprofit consortium in Boston, held the competition to encourage graduate and undergraduate engineering students to develop creative, technological solutions that could enhance medical delivery.

—Molly Cronin ’11
Grad Student Receives Women in Triticum Award in Russia

A first-year CALS graduate student in plant breeding and genetics, whose work may help provide resistance in wheat to a deadly new variety of wheat rust, was honored at the Borlaug Global Rust Initiative (BGRI) meeting in St. Petersburg, Russia, this past May.

Jessica Rutkoski was one of five women presented with the Women in Triticum award. The BGRI established the awards this year to provide professional development opportunities for women working in wheat research during the early stages of their careers.

At the BGRI meeting, Rutkoski presented preliminary work investigating genomic selection methods to incorporate adult plant resistance to stem rust in adapted germplasm in wheat.

“I work on the use of genomic information in the form of molecular markers to predict the breeding value of individual wheat lines that have been genotyped but not phenotyped,” Rutkoski said.

Rutkoski is conducting research with Mark Sorrells, professor of plant breeding and director of the Cornell Small Grains Breeding Program, on breeding technologies and integrating molecular methodologies into wheat breeding. Sorrells characterizes Rutkoski’s access to molecular marker technology as “potentially revolutionary, similar to the access to computer technology we felt as young scientists starting in the field some 30 years ago.”

—Linda McCandless ’74

Interns Spend 11 Weeks Immersed in Aquatic Ecology

For students in the life sciences looking for both practical lab skills and hand-dirtying fieldwork, the Cornell Biological Field Station provides them with summer internships to work with mentor scientists on a wide range of ecological research projects.

“There really is no substitute for hands-on experience,” says Randy Jackson, associate director at the field station and senior research associate. “We hope that the projects our interns participate in put a face on the theories that they learn in the classroom.”

Based in Bridgeport, N.Y., on Oneida Lake—about 75 miles northeast of Ithaca—the Cornell Biological Field Station’s goal is to study fisheries and aquatic ecology in New York state, particularly in the Oneida Lake region. John Forney, PhD ’57, and Edward Mills, MS ’72, PhD ’75, initiated the internship program in the late 1970s, and since then, undergraduates, graduate students, and faculty have come together each summer to collaborate on research initiatives. Living and working at the field station, students earn three credits for their research on such diverse topics as bird nesting patterns, hydroacoustics, and invasive shrimps.

Students also have the opportunity to attend a summer seminar series at the field station, where they can discuss their research with speakers from all over the world.

“The core research program—aquatic studies—has continued for over 50 years and consists of both applied and basic studies,” says David Green, MS ’62, PhD ’82, a retired professor of natural resources who worked at the field station. “It has involved a wide range of participants from Cornell, other universities and laboratories, and state and federal agencies, especially the fisheries program of the New York State Department of Environmental Conservation.”

This summer, eight undergraduates spent 11 weeks at the field station, each working on research projects.

“My job was to go out on the boat about twice a week to tag and monitor terns (a seabird closely related to gulls) nests, count the number of eggs or chicks in each nest, and tag the tern chicks,” explains Cara Schwartz ’13, as she prepared to present her findings to fellow researchers at the field station and write a report for the New York State Department of Environmental Conservation.

“I have learned many different field techniques and some lab techniques used in fisheries science, says Kathleen Marean ’11, who worked with the Warm Water Fisheries Unit at the field station. “I’ve also learned that this is something I love doing and would be happy to make a long career out of it.”

Jackson adds, “Every summer is different in terms of the projects, but one constant is that students get intimate, hands-on experience with the research process; work closely with faculty, staff, and grad students; and get to spend a summer as an integral part of an active and friendly research community.”

—Molly Cronin ’11
Outstanding Alumni

The College of Agriculture and Life Sciences and the CALS Alumni Association will recognize the following individuals at a banquet at the Statler Hotel on November 5, 2010. Of more than 80,000 CALS alumni, since 1977 only 209 have been recognized with this awards program. The winners represent a wide range of interests and accomplishments, and each has strong roots in the college. All have achieved success in business, professional, or other vocational endeavors; shown leadership on behalf of the College of Agriculture and Life Sciences and Cornell University; and made a significant contribution to the betterment of society through community service.

Brief biographical sketches of the recipients are included here. More information is available at www.calsnews.cornell.edu

Lynn A. Calpeter ’86
Lynn Calpeter is executive vice president and chief financial officer of NBC Universal, a position she has held since May 2004. She is responsible for NBC Universal’s financial planning and operations and plays a key role in the company’s strategic business initiatives.

Prior to this role, Calpeter had served as executive vice president and chief financial officer of NBC. Before that, she was chief financial officer of the NBC Television Stations Division from 1999 to 2001, after which time she served as vice president of the General Electric Corporate Audit staff in Fairfield, Conn.

She is currently chair of the Dyson School Undergraduate Program Advisory Council at Cornell, of which she has been a member since 2003. As chair, Calpeter is focused on her plans to engage members of the council in discussing issues of greatest strategic importance.

Her many years of holding corporate leadership positions clearly exhibit her strong ability to lead and to think strategically about positioning, marketing, budgeting, profit centers, and finance. She also serves as an Executive Board member of GlamourGals Foundation, a non-profit organization founded by Rachel Doyle ’05.

Calpeter is deeply committed to CALS and Cornell. She has been a frequent guest lecturer in courses on accounting, leadership, and women in business, as well as a strong supporter of student financial aid through an endowed scholarship. Her videos on e-Clips are used significantly in Cornell and other courses. Calpeter is widely regarded as a role model for women and young people.

Calpeter resides in New York City.

Edwin D. Fessenden ’54
When Edwin “Ed” Fessenden joined his father in operating the family’s farm in King Ferry, N.Y., he represented the fourth generation to enter the family business. At that time, Fessenden Farms had 20 milking cows and a small number of pigs, sheep, and chickens.

Fessenden leveraged his Cornell education and the success of four generations before him to grow the farm into a progressive, sustainable 120-milker dairy and 700-acre crop farm. The farm remains in the family and has seen steady growth to its present size of 600 milking cows and crops on 1,200 acres.

Fessenden has served with various organizations, including the U.S. Department of Agriculture’s Farm Service Agency, New York State Department of Agriculture and Markets Agriculture Advisory Council, and Cornell Cooperative Extension of Cayuga County. He became a strong proponent of the cooperative marketing movement through his service with the Owasco Valley Milk Producers and AGCO Cooperative. For more than 20 years he was a director of Midstate Mutual Insurance Company and to this day he serves as a director of Cayuga Lake National Bank.

He has shared his expertise in support of education, agriculture, and his community and has hosted scores of Cornell students at Fessenden Farms for field research. He has also served as a member of the CALS Regional Committee, CALS Dean’s Advisory Council, CALS Campaign Committee, and the W.I. Myers Agricultural Finance and Management Program Advisory Council.

Fessenden and his wife, Anne, live in the same home where they raised their seven children, Elizabeth, Martha ’79, Timothy, Mary, Mark, John ’85, and Daniel ’87.
Frederick R. Frank ’79
Frederick Frank is president of Dr. Konstantin Frank Vinifera Wine Cellars, a position he has held since 1993. After graduating from Cornell, Frank worked for Banfi Vintners from 1979 to 1982, before attending the Geisenheim Research Institute for Viticulture and Enology in West Germany in 1982–1983. Upon graduation, he became managing director of Old Brookville Vineyards at Banfi from 1984–1993.

Under Frank’s leadership the production and number of honors received by the family’s winery has increased greatly. Wines from Dr. Frank’s winery are now available in over 30 states, making them among the most visible and recognized in New York state. The winery draws 70,000 visitors each year.

In 2009 alone, Dr. Frank’s received 67 gold medals for its wines at various competitions. Wine Enthusiast nominated the winery for 2009 American Winery of the Year two years after the industry publication named Dr. Frank’s the Finger Lakes’ Most Award-Winning Winery.

Frank has been a two-term member of the CALS Dean’s Advisory Council and is a member of the Liberty Hyde Bailey Leadership Society. He has also served as a district director of the CALS Alumni Association. Since 1999, he has provided staff or his own time for the Reunion Weekend wine-tasting event. In 2008, the winery and the Frank family donated a collection of 132 books, which belonged to Dr. Konstantin Frank, to the New York State Agricultural Experiment Station’s Frank A. Lee Library.

Frank and his wife, Maryclare, reside in Painted Post, N.Y., and have three children attending CALS, Meaghan ’11, Gretchen ’12, and Kyle ’14.

Jules Janick ’51
Jules Janick is widely regarded as one of the world’s most highly respected and best-known horticulturists. At an age when many of his peers have retired, Janick continues to teach undergraduates, edit publications in horticulture and plant breeding, and participate in research on fruit breeding and horticultural history and iconography.

Janick has been director of Purdue University’s Center for New Crops and Plant Products since 1993. He was named James Troop Distinguished Professor in 1988.

He is founder and editor of the journals Horticultural Reviews and Plant Breeding Reviews. Janick’s textbooks Horticultural Science and Plant Science, an Introduction to World Crops have been regarded as national standards for three decades. He has recently co-edited the 954-page Encyclopedia of Fruit and Nuts. In all, Janick has written, co-authored, or edited 147 volumes.

Janick served as president of the American Society for Horticultural Science (ASHS), was a long-time editor of the Journal of the American Society for Horticultural Science and HortScience, and was editor-in-chief of ASHS Press. He has just completed an eight-year term as science editor of Chronica Horticulturae, a publication of the International Society for Horticultural Science. In 2009, Janick was named to the American Society for Horticultural Science Hall of Fame—the society’s highest honor.

Janick has returned to Cornell several times to lecture and to collaborate with students and colleagues at Ithaca and Geneva.

Janick and his wife, Shirley, live in West Lafayette, Ind. They have two children, Peter ’75 and Robin.

Joseph A. Manelski ’56
Joseph Manelski retired in 1997 after a long and successful career as chief executive officer, owner, and founder of American Realty Tax Services, a privately held corporation based in Vienna, Va.

Manelski shares the boundless success of a horticulturist and his large home for charitable causes such as Rotary International and Cornell University. He housed and arranged meals and transportation for Rotary events for delegations from Russia and Belarus. He hosted the Cornell Glee Club in January, 2006 and 2010, and the Cornell Solar Decathlon Teams of 2005, 2007, and 2009. He was among the first Cornell alumni to come forward with financial support to renovate Mann Library.

After graduation, Manelski began his career with the Kroger Company. After one year he pursued a commission in the United States Navy. He achieved the rank of commander before retiring from the Navy Reserve in 1984.

After a seven-year career in management for the New York Life Insurance Company, Manelski launched American Realty Tax Services in 1974. During the next decade, the company branched into 11 regional offices from coast to coast and became the third-largest company of its kind in the United States. Manelski sold the company and retired in 1997.

Manelski is a life member of the Cornell Club of Washington, D.C., and within the past year, with other alumni support, began a Northern Virginia Chapter of the D.C. club, which meets quarterly at his home.

Manelski lives in McLean, Va., and has one son and a grandson, who reside in Seattle, Wash.
Scott Belsky ‘02

Scott Belsky is the founder and chief executive officer of Behance LLC, a company that develops products and services for creative industries. Behance oversees the Behance Network, the world’s leading online platform for creative professionals; The 99%, Behance’s think tank and annual conference devoted to execution in the creative world; and Action Method, a popular online/mobile productivity application and line of organizational paper products.

Belsky is also the author of the national bestselling book Making Ideas Happen. He graduated cum laude from CALS and earned an MBA from Harvard Business School.

Belsky has been a guest lecturer at Cornell, Harvard, Virginia Commonwealth University’s Brand Center, Rhode Island School of Design, and the University of California–Berkeley, among other institutions.

He is an advocate for technology and community initiatives that empower creative professionals and the growth of small businesses. He has consulted for leading media and Fortune 500 companies.

Belsky has appeared in the Wall Street Journal and Business Week and shared Behance’s research with the U.S. Department of State.

He is a member of Quill and Dagger, the Cornell Honor Society. He also serves on the advisory council of the Entrepreneurship@Cornell Program.

Belsky is chairman of Reboot, a New York City–based nonprofit, and a director of the Rita J. and Stanley H. Kaplan Foundation.

He lives in New York City, with his wife, Erica Rodbell Roizen (A&S) ‘04.

David M. Galton

David Galton has been a member of the CALS faculty since 1981, when there were just 25 undergraduates enrolled in the dairy management program. Today, the program has more than 140 students and is one of the premier undergraduate teaching programs in dairy science and management.

Galton is the lead instructor of four courses in dairy management and the leader of the Dairy Fellows Program, which offers hands-on experience to juniors and seniors seeking careers in the dairy industry. The Dairy Fellows Program is credited with helping to increase the enrollment of dairy-oriented students majoring in animal science.

Galton is the faculty advisor to the Zeta chapter of the Alpha Gamma Rho fraternity, and coached the Cornell Dairy Cattle Judging Team to eight national titles.

He is regarded as the visionary and driving force behind the enhancement of the PRO-DAIRY program that has served the New York dairy industry for the past two decades. Galton served as director for the past 13 years.

Galton was also instrumental in envisioning the Northeast Dairy Producers Association and its role in addressing issues of the New York dairy industry since the early 1990s.

Galton has garnered several honors, including the New York Farmer Club Award, CALS Outstanding Professor for Teaching, SUNY Chancellor’s Award for Excellence in Teaching, and the Ohio State University College of Agriculture Distinguished Alumni Award. He was named a Stephen H. Weiss Presidential Fellow by Cornell in 1995.

Galton and his wife, Sally, reside in Genoa, N.Y., and have two children, Amy ‘08 and Bradley ‘01.

Peter J. Trowbridge

Peter Trowbridge is currently the chair and a professor of the Department of Landscape Architecture. He has been engaged in planning, design, and implementation of works of landscape architecture for over 35 years. His innovative professional methods and techniques include the most contemporary and best “green” environmental practices and technologies. He brings these into the classroom, influencing the next generation of teachers and practitioners.

Trowbridge has also been a partner in the firm Trowbridge and Wolf, LLP, Landscape Architects. His professional work, focusing upon institutions of higher education, has received numerous awards from the American Society of Landscape Architects (ASLA) and other state and national societies. He was named a Fellow of the ASLA in 1996.

Trowbridge is the recipient of the SUNY Chancellors Award for Excellence in Teaching, the 2010 Martin Dominguez Award for Distinguished Teaching, recognition by a Merrill Scholar as the most influential teacher, and the Professor of Merit Award for Outstanding Teaching and Advising from the Class of 2010 of the College of Agriculture and Life Sciences at Cornell.

In 2004, he published a textbook, Plant Establishment and the Urban Environment with Professor Nina Bussak ’74, who is also his wife. He co-teaches with Bussak a year-long class entitled Creating the Urban Eden as well as design studios and technology courses in the Department of Landscape Architecture.

Trowbridge and Bussak have two daughters and reside in Ithaca.
Developing Leaders, Improving Lives, and Shaping the Future

It’s my honor and privilege to lead the College of Agriculture and Life Sciences (CALS) Alumni Association as president for 2010–2011. During Reunion Weekend we saw the “passing of the hat” from Dean Susan Henry to Dean Kathryn Boor at the CALS Alumni Association annual breakfast. We are grateful that both of the deans see the value of our alumni association in developing leaders, improving lives, and shaping the future. CALS would not be the leader in so many fields without our alumni, faculty, and friends.

This year, with support from the dean, the CALS Alumni Association continues to transition from a dues-paying membership toward engaging all of our alumni—whether it be through recognizing their accomplishments, providing networking opportunities, or encouraging them to support the college and/or host student interns.

One of the many responsibilities of my current job in the Ballston Spa Central School District is connecting K–12 schools with higher education and industry, especially in regard to workforce development. The Center for Economic Growth and Development in Albany has identified the following five industry sectors as important to upstate New York: advanced materials, bio/life sciences, clean tech/energy, homeland security/defense, and information technology and nanotechnology/semiconductors. Similar sectors have been identified as priorities in other areas of the country.

CALS is a leader in many of these identified areas. I also can’t help but note that CALS alumni are instrumental in addressing the current economic and environmental issues in this country.

I would like to request your assistance in identifying alumni who are industry leaders in these fields without our alumni, faculty, and friends.

To help develop future industry leaders, our alumni association is committed to supporting our current students. We are working to make the Alumni Career Link easier to use and more meaningful to both alumni and current students. We are also looking to increase opportunities for industry field trips and internships with alumni. Please let us know if you can assist with this endeavor.

In 2009, for the first time, the CALS Annual Fund exceeded one million dollars in total giving. That would not have been possible without your generous support. Thank you! Please consider continuing that support by designating a portion of your Annual Fund gift specifically to CALS.

This an exciting time for the college and our alumni association, which both play a key role in developing leaders, improving lives, and shaping the future.

Diane M. Irwin ’94
2010–2011 CALS Alumni Association President

1930s
Rosemary Hunt Todd ’31 of Hollis, N.H., celebrated her 101st birthday on July 19. During the celebration, Todd admitted there was no secret pill or expert advice that helped her achieve this milestone. Even at her advanced age, Todd says she does not like to sit around. She lives with her daughter, Rosemary, and answers the phone before her daughter, reads the paper daily, travels, and works on challenging crossword puzzles younger folks won’t even attempt. Her daughter says that her mother loves to visit with her 12 grandchildren and 21 great-grandchildren.

1960s
Gary K. Van Slyke ’62 of Portageville, N.Y., along with his brother Greg and the rest of the Van Slyke family were presented with the Agricultural Environmental Management Award on August 11 at Empire Farm Days. The award is sponsored by the N.Y. Department of Agriculture and Markets, the Empire State Potato Growers, and American Agriculturist magazine. In recognizing the Van Slyke’s Dairy Farm, Agriculture Commissioner Pat Hooker said the family “is a superb role model of personal environmental stewardship and resourceful innovation.”

Robert L. Thompson ’67 of Washington, D.C., (formally of Urbana, Ill.) retired this year from the University of Illinois, where he held the Gardner Endowed Chair in Agricultural Policy for the last six years and was honored this year with the Illinois College of Agricultural, Consumer, and Environmental Sciences Faculty Award for Global Impact. He also was awarded the Bruce Gardner Award by the USDA Economists Group. Thompson intends to stay active on the speaking circuit and engaged in the future agricultural policy debate. He and his wife, Karen, will split their time in “retirement” between their condos in Washington, D.C., and Bethany Beach, Del.

Willard N. Harman, PhD ’68 of Cooperstown, N.Y., was honored by the Otsego County Conservation Association (OCCA) at a dinner this July at the Otsegoa Resort Hotel. Harman is the longtime director of SUNY Oneonta’s Biological Field Station on Otsego Lake. Proceeds from the dinner helped establish the Willard N. Harman OCCA Biological Field Station Internship Endowment Fund. Harman said he has no plans to retire.

1970s
David M. Pittenger ’71 of Cockeyesville, Md., announced in May that he will step down after 15 years as executive director of the National Aquarium in Baltimore and more than 25 years working at the aquarium altogether. During his tenure, Pittenger introduced visitors to the wonders of Australia’s Outback and is helping to lead the push for a swimable and fishable Otsego Lake. A native of Pennsylvania, Pittenger said he will stay on the job during the national search for his replacement, which is expected to take eight months to one year.

Kenneth D. Sayre, PhD ’71 of Mexico City, Mexico, was recently recognized with the first Louis Malassis International Scientific Prize for Agriculture and Food by CIMMYT. Sayre was recognized for his work to promote resource-conserving practices with farmers in developing countries. CIMMYT is an internationally funded, not-for-profit organization that conducts research and training related to maize and wheat throughout the developing world. (The abbreviation “CIMMYT” derives from the Spanish version of the organization’s name: Centro Internacional de Mejoramiento de Maíz y Trigo.) Sayre officially retired from CIMMYT in February 2010, but continues to act as a consultant.

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er in sustainable agriculture. The Senate's Women of Distinction program began in March to coincide with Women's History Month in New York State and allows senators statewide to select one honoree from their respective legislative districts.

Lloyd R. Traven, MS ’82, of Kintnersville, Pa., appeared on The Martha Stewart television show in March speaking about his passion: beekeeping. Traven and his wife, Candy, run a greenhouse operation called Peace Tree Farm. Their son, Alex, is a current CALS student.

James J. Joseph ’85 of Newtown, Pa., published a new marketing book in May entitled, The Experience Effect. More information can be found at his website: www.jimjosephxpm.com. He signed books this past June during Reunion Weekend at the Cornell Store.


Steven J. Danzer ’87 of Stamford, Conn., is the owner of an independent environmental consulting firm located in Connecticut. He holds a PhD in renewable natural resource studies from the University of Arizona. He lives with his wife, Zimra, and his son, Gideon, and a pit bull named Bunny.

Beth Newlands Campbell ’87 of Cape Elizabeth, Maine, was recently named president of Hannaford Supermarkets. The promotion was part of organizational changes announced in January by Delhaize Group. Newlands Campbell, formerly an executive vice president at Hannaford, led the creation and implementation of Hannaford strategy. She joined Hannaford Supermarkets nearly 20 years ago as part of its industry-leading Retail Management Training program. She learned food retailing and the art and science of leading people at more than 15 Hannaford Supermarkets early in her career.

Marquet M. "Meg" Ham ’88 of Concord, N.H., was named president of Bottom Dollar Supermarkets. The promotion was part of organizational changes announced in January by Delhaize Group. Ham will oversee all aspects of Bottom Dollar Food’s operations, including its financial performance, merchandising, pricing, customer service, and marketing. She also serves as a member of Delhaize America’s executive committee.

2000s
Shepherd P. Myers ’02 of Honolulu, H.I., was recently featured in the May issue of Honolulu Magazine for his management of the Bishop Museum's insect collection. Myers provides tours of the collection for diplomats, researchers, and other members of the Hawaiian community. The Bishop Museum’s Grellis Center houses some 14 million prepared specimens of insects and related arthropods, including more than 16,500 primary types, making it the third largest entomology collection in the United States and the eighth largest in the world.

Travis C. Spier ’02 of Syracuse, N.Y., recently became engaged to Anna M. Stewart, also of Syracuse. A summer 2011 wedding is planned. Travis holds a Master of Professional Studies from SUNY College of Environmental Science and Forestry and a Master of Science from Syracuse University. He is a science teacher in the Solvay School District.

Bethany S. Souers ’02 of Rhinebeck, N.Y., is licensed to practice veterinary medicine in Vermont. Souers is practicing at Lamolile Valley Veterinary Services in Hyde Park, VT.

2010s
Jeremy W. Singer ’90, MS ’96, PhD ’98 of Ames, Iowa, has been working as a research agronomist for the Agricultural Research Service (ARS) at the National Laboratory for Agriculture and the Environment since 2002. His work focuses mainly on radiation and water interactions in complex farming systems.

Robert A. Budington ’91 of Winnetka, Ill., recently joined Avison Young as senior director of Chicago's office tenant representation group. Most recently he was a vice president with Colliers Bennett & Kahnweiler, Inc. Avison Young is Canada's largest independently owned commercial real estate services company. The firm opened its first U.S. office in Chicago in 2009, followed by offices in Washington, D.C., Atlanta, and Houston, during the past half year.

Erik B. Olsen, MS ’91 of Healdsburg, Calif., was promoted to sales leader with Constellation Wines. Olsen joined Constellation in 2007 during the acquisition of Beam Wine Estates, where he served as vice president of winemaking for Clos du Bois for seven years. Previously, he spent 10 years at Chateau Ste. Michelle in Washington State, where he was a winemaker, and was also an enologist in the Simi Valley. He will continue to be based at the Clos du Bois winery in Sonoma.

Heidi E. Kretser ’95, PhD ’08 of Saranac Lake, N.Y., is a conservationist with the Wildlife Conservation Society’s (WCS) wildlife trade education program, which is funded in part by the Department of Defense. WCS is enlisting the U.S. military in the fight against illegal wildlife trade. Kretser will teach soldiers to avoid unwittingly purchasing clothes, blankets, and other items made from illicitly killed threatened and endangered species.

Andrew C. Arenowitz ’96 of Los Angeles, Calif., started a new Internet business called Idea Marketplace. He writes: “We are harnessing the creative capital of the world by allowing anyone who has a commercially viable idea to sell it to the company or organization that could best use that great idea. So the next time you think of a great idea, come sell it in the marketplace! He can be reached via email at: drew@ideamarketplace.com.
Jennifer Ann Kaido ’03 of West Leyden, N.Y., is learning a new rowing discipline with an eye on qualifying for her second Olympic team. Kaido has been training in a two-person boat for much of the spring to improve her technique. She took several months off returning home from the Beijing Olympics but is committed to her long-term goal of getting back (to the Olympics) and hopefully winning a gold medal.

Suzanne Finizio Rake ’05 of Syracuse, N.Y., married Tim Rake in June 2007. After graduating from Cornell in 2005, she went on to receive a M.S. degree in Occupational Therapy from Utica College in 2008. The recently welcomed their son, Joseph James Rake, who was born on July 19, 2010.

Joanna M. Souers ’05 of Rhinebeck, N.Y., has taken a leave of absence in her third year of medical school at Escuela LatinoAmericana de Medicina in Havana, Cuba, to work in Haiti with Cuban and Haitian physicians at a medical encampment near Port-au-Prince. Souers provides medical assistance for a team of 20 physicians seeing more than 500 patients a day. She reports that language barriers are the greatest challenge to effectively care for the Haitians who speak predominately Creole. Souers has been taking Creole language lessons provided by Cuba to their physicians and staff.

Stacey Marie Gilles ’06 of Stanford, Calif., recently became engaged to Luke Charles Sheahan of Lebanon, Oregon. A November 2010 wedding is planned. Dr. Gilles is a graduate of the University of Pennsylvania School of Veterinary Medicine. She is a practicing veterinarian and resides currently in Honey Brook, Pa.

Markell J. Ripps ’07 of Adams, Mass., was awarded degrees of Juris Doctor and Master of Environmental Law And Policy, magna cum laude, from the Vermont Law School in May. Ripps plans to work for the Daniel F. Grossman Law Office in Norwich, Vt., which specializes in real estate, land use, and estate planning. While at Vermont Law School, she was co-chair of the Arborist Society and created an arboretum on campus.

Kirsten A. Schimoler ’09 of Burlington, Vt., is working as a food scientist, doing product development and innovation for Ben and Jerry’s Ice Cream/Unilever.

Tristan J. Zuber ’08 of Baltimore, Md., recently accepted a position as a technical account manager at TIC Gums, Inc., in White Marsh, Md. She was previously a coordinator for regulatory affairs at the U.S. Dairy Export Council in Arlington, Va.

Shannon E. Cullen ’09 of Manville, R.I., has joined Teach for America, a national corps of college graduates who commit to teach for two years in urban and rural public schools in low-income communities. Cullen is currently teaching in Miami, Fla.

Breanna Leigh Fulper ’10 of Lambertville, N.J., with her sister, Mikayla, run Fulper Dairy Day Camp, which is a week-long day camp at their 100-year-old family farm, Fulper Farms. They hosted 24 children who are taught where dairy products come from, what it takes to operate a dairy farm, and how to care for a calf. New Jersey Secretary of Agriculture Douglas H. Fisher visited the day camp in July and remarked that “this unique on-farm experience informs young people, who may have little knowledge of agriculture, and allows them to experience what it is really like to be a farmer. This camp is just one way to help people understand how vital it is to have a thriving agriculture in our state.”

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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, holidays, 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), $85
- Single (60 x 90 inches, 3 stripes), $119
- Double (72 x 90 inches, 3 stripes), $129
- Queen (76 x 104 inches, 3 stripes), $155

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Additional information about the blankets is available at: www.sheep.cornell.edu (click on the link at the top of the page for “Blankets”)

Purchase at:
Cornell Orhards or from the 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 (cspblankets@cornell.edu)
In June 2010, the Dyson family and Charles H. Dyson’s former business partner John Moran announced a gift of $25 million to create the Charles H. Dyson School of Applied Economics and Management in the College of Agriculture and Life Sciences. The gift honors the patriarch of the Dyson family, Charles H. Dyson, a financier and philanthropist who died in 1997.

Dyson’s values of hard work and innovative but steadfast financial acumen and business management will be associated with the school, which has been steadily rising in undergraduate business program rankings since it was accredited back in 1992.

Born in New York City in 1909 to immigrant parents, Dyson attended night school at what is now Pace University. “It was not popular at the time to go to school at night,” said Dyson, in an interview in 1987, “but it was during the Depression.” Dyson worked days to help support his family and studied accounting and business law at night.

After college, Dyson went to work for Price Waterhouse, but, in 1939, was recruited by the U.S. Army Air Corps to help organize Lease-Lend—the program that distributed war materials to the allied nations. Following that, he worked for the U.S. Treasury and was one of the architects of the International Monetary Fund. For his wartime service, Dyson received a Distinguished Service Medal and was made a Commander of the Most Excellent Order of the British Empire.

“We were just a bunch of kids,” Dyson said. “We had no idea it would last as long as it did.”

His wartime experiences gave Dyson a taste for management and a critical network of contacts. In 1954, with only $8,000 of his own money, he was able to buy a company, borrowing $4.6 million based on the assets of the company, in what we know now as one of the first leveraged buyouts. Dyson went on to secure several companies using the same business concept, thereby launching the Dyson-Kissner-Moran Corporation, after taking on as business partners, his longtime friend Frank Kissner in 1957, followed 10 years later by John Moran.

The Dyson-Kissner-Moran Corporation became one of the largest private corporations in the U.S. and a pioneer in leveraged buyouts.

Even before he became successful, Dyson and his wife, Margaret, started to “give back.” Establishing the Dyson Foundation in the early ’50s, the Dysons’ philanthropy extended from Pace University, to Greer Children’s Services, the American Ballet Theater, and the Metropolitan Opera, to name a few.

Dyson did not only lend his name and his pocketbook to the boards on which he served, he lent his considerable organizational leadership. Among other things, he is credited for helping to guide Pace from a technical institute into a college and then a university.

In 1973, Dyson, a lifelong Republican, made No. 5 on Richard Nixon’s infamous “enemies list.”

“Tell them, it is an endorsement for good standards,” quipped Dyson, when his son John asked what he should tell the press.

Dyson’s relentless hard work, steadiness, and no-nonsense demeanor were legendary, and are remembered fondly by his friends and family.

“Get a haircut, shine your shoes, be the first one in, and the last one out,” recalls his son Peter of his dad’s advice.

The Charles H. Dyson School of Applied Economics and Management’s internationally renowned areas of expertise in food and agricultural economics, management science, environmental and resource economics, and international and development economics work in concert to fulfill the school’s mission to inform and foster the public stewardship and private management of businesses, organizations, livelihoods, and natural resources.

—Emily Hopkins

WEB EXCLUSIVE
Patriot, pioneer, philanthropist. Explore the legacy of Charles H. Dyson.
calsnews.cornell.edu
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, furniture, and more.

The CALS Development Office is available to discuss various giving options, including gifts of securities, planned giving opportunities, and to answer your questions about gifts for endowment. For more information or to make a gift in support of one or more of these priority needs, please contact Mike Riley ’87, 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 Needs You**
The College of Agriculture and Life Sciences relies greatly upon the generosity of alumni and friends. Gifts of all sizes are important to provide significant program and budget support. Dean Kathryn J. Boor is directing Annual Fund donations to support the college’s highest academic priorities, including unmet undergraduate scholarship need, start-up costs for newly hired faculty, and internships for undergraduates. Your gift at this critical time will provide essential support for our college’s students, faculty, and academic programs.

**Job Camp**
Prepare Communication majors for the job market with a boot camp for selected incoming seniors. Alumni and faculty join forces to create a comprehensive weekend of interactive activities, workshops, and inspirational and informative talks on how to prepare for a job search.
$20,000 (Communication)

**Internships: The Next Step**
Funding for undergraduate experiential learning helps students explore their interests in a career field and allows them to develop skills that can provide a competitive edge in a full-time job search.
$4,000 minimum per student

**Keep Our Campus Beautiful**
Fund the purchase of plants used by horticulture students to beautify campus and allow them to gain valuable hands-on experience.
$2,000 (Horticulture)

**Recruiting the Best and the Brightest**
Fund a travel display for CALS Admissions to be used by alumni and staff when they attend recruitment events.
$3,000 (CALS Admissions)

**Collaborative Work in Progress**
Create a customizable common space for Communication students to work collaboratively on academic projects and assignments.
$10,000 (Communication)

**Student Flower Power**
Support two undergraduates during the summer to maintain the gardens that were installed by horticulture and landscape architecture classes.
$2,500 per student (Horticulture)

**Forestry and Wildlife Internships**
Support an Amot Forest summer 2011 internship. Give an undergraduate the opportunity to conduct research at Cornell’s acclaimed Amot Forest.
$3,600 per student (Natural Resources)

**Tools of the Trade**
Provide computers for our graduate student commons areas. Give our graduate students access to current technology.
$1,500 per computer (Communication)

**Food for Thought**
The New York Youth Institute is a forum for high school students to develop their interests in global food security, sustainable agriculture, and environmental policies and practices. Support a one-day program at Cornell for New York high school students and teachers, and transportation to the affiliated World Food Prize’s Global Youth Institute in Iowa for select students and teachers.
Annual need is $9,000 (New York Youth Institute)

**Reduce Cornell’s Carbon Footprint**
Support the planting of an acre of shrub willow to be harvested every three years to provide carbon-neutral biomass fuel.
$1,000 per acre (Horticulture)

**Honors Research Students**
Support Communication honors students and their research by providing each student with a laptop. This is a great opportunity to support our best and brightest students.
$1,000 per computer (Communication)

**Help Our Students Help Others**
Provide support to summer interns who are working with communities to promote entrepreneurship and improved land use, housing, and goal setting.
$6,000 (Community and Regional Development Institute)

**Advance the Use of Biomass Fuel**
Sponsor the purchase of a drying oven to dry willow biomass from yield trials before weighing and chemical analysis.
$19,000 (Horticulture)

**Support Student Growth and Development**
Promote educational and professional engagement. Send an undergraduate student to a relevant, professional workshop or conference.
$750 per student (Communication)
WEB EXCLUSIVES

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A Q&A with Dean Kathryn J. Boor
Go in depth with CALS’ new dean. Find out more about her research, her role as student mentor, her aspirations for the college, and her favorite Cornell Dairy ice cream flavor.

Images from the Gulf
The Lab of Ornithology documents birdlife after BP in photographs taken soon after oil from the Deep Water Horizon well began spilling into the Gulf of Mexico.

The Legacy of Charles H. Dyson
Patriot, pioneer, philanthropist. Learn more about the man for whom the new Charles H. Dyson School of Applied Economics and Management is named.

Infra(Red): CU From a New View
Human eyes are only sensitive to a small portion of the electromagnetic spectrum. CALS photographer Kent Loeffler explores the campus on a different wavelength.

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