

College of Agriculture and Life Sciences

NEWS

Fall 2008



Market Advantages of High-Tunnel Agriculture

Also inside

Ovarian Cancer Research

Plant Defense and Biodiversity

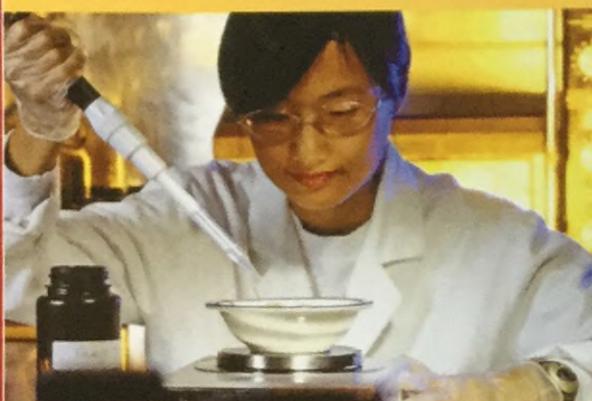
Green Public Policies

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Fall 2008

Marvin Pritts examines a crop of high-tunnel blackberries.

Features

6 Why the "Persistent Ovulator" Crossed Tower Road

Patricia Johnson uses the chicken as a model to study how ovarian cancer starts. Her goal is to help develop more optimal treatments and prevention for this lethal cancer in humans.



10 Arms Race between Plants and Insects Escalates through Evolution

The reciprocal interaction between species is important for their ecology—and seems to influence biodiversity in a good way, says Anurag Agrawal, an evolutionary biologist interested in environmental sustainability.

14 Farmers Find Market Advantages in High Tunnels

High-tunnel technology is transforming agriculture. Growers are finding success with many fruits and vegetables—and reaping the commercial rewards of marketing their products locally.

19 Power Politics



Antonio Bento brings science into the making of public policy in the fields of energy and climate change. His Program in Environmental Economics and Energy Policy helps decisionmakers find policy solutions.

On the Cover:

Horticulture Professor Hans C. Wien, MS '67, PhD '71, checks sunflowers outside the high tunnels at the East Ithaca Farm.

Departments

2 Message from the Dean

3 Short Reports

TranquiliTea Earns Honorable Mention

Whales Heard near New York City

DuPont Funds Plant Breeding Fellowships

General Mills Funds Food Science Scholars

"Library in a Box" Gets Updated

Quagga Mussels Threaten U.S. Infrastructure

23 People

Entomologists Work against Dengue Fever

Landmark Gate for Minns Garden

Nonprofit Brings Together Teens and Seniors

Alumnus Writes about A Capella Culture

Recent Alumna Creates Turf Art

CALS Alumni Career Link

26 Alumni Notes

28 Outstanding Alumni Awards

32 End Note: Weill Hall

Message from the Dean

Toward a More Sustainable Future

It has been nearly two years since President Skorton signed the *American College & University Presidents Climate Commitment*, which pledged Cornell to reduce emissions of greenhouse gas associated with global warming and move toward carbon neutrality.

There are several noteworthy examples of the innovative initiatives across the campus that contribute to reduced greenhouse gas emissions and overall sustainability. One is the Lake Source Cooling Project, which saves more than 25 million KwH each year compared to conventional systems. Another is the university's recycling efforts, which keep more than 2,000 tons of waste out of landfills every year. And the award-winning Transportation Demand Management Program has been so successful in encouraging employee carpools, public transportation, and other incentives that it has cut campus parking permits by 25 percent and reduced Cornell employee commute miles by 10 million annually.

For our part, the College of Agriculture and Life Sciences is providing leadership on sustainability through scholarly research, student and staff development, and resource utilization.

"Power Politics," one of the articles in this issue, highlights some of the important economic research being conducted by Antonio Bento, one of our newer faculty members, whose work on renewable energy informs public policy.

Bento is part of a CALS team that was recently awarded funding for an innovative energy project from the Cornell Center for a Sustainable Future (CCSF). One testament to the diversity and depth of our college is the fact that CALS faculty are involved with a significant proportion—three-fourths—of the first round of grants awarded by CCSF through its Academic Venture Fund. A total of twelve proposals was selected for \$800,000 of funding. Many proposals involve cross-campus collaborations; some among individuals who had never before worked together.

Promoting interdisciplinary research and education programs that address the major environmental challenges of the 21st century such as global warming, development of sustainable energy systems, and conservation of land, water and biological resources is one of the college's long-term strategic goals.

CALS is also leading the way to sustainability from an operations standpoint. We are renovating our greenhouse complex—one of the largest in the state—to improve energy efficiency, and consolidating other research facilities with sustainability in mind. CALS also supports a campus-wide compost facility, which annually converts about 8,000 tons of waste from 57 different campus sources—from the dining halls to the vet college—into high-quality compost that is used throughout the campus to enrich soil.

The college is also working on a proposal to provide a portion of the university's heat and power needs with renewable energy technologies sourced by college and campus biomass inputs. The initiative would substantially contribute to Cornell's carbon neutrality goals and be a model for other universities and educational campuses, municipalities, and businesses.

Across the college, we are reviewing our communications strategies and, with an eye to sustainability, converting as many print publications as possible to electronic distribution. Many of our print subscribers have asked us to e-mail an electronic version of this magazine. Our goal is to produce a more dynamic, interactive version starting with the next issue of *CALS News*, in spring 2009. We hope to convert many of our subscribers from a print to an e-mail edition. The more successful we are with this initiative, the fewer number of copies we will print and mail.

You can facilitate this process by letting us know how you want to receive your copy of the magazine. Go to www.cals.cornell.edu/subscribe and choose your preferred format. If we don't hear from you via e-mail, you will continue receiving the print edition.

Wiser stewardship of the world's limited resources is the responsibility of us all. There are many ways we can partner in a more sustainable future as we take advantage of opportunities that require us to act as global citizens.

—Susan A. Henry, PhD,

The Ronald P. Lynch Dean of Agriculture and Life Sciences

More on the college's strategic goals at:

www.cornell.edu/president/strategic-plan.cfm#cals.

College of Agriculture and Life Sciences

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Short Reports

TranquiliTea Earns Honorable Mention



Food Science students Dongjun Zhao, Lisa Tirino, and Yankai Liu, display a bottle of TranquiliTea.

A team of food science students from CALS garnered honorable mention for the "cosmeceutical" TranquiliTea at the 2008 Institute of Food Technologists (IFT) annual meeting in New Orleans.

"The team did very well, and we're all very proud of them," says Kathryn Boor '80, professor and chair of food science at Cornell. "They

were beat out, respectively, by Ready-to-Dough, an allergen-free cookie dough; Dream Pies, pumpkin pie on a stick; and Ediballs, which are balls of peanut butter, jelly, and pita bread."

TranquiliTea—with its slogan, "Beautify from the Inside Out"—was developed by 15 students on Cornell's Food Science Product Development Team. The cucumber-honeydew-flavored tea has 75

calories per 375 milliliters (about 12.7 ounces) and "offers all of the exceptional health and beauty benefits of tea, honey, aloe vera, and vitamin E," according to the team's proposal, which touted the tea's high levels of antioxidants to promote healthy skin and well-being.

One of the product's unique aspects, says Lisa Tirino '08, a Cornell food science major and team co-leader, is its use of aloe vera as a functional ingredient, which is new to beverages sold in the United States. Other ingredients include

organic green and white tea, vitamin E, organic sugar and honey, and natural flavorings.

Cornell students started developing the tea in September 2007 and tested various formulations on about 70 tasters in focus groups of faculty, staff, and students.

Cornell had an unusually high visibility at this year's IFT meeting, food science's premier professional society:

- For the first time, Cornell's College Bowl Team competed in the national competition.
- Of six finalists in the Phi Tau Sigma Undergraduate Research Paper Competition, two were Cornell students—Kim Stangl '08 and Vidya Endraiyan '08.
- Dennis Miller, PhD '78, professor of food science and nutrition, received the Babcock-Hart Award for his work to assess iron bioavailability in a range of foods and his work to "bio-fortify" staple food crops.
- Bob Gravani, MS '69, PhD '75, professor of food science, received the Carl R. Fellers Award for bringing honor to the profession "through a distinguished career displaying exemplary leadership, service, and communication skills."
- Kathryn Boor '80, professor of food science, was elected an IFT fellow.

Susan Lang

Whales Heard near New York City

For the first time in waters surrounding New York City, the beckoning calls of endangered fin, humpback, and North Atlantic right whales have been recorded, according to experts from Cornell's Bioacoustics Research Program and the New York State Department of Environmental Conservation.

"This is an exciting time for New Yorkers. Just miles from the Statue of Liberty, the Empire State Building, and Carnegie Hall, the great whales are singing," says Chris Clark, director of the Bioacoustics Research Program at Cornell's Laboratory of Ornithology. "These are some of the largest and rarest animals on this planet trying to make a living just a few miles from New York's shores. It shows us that there are many important and wonderful discoveries to be made about the living world right here, right in our backyards."

The recorders were placed about 13 miles from the New York Harbor entrance and off

the shores of Fire Island. Information about the seasonal presence of whales will help New York State policymakers develop management plans to protect the whales. Knowing the whales' travel paths will help managers of ship traffic to avoid whale collisions in New York waters. The study also will characterize the New York water's acoustic environment and examine whether underwater noises, including shipping, affect the whales.

The Bioacoustics Research Program develops digital-recording equipment, computer software, and algorithms that are used by scientists around the world to study animal communication and monitor the health of wildlife populations. Last spring, the team launched a real-time



Steve Cluett/courtesy Cornell Lab of Ornithology

Researchers from the Lab of Ornithology synchronize the marine autonomous recording units on the *RV Seawolf*, where they were monitoring whales.

listening network—www.listenforwhales.org—to reduce the collisions between whales and ships in Massachusetts Bay.

DuPont Funds Plant Breeding Fellowships

Cornell's Department of Plant Breeding and Genetics was recently awarded funding for two PhD fellowships by DuPont. In total five fellowships were awarded by the company—through its Pioneer Hi-Bred seed business—for graduate students studying plant breeding at five universities, including Cornell. Each university received a \$60,000 Pioneer Hi-Bred University Plant Breeding Fellowship, renewable annually for five years, to support two graduate student fellowships.

"We appreciate the recognition of our department's contribution to the science, teaching, and training of plant breeders," says director of graduate studies Elizabeth Earle.

"The funds allow us to admit outstanding students interested in plant breeding whom we would otherwise be unable to support," says Earle. "An important mission of our department is the training of a new generation of plant breeders, of which there is an increasing shortage," she adds. She also notes that it is difficult

to fund entering students interested in doing rotations with several faculty members before selecting a specialization and a main advisor.

"Our commitment goes beyond financial support," says William S. Niebur, vice president, DuPont Crop Genetics Research and Development. "Each fellowship recipient will be paired with a mentor from Pioneer, and we will provide in-kind support for research projects. Also, each student will be invited to present his or her dissertation research at Pioneer and spend time at one of our research centers."

Two PhD candidates will be supported by Pioneer fellowships at Cornell in 2008–2009. The first is Josh Cobb, who will do rotations in several labs working on breeding and genetics of cereal crops. The other is John Hart, who is working on viral diseases of snap beans with Phil Griffiths, associate professor, Department of Horticultural Sciences, Geneva, and a member of the Graduate Field of Plant Breeding.

Marissa Fessenden



John Hart

Joe Ogronick, Cornell University

General Mills Funds Food Science Summer Scholars

General Mills has contributed \$30,000 to the Food Science Summer Scholars Program. This gift funds two summer scholars for three years.

"The General Mills contribution is critical," says Martin Wiedmann, PhD '97, associate professor of food science. "It is a multiyear contribution that allows us to plan for the future. This contribution ensures future scholars."

The Summer Scholars program inspires

research and cultivates interest in Food Science, with a focus on traditionally under-represented minorities as well as students not currently in a Food Science program. Students from across the country and the world come to Cornell for a 10-week study program. They are assigned a faculty mentor and work in laboratories to conduct food science research. The Cornell program also brings summer scholars together to discuss ideas during field trips and group

activities on topics such as science ethics, graduate programs and careers in food science, and the scientific method.

The Summer Scholars program is unique. "The students learn not only about their particular field of food science," says Wiedmann, "but through the group activities and field trips they learn from their peers about all aspects of the discipline."

Wiedmann first visited Cornell as an observer of the summer Leadership Program for Veterinary Students. Then a veterinary student himself, studying in Germany, Wiedmann was inspired by the focus on group learning and wanted to ensure more students would be able to enjoy similar experiences. With Professor Kathryn Boor '80, he initiated the Food Science Summer Scholars program in 2000.

Since its inception, the program has been funded through a variety of sources, including two grants from U.S. Department of Agriculture for a total of \$200,000 and multiple PepsiCo Foundation gifts totaling nearly \$260,000. In addition to the General Mills contribution, industry contributions have included funding from the Heinz Foundation—which has provided \$40,000 for two summer scholars annually for five years—Kraft Foods, Gorton's, Hershey's, Gallo, the International Food Network, and TIC Gums, as well as support from CALS and Cornell faculty members.

Marissa Fessenden



Food Science Summer Scholars Scott McClure and Terolyn Nesmith work on a research project in the laboratory.

Mann Library Upgrades "Library in a Box" for World's Poorest Countries

In about 50 of the world's poorest countries—from Afghanistan to Zimbabwe—Cornell's "library in a box" gives nutritionists, veterinarians, soil and animal scientists, and natural resource managers, among others, access to 137 top agricultural journals—with no compact discs to find, no Internet, and no waiting.

Cornell's Mann Library has just issued an upgraded version of the digital database of journal articles that includes the last 15 years or so of most journals and such features as advanced searches, browsing, saving, and indexing.

The database, which works on libraries' or universities' local area networks (LANS) and is called The Essential Electronic Agricultural Library (LanTEEAL 2.0), is stored on an external hard drive, about the size of a video cassette.

"Since its launch nine years ago, TEEAL has improved access to current scientific knowledge in several dozen of the world's poorest countries," says Olivia Vent, TEEAL outreach coordinator in Mann Library.

TEEAL has helped place nine updated sets in universities and ministries in the Kurdistan region of Iraq and 25 more sets throughout Africa, including at the West African Center for Crop Improvement at the University of Ghana.

"The use of LanTEEAL has been overwhelming," says a librarian from Moi University in Kenya in a survey. "It is used from 8 a.m. to 5 p.m."



Participants at a train-the-trainer workshop in southern Sudan discuss TEEAL and other online journal delivery programs.

"What a difference the TEEAL collection has made for the Bangladesh Agricultural Research Council library," writes Craig A. Meisner, an adjunct Cornell professor from Dhaka, Bangladesh. "Before, the library was dark and no one was there. Now it is vibrant with so many students waiting to use TEEAL and reading."

"Since we introduced TEEAL we have seen a dramatic increase in the number and currency of citations in student theses and papers," says Willis Oluoch-Kosura, professor of agricultural economics at the University of Nairobi.

Susan Lang

Quagga Mussels Threaten U.S. Water and Electric Plants

Pipe-clogging invasive mussels caused up to \$1.5 billion in damage across 23 states between 1989 and 2007. Now, fingernail-sized quagga mussels, a close relative of zebra mussels, have spread to the West and threaten to do even more damage.

Quagga mussels showed up in the Great Lakes in the early 1990s. In the East, quagga mussels are now colonizing deeper water and are out-competing zebra mussels. Last year, quaggas were discovered for the first time in the West in Nevada's Lake Mead and have since been found down the Colorado River in Lake Mojave, Lake Havasu, and in various locations in California.

"The spread west is not a surprise," says Chuck O'Neill, a senior extension associate with Cornell Cooperative Extension and New York Sea Grant who testified before the U.S. House of Representatives Committee on Natural Resources Subcommittee on Water and Power on June 24. "It's something that's been expected to happen."

Both quagga and zebra mussels originated in the Caspian, Ural, and Baltic seas and

spread to the United States in ballast water from freighters.

Zebra mussels filter food as small as 15 microns (the size of a mold spore); quagga mussels can feed on even smaller bacteria and out-compete their relatives. Water-intake pipes and similar structures offer ideal habitat for their colonization because the continuous flow of water provides steady food and oxygen and carries away waste; the structures protect young mussels against predation, silt, and waves.

As mussels line a pipe or tunnel, they disrupt water flow. A single layer of mussels, 0.1 inches thick throughout a pipeline, can decrease water-carrying efficiency by 5 to 10 percent, says O'Neill. In extreme cases, researchers have measured foot-thick colonies at the bottom of Lake



Erie. Great Lakes intake canals have held 2- to 3-inch-thick colonies with three-quarters of a million mussels per square meter.

"Western infrastructure owners need to learn from the eastern experience," says O'Neill, recommending that critically important bodies of water be monitored and that pipeline owners take preventive measures.

Krishna Ramanujan



Why the “Persistent Ovu Crossed Tower Road:

To Become an Animal Model for Ovarian Cancer

**Studying how ovarian cancer starts in chickens
may lead to the development of therapies that can
decrease the lethality of this cancer in humans.**

BY ROGER SEGELKEN



lator”

Jason Koski, University Photograp

When it comes to choosing an animal model for a human disease that seems related to frequent ovulation—ovarian cancer—Patricia A. “Pat” Johnson, PhD ’83, makes no bones about it: “Chickens are egg-laying machines,” she says. “They are what we reproductive physiologists call ‘persistent ovulators.’”

Multiple miles and millennia from the ancestral jungle fowl of Asia, domesticated egg-a-day hens compress into a few short years the egg-production cycle of pre-menopausal women that takes decades to run its course.

And artificial selection, by humans who want birds to earn their keep, has coincidentally produced a near-perfect animal model for human disease.

Each time an egg is released from the follicle structures inside the ovary—of a laying hen or a woman—the ovary ruptures and must repair itself. That natural event occurs almost daily during the first couple of years of a hen’s economically productive life—and monthly during a woman’s reproductive life.

The Real Chicken-and-Egg Story

It’s in the details that Johnson’s chicken-and-egg story gets interesting—at least for humans who fear cancer (if not for farmers who, as the CALS professor of animal science matter-of-factly notes, “know that production hens have done their job after one to two years, while our experimental hens are kept for many years”).

- Generally, spontaneous ovarian cancer occurs in only two animal species: humans and domestic hens. Under the pathologist’s microscope, ovarian tumor cells from humans and chickens are virtually indistinguishable.
- The outer surface of the ovary—whether in a hen or human—is called the OSE (ovarian surface epithelial) layer. The repeated rupture-and-repair cycle of the OSE is believed to encourage malignant transformation of normal ovary cells. For the thousands of women ($1\text{ in }57$ in the United States) who develop ovarian cancer, the tumors all too often metastasize, with frightening speed, to other organs of the body.

Pat Johnson displays one of the older laying hens in her program that does not develop ovarian cancer. Still to be resolved is the question: If 55 percent of laying hens eventually develop ovarian cancer, what factors protect those that don’t? And how can that knowledge help women facing the fifth-leading cause of cancer death?

- Regular use of progestin-based oral contraceptives (like "The Pill"), which prevent release of eggs from ovaries, also reduces the likelihood of ovarian cancer. (Women with multiple pregnancies also incur a lower incidence of ovarian cancer.)
- Some 20 percent of laying hens (white Leghorns, in particular) get ovarian cancer. Malignant ovarian adenocarcinoma is age-related, increasing in incidence as hens get older. (Farmed hens very rarely develop ovarian cancer in their economically productive years and, if so, they are culled from the flocks.) By age five, as many as 55 percent of the Leghorns in Johnson's experimental flock have ovarian cancer.

When reproductive physiologist Johnson makes these points to cancer researchers, the chicken jokes stop. At long last, a humble fowl is starting to get a little respect.

A Question from a Friend

Johnson, whose longtime research specialty is follicle development, was about five years into her two-decade tenure in the Department of Animal Science when a friend at Washington University School of Medicine, Lisa M. Olson, PhD, posed a provocative question: do chickens, of all things, really get ovarian cancer?

Johnson earned her Cornell PhD with Ari van Tienhoven, an expert in avian physiology and professor of animal science, now emeritus. But she turned to "an old-time geneticist" and veteran of the Cornell Poultry Department, Randall K. "Randy" Cole, MS '37, PhD '39, for the answer to the query from her friend in the Obstetrics and Gynecology Department.

"We'd really like to know how ovarian cancer starts—in chickens and ultimately in humans."

—Pat Johnson

"Oh, yeah, we have tons of data on ovarian cancer," including two strains with significantly higher—but slightly different—incidences, said Cole, who retired in 1973 and lived into his nineties. (When Cole died in 2006, admiring colleagues in the Poultry Science Association linked his chicken-based research to advances in human medicine.) Delving into that data, Johnson refocused her research and won a multi-year grant from the U.S. Department of Defense (DOD), which devotes a small portion of its budget to basic research that might eventually benefit the troops and their health.

By then, most Cornell chickens had left the campus. But there was plenty of room—at a Cornell facility on Ithaca's Game Farm Road—to let hundreds of

hens live into their golden years. Johnson keeps about a thousand Leghorns in the experimental flock, young'uns and elderly fowl alike. Her large-scale, longterm studies would be all but impossible in a medical school or research university in an urban setting, says Johnson, happy to be at CALS.

Not Your Average Hen House

For Johnson—and her research collaborator and husband, James R. Giles, who live nearby in Ellis Hollow—the Game Farm Road facility is like having a big chicken coop in the backyard, located on their way to work in Morrison Hall. One product of that work, with co-authors Olson and Giles, was the report, "Characterization of Ovarian Surface Epithelial Cells from the Hen: A Unique Model for Ovarian Cancer," published in *Experimental Biology and Medicine* (2006).

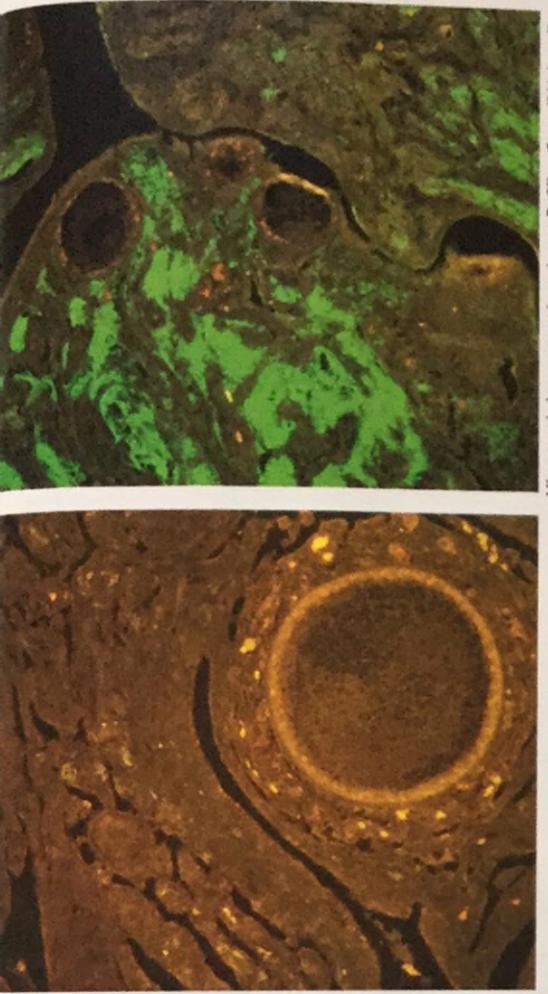
It was a small but important step toward understanding the fifth leading cause of cancer death in women. "We'd really like to know how ovarian cancer starts—in chickens and ultimately in humans," Johnson says. Knowledge about the etiology of ovarian cancer could help in the detection of this disease at an earlier stage, when it is more easily treated, she predicts. "An animal model will help in the design and testing of more optimal treatments—and perhaps even prevention—and that's what it will take to decrease the lethality of this cancer."

Early Detection is Essential

As is the case with many cancers, early detection is key to successful treatment, notes Johnson. The five-year survival rate for ovarian cancer that is diagnosed and treated in stages I or II is approximately 80 to 90 percent. But if ovarian cancer progresses to stages III or IV before detection and treatment, only five to 40 percent of women survive to reach the five-year milestone.

In addition to the DOD funding, Johnson's cancer research has received support from the President's Council of Cornell Women and Cornell's Institute for Biotechnology and Life Sciences.





Microscopic images courtesy James R. Giles, Cornell University

(top) Abnormal expression of the protein ovalbumin (green staining) in a cancerous ovary. Ovalbumin is used as a marker for ovarian cancer in the hen. (bottom) A normal ovary, which does not express this protein (red staining is non-specific fluorescence).

Technologies. She teaches the only endocrinology course on the Ithaca campus (*Fundamentals of Endocrinology, AS/BioAP 427*) and co-teaches the graduate-level course, *Current Concepts in Reproductive Biology*.

Another Cornell CALS advantage, dating back to Randy Coles's work in the poultry department, is the availability of two strains of chickens with nearly identical genetic backgrounds but different incidences of ovarian cancer. A 2006 report from Johnson and Giles noted elevated levels of a hormone called plasma estradiol in "C strain" chickens, compared to estradiol levels in "K strain" hens, as well as relatively

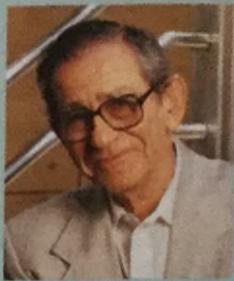
A Good Animal Model Indeed

For a university that disbanded poultry-science research and education (in and around Rice Hall when the industry moved from New York to elsewhere), the chicken—as an animal model—has been very good to Cornell.

- The chicken became a workable model for early-onset vision disorders in children when neurobiologist Howard Howland, PhD '68, showed how the first few days of a chick's life parallel the first months of a developing infant. Photos of chickens in goggles (to hold vision-distorting lenses in place) made them look like old-time aviators who'd lost their scarves and bi-planes. But kids who got free check-ups in Mudd Hall's Infant Vision Laboratory benefited from early detection of conditions such as amblyopia (lazy eye).
- At the College of Veterinary Medicine, husband-and-wife microbiologists Julius Fabricant, MS '47, PhD '49, and Catherine Fabricant '42, MS '48, established the so-called viral hypothesis for atherosclerotic heart disease—by showing that chickens infected with a herpesvirus developed arterial lesions and those without the virus did not. The heart-research "establishment" was incredulous, in a time when cholesterol was the favored bogeyman for atherosclerosis—even when the Cornell researchers managed to immunize chickens against the virus to protect against lesions and tumors.
- Another veterinary researcher, the James Law Professor of Physiology, put chickens to work in the laboratory. Robert H. Wasserman '49, PhD '53, a member of the National Academy of Sciences and now retired from the College of Veterinary Medicine's Department of Biomedical Sciences, used chickens to examine vitamin D-dependent calcium-binding protein.



Howard Howland



Robert H. Wasserman

"An animal model will help in the design and testing of more optimal treatments—and perhaps even prevention."

—Pat Johnson

less plasma immunoreactive inhibin in the C strain. K strain hens are the ones with a lower incidence of ovarian cancer at two years of age.

Recently one of Johnson's graduate students, Mary Ellen Urick, reported in the journal *Gynecological Oncology* on experiments that fed nonsteroidal anti-inflammatory drugs

(NSAIDs) to hens. Disappointingly, the aspirin and a COX-1-specific inhibitor do not stop ovarian cancer altogether—Urick, Giles, and Johnson report—but NSAIDs seem to arrest cancer at an earlier stage, which might offer hope for delaying metastasis.

Another graduate student, Lindsey Treviño, is giving oral contraceptives to the hens. It's not clear yet whether The Pill will have the same cancer rate-reduction effect that is seen in women. Surely, however, egg production at Game Farm Road will drop.



Arms Race between Plants Insects Escalates through E

Anurag Agrawal watches monarch caterpillars munch milkweeds to better understand how plants defend themselves against herbivores and how this struggle spurs evolution and the genesis of biodiversity.

BY ELIZABETH L. BAUMAN

and volution

Species interact in three basic ways: they eat each other, compete with each other, and help each other. These key interactions are the focus of research being conducted by Anurag Agrawal, associate professor of ecology and evolutionary biology and entomology, and a newly named associate director of the Cornell Center for a Sustainable Future.

"Some species appear to be in an 'arms race,' and that reciprocal interaction is known to be important for their ecology, but is it important in generating diversity as well?" Agrawal asks.

For every defense a plant uses against being eaten by an insect, there's a counter-defense mounted by the insect. Agrawal says that species that have changed the most from their common ancestors have changed in a particular direction in their defenses, so there appears to be a long-term escalation in the evolution of this "arms race."

He points out that species interactions are not fixed and can be complicated. For example, in a particular place or species pair, a certain individual might switch from a mutualistic to a parasitic interaction. In another context, an invasive species comes into the picture, and this can change the existing nature of the interaction.

"I'm focused and somewhat obsessed with how plants defend themselves against being eaten," he says. "I've justified this by the fact that all animals are ultimately dependent on plants, because all food chains get their energy from plants. Snakes eat birds who eat insects who eat the green stuff. There is tremendous pressure on plants to defend themselves." Unraveling these interactions has proven important in improving crop resistance to pests and understanding the success of invasive species.

Chemicals As Defense

"Plants are basically a storehouse of remarkable chemicals. In any meal, many of the compounds one tastes are evolutionarily derived from interactions among species," Agrawal says. For example, the flavorful compounds that we enjoy in radishes have evolved through natural selection to ward off the radishes' herbivores.

Agrawal says that some 25 percent of all pharmaceuticals come from natural products, extracted from plants, fungi, and bacteria. The natural compounds often provide a roadmap for us to produce synthetic compounds for use in medicine.

"Time and time again, nature comes up with things that are far more bizarre, or useful, than we can conjure in our imaginations," he says. "So much of what we do is trying to mimic what happens in natural processes."

Milkweeds vs. Monarchs

Milkweeds, or *Asclepias* species, are Agrawal's primary subject of study. They are named after the Greek god of medicine, Asclepios, son of Apollo.

Milkweeds contain cardiac glycosides that have been used as human medicine for thousands of years, in particular for their effects on heartbeats. The glycosides affect the heartbeat in insects as well as in humans.

Agrawal's research has examined how milkweeds defend themselves against the monarch caterpillar, their most daunting insect enemy.

As its first defense, milkweed has a bed of hairs, called trichomes, on its leaves. The monarch caterpillar must shave an area of the leaf until it is free of these trichomes. Then it punctures a hole in the leaf, out of which oozes a droplet of sticky, gummy latex, which the caterpillar must avoid to continue eating the leaf. Many monarchs die at this stage, mired in the latex. To survive, caterpillars often sever the veins delivering the latex to deactivate the system.

Even if the monarch is hardy enough to continue munching, the cardiac glycosides in the leaf pose an additional poisonous burden on the caterpillar.



Jason Koski, University Photography

Courtesy Anurag Agrawal

A Chemical Ecology Powerhouse at Cornell

Agrawal is the director of the Cornell Chemical Ecology Group (www.chemicalecology.cornell.edu) and collaborates on research with several group members, including Robert Raguso of Neurobiology and Behavior, Jennifer Thaler of Entomology, Andre Kessler and Drew Harvell of Ecology and Evolutionary Behavior, Bernd Blossey of Natural Resources, Georg Jander of the Boyce Thompson Institute, and Charlie Linn at the Geneva Agricultural Experiment Station. They focus on interdisciplinary work, such as promoting agricultural sustainability via the manipulation of both plant and insect chemistry.

"Cornell has an extraordinary history in chemical ecology," Agrawal says, "with some of the founding fathers of that field now retiring, including Paul Feeny, Thomas Eisner, and Wendell Roelofs. We feel privileged to continue their tradition, while taking advantage of modern advances in molecular and chemical techniques."



(top) Agrawal checks on *Gomphocarpus physocarpus*, or balloonplant, a highly toxic milkweed from southeast Africa. A Monarch butterfly is seen drinking the copious nectar produced. (above left) *Asclepias incarnata*, or swamp milkweed, and (above right) *Asclepias hirtella*, or green milkweed, are among the many species of milkweed that Agrawal studies.

Benefits of Biodiversity

Agrawal is investigating how these interactions impact the genesis and maintenance of biodiversity. For example, there are some 150 species of milkweed in North America, from desert- to swamp-inhabiting species. It appears that shifting to new habitats has facilitated the evolutionary radiation of the milkweeds. Not only is there great variation among species, but there are great differences among individuals within species

(think of all the ways humans are different). Much of this variation is inherited and thus can be shaped by natural selection.

Agrawal points out that the amount of genetic diversity within a population of one species has consequences not only for that species but also for the species with which it interacts. For example, if a forest has only one genotype of dogwood, fruits would all be very similar in size and shape and would be produced at one time, limiting the feed-

ing duration of birds that depend on dogwood fruits. But if there are hundreds of genotypes, as in a healthy forest, dogwoods are much more variable and produce fruits over a much greater time span.

"Genetic diversity likely has great ecological consequences, yet we know remarkably little about its importance," Agrawal says. "Let's say we reforest an area that was clear-cut, and we plant only one genotype of oaks there. It will be incredibly sensitive to disease, all the trees will have the same growth characteristics, and they will have the same resistance, or lack of resistance, to drought." Again, this shows the importance of studying the interplay between agriculture, where one genotype is often grown in large plots, and natural habitats, which typically maintain higher diversity.

"Genetic diversity likely has great ecological consequences, yet we know remarkably little about its importance."

—Anurag Agrawal

Intersection of Ecology and Evolution

The intersection of ecology and evolution is another central theme in Agrawal's work. "How the interactions between species in an ecosystem play out over long periods affects evolution," he says.

Agrawal uses phylogenetics (identifying and understanding the evolutionary relationships among organisms) in his research to infer the history of species.

In his study published this summer in the *Proceedings of the National Academy of Sciences*, Agrawal reported on research conducted with Professor Mark Fishbein of the Department of Biology, Portland State University. They grew 36 species of milkweed to test classic predictions of plant defense theory. Their major finding was that where plants are primarily consumed by specialist herbivores, an increased ability for regrowth (or tolerance to herbivore damage) seems to have trumped the evolution of resistance traits (like the latex, trichomes,



Latex oozing from a milkweed leaf can kill the monarch caterpillar.

and cardiac glycosides) during the diversification process. This finding of escalating regrowth ability and declining resistance gives a new view into the co-evolutionary dynamics between plants and herbivores and suggests a revision of plant defense theory.

Biodiversity Is Everywhere

Earlier in his career Agrawal's research took him to Finland, Costa Rica, and the Bahamas. Now with a family (his wife, Professor Jennifer Thaler, is a faculty member in the CALS Department of Entomology, and his three-year-old son, Jasper, a frequent visitor to campus), he is concentrating his work closer to home.

"I care tremendously about the biodiversity of central New York," he says and calls it a lush and rugged place with a relatively low population density and much more forested land than a century ago.

Agrawal hopes to contribute to a larger purpose: "I'd like to have an impact on environmental sustainability. My obsession with biodiversity is very personal, it's part of me. If we don't do something as a society, we aren't going to have much left."

Cornell Works to Create a Sustainable Future

This spring, Anurag Agrawal was named one of three associate directors for the Cornell Center for a Sustainable Future (CCSF) to oversee programs focused on the environment.

While groups like Sustainable Cornell and the President's Climate Commitment Implementation Committee work internally to bring Cornell closer to carbon neutrality, CCSF's agenda is more outwardly focused. As an umbrella organization for Cornell's diverse research on sustainability—including several institutes, centers, and many faculty members focused on green issues—CCSF also works with external partners to put those resources to work for the world.

The center seeks to attract targeted funding by creating teams of researchers across colleges who can collaborate on specific issues, such as solar research. By creating such teams in advance, Cornell will be well-positioned and competitive for large grants when they become available.

Two other new associate directors were named along with Agrawal. Chris Barrett, the Stephen B. and Janice G. Ashley Professor of Applied Economics and Management, who works primarily on rural poverty and hunger problems in Africa, heads the center's economic development programs. Sidney Leibovich, PhD '65, the S. B. Eckert Professor of Mechanical and Aerospace Engineering and an expert in fluid mechanics, directs the center's energy programs.



www.sustainablefuture.cornell.edu





Farmers Find Market Advantages in High Tunnels

Fred Forsburg's tomatoes are perfect, blemish free—tough to do in a certified organic operation where no pesticides, herbicides, or fungicides are used. The secret? He grows all his tomatoes in high tunnels.

BY METTA WINTER

“People eat with their eyes—when we go to market with tomatoes that look like jewels, they flock to them,” says Forsburg of the pink, red, orange, green, yellow, and purple tomatoes (15 heirloom varieties in all) that he grows at Honeyhill Farm in Livonia, New York.



The premium that beauty brings isn't the only market advantage high-tunnel technology offers New York state fruit and vegetable growers. Take what happened in the summer of 2004 when it rained practically every day.

(opposite page) A Mennonite farmer checks the health of his high-tunnel pepper crop. (left) High tunnels are sized to allow in horses or small tractors for tillage.

Old Order Communities in New York State

Howard Hoover put together the design of his first high tunnel in a flash in the middle of the night.

"I didn't have the money to build a proper greenhouse with plumbing, heating, ventilation, foundation, concrete," Hoover explains, "but in my steel shop I could make some hoops and stretch plastic over them to build a place that would be nice and warm on a cold day."

That was six years ago. Today Hoover, a member of the Groffdale Conference Mennonite community who bought his farm in Yates County in the mid 1980s, manufactures and sells tunnels to other Old Order Amish and Mennonite farmers as well as conventional growers scattered across the state.

In the mid 1970s members of the Groffdale Conference began to migrate from Lancaster, Pennsylvania to the Finger Lakes, where they found viable, affordable farm land. Now there are 450 families in the four counties surrounding Penn Yan. Members of the Groffdale Conference operate 90 percent of the 300 dairy farms in Yates County. The thriving Finger Lakes Produce Auction provides them an outlet for fresh market vegetables, putting millions of dollars of new revenue into local communities.

High-tunnel technology is particularly appealing to Old Order farmers because the tunnels require a modest capital investment, are ventilated by rolling up the sides rather than relying on a fan, are movable and thus can leave soil-borne diseases behind, and reduce dependence on chemical inputs. Too, this technology is most profitable when there is an abundant, inexpensive labor pool.

"Clipping and tending the plants is easy work for small children," notes Hoover, who has 10. (The average number of children among families in Old Order communities is 8.) "And since we use no pesticides it's safe for them."

Hoover has been an active participant in the on-farm research that Judson Reid conducts. This past summer they worked together to evaluate grafting tomato plants to increase yield and disease resistance; different trellis systems and types of plastic coverings; and the growing requirements of a novel crop—the three-pound, personal-sized, seedless watermelon. Reid will summarize the data, make recommendations, and share those with other farmers. Hoover and Reid also hosted a field day at the farm, attracting more than 50 growers last year.

Metta Winter



(clockwise from top) Judson Reid inspects tomatoes growing in a high tunnel in Penn Yan, New York. A young Old Order woman trellises her family's tunnel tomato crop. Judson Reid and Leonard Hoover discuss production techniques at the Finger Lakes produce auction.

Forsburg lost 100 percent of the fruit on the 600 plants in his fields. The only tomatoes he had to sell that year were those from plants trellised upward on a length of string and sheltered under a row of high polyurethane-covered hoops.

"We had one tunnel at the time and now we have three, and I'm getting more next year," Forsburg says of the 20- by 100-foot movable plastic structures—also known as hoophouses—that each cover 300 plants. (On average each plant will produce 16 pounds of fruit) "I'll never grow a tomato outside the tunnel again."

Protection against the vagaries of weather can also mean safety from some devastating losses due to diseases such as the late blight (the pathogenic fungus of Irish Potato Famine fame) that swept through the Northeast in 2004. If Howard Hoover, the owner of a family-operated

vegetable farm in Penn Yan, New York, hadn't already been convinced of the virtues of high-tunnel technology, he certainly was by the end of that July.

"The late blight was so severe that every potato and tomato on our farm died, right up to the edges of the tunnels," says Hoover, who explains that the host plant has to be wet for six hours for the fungus to inoculate it, so those protected from the dew and rain won't develop the disease. "One of the high points of having a tunnel was being able to save those tomatoes without using any chemicals."

There's no question money is to be made when a crop that consumers desire can be grown dependably—and close to home. High tunnels increase a grower's profits because they produce a more beautiful, higher-yielding crop during an expanded growing season.

In the six years since New York growers began adopting high tunnels, it's been tomatoes (heat-loving plants that can be trellised vertically and bear continuously) that have been most commercially successful. At the Finger Lakes Produce Auction in Penn Yan, a 25-pound box of U.S. #1 top-grade tomatoes sells for \$40. During a rainy summer the wholesale price could rise to \$50, while field-grown tomatoes (with their unavoidable cracks and slight blemishes) may bring a grower only \$5.

In New York state, high-tunnel agriculture has taken off at a time when consumers want to buy food raised close to home.

"It's now more profitable than ever to grow food and market it locally," says Hoover. "There's no such thing any more as cheap transportation."

"When tomatoes are ripe at the same time as strawberries it's a good economic position for a farmer to be in—he can sell the tomatoes at a premium because the product will move itself when it's next to

strawberries," explains Judson Reid '97, MPS '04, an extension associate with the Cornell Vegetable Program. First introduced to high tunnels by Hoover, Reid now assists farmers across the state who want to adopt the technology.

"I'll never grow a tomato outside the tunnel again."

—Fred Forsburg

"Active research is being done with growers in their facilities," says Hans C. Wien, MS '67, PhD '71, a professor in the Department of Horticulture, who is the leader of high-tunnel research projects funded through the New York Farm Viability Institute. He explains that all project proposals must be approved by a board of growers. "We want to be sure that there's a sustainable system in place by which high-tunnel technology is easy to come by and there's a knowledgeable

extension staff available to help."

Reid has half a dozen vegetable projects on farms in multiple counties, while Wien, a specialist in cut flowers, and Marvin P. Pritts, professor and chair of the Department of Horticulture and an expert in small fruits, also do some controlled experiments in three tunnels adjacent to campus at the East Ithaca Farm.

In the Northeast, raspberries are a hot commodity, as are sweet cherries. In response to this consumer demand, Pritts summarized the current knowledge on all aspects of production into a booklet, "High-Tunnel Raspberries and Blackberries," available online. Terence Robinson, associate professor of horticultural sciences at the New York State Agricultural Experiment Station in Geneva, NY, has begun to work on cherries in very high tunnels.

Currently Wien is coordinating the high-tunnel work of six extension specialists around the state. These specialists have projects with 11 growers producing high-tunnel

Marvin Pritts evaluates the condition of the Triple Crown thornless blackberries growing in high tunnels at CALS East Ithaca Farm.





Not by Tomatoes Alone

On Wind Flower Farm in Washington County, Jan Blomgren and her husband Ted, MS '00, a graduate student in the college from 1989 to 1991, have 11 high tunnels in which they grow cut flowers (among them stock, godetia, larkspur, snapdragon, delphinium, and lisianthus) and cucumbers, peppers, eggplants, tomatoes, and salad greens for 750 community-supported agriculture (CSA) shareholders in New York City.

Former Extension Agent Zaid Kurdieh has three-and-one-half acres of vegetables and small fruit under tunnels at Norwich Meadow Farms in Chenango County. Kurdieh supplies more than 700 customers through CSAs and green markets in New York City.

"In Ithaca you can get a crop of early sunflowers to market two to three weeks before the competition," Wien says, speaking about the benefits of high tunnels. "That's worth money because it gets customers to say, 'Ah, I got these wonderful sunflowers from you, so I'll keep coming back because you might have other special things!—so you get a customer all season."

Metta Winter

Hans C. Wien checks on plants in the high tunnels in Ithaca where he and other researchers grow various varieties of flower and vegetable crops.

vegetables, in projects funded by the New York Farm Viability Institute.

In addition to specific experiments in growers' high tunnels, the team is also investigating the most profitable sequence of plantings to keep the tunnels full—and customers coming back to farm stands and markets all season. Crop rotation keeps the ground healthy; early-bearing crops such as cucumbers might perhaps be followed by lettuce or cold-tolerant spinach.

By the winter of 2009, Wien expects to have their findings on a website, with results from two cycles of the studies sponsored by the New York Farm Viability Institute. Economic data gathered by Wen Fei Uva, MPS '93, PhD '99, senior extension associate in applied economics and management, will also be available.

Wien explains: "Growers who might want to pay for a specific type of high tunnel for growing tomatoes, for example, will be able to go to the website and—before

taking any action—find out how many pounds of fruit they'll need to produce, the price they'll need to get for it, when they'll need to first plant, how late to continue harvesting, and more."

The growers are excited—there has been record-breaking attendance at high-tunnel presentations from the North Country to the dairy region of Delaware County.

"Farming is a stressful business, and some things—hail, drought, high winds—you can't do anything about," says Hoover. "The tunnel is one part of my operation where I can feel secure in my chances of a good harvest."

web urls

Cornell Fruit Resources-Berries:
www.fruit.cornell.edu/berry.html

New York Farm Viability Institute:
www.nyfarmviability.org



Power Politics

A Cornell energy economist and a team of students decipher the mysteries of “green” public policies.

BY E. LAUREN CHAMBLISS

A century after German statesman Otto von Bismarck famously quipped that “politics is not an exact science,” Cornell economist Antonio Bento is trying to bring as much science as possible—practical, applied, economic science—to two of the most critical and contentious public-policy issues facing our nation: energy and climate change.

Concern about everyday transactions serves as the foundation of Antonio Bento's work with energy and climate-change policies.

Making sense of the complex intersection where energy policy and the real world meet is Bento's passion. The Applied Economics and Management associate professor, a specialist in transportation, energy, and the environment, approaches energy policy much the way an engineer looks at those giant spider-like freeway intersections where several major highways converge, taking into account all the possible factors affecting the potential flow of traffic before designing an efficient system to handle it.

Bento's year-old headline program—the Program in Environmental Economics and Energy Policy—is designed precisely to fill the gap between expectation and reality, to decipher the mysteries of various policy instruments, to encourage dialogue among the major players, and to provide sound information on policy solutions.

The recent controversy over biofuel mandates provides a case in point. In an effort to promote domestic "clean" fuel sources to reduce greenhouse-gas emissions and provide alternatives to foreign oil, the U.S. government last year approved new energy policies, including mandates calling for America's production of energy from renewable resources—such as corn-based and cellulosic ethanol from

plants—to double by 2015. When the bill was signed into law, it was hailed by many environmental groups, energy producers, and agricultural specialists as a giant step forward for America's effort to produce cleaner, safer, stable supplies of energy resources. But then a few things happened in world markets, including tighter-than-expected grain supplies, rising oil costs, and strong energy demand in developing nations. The result, Bento explains, was an increase in corn, rice, and other world food prices.

Though U.S. biofuel policies contributed but a small portion of the



"Biofuels, climate, and energy—right now these are the hot topics."

—Antonio Bento

global price hike for corn—about three percent, according to the White House Council of Economic Advisers—there has been a political backlash. Citing rising food and fuel costs, Texas Governor Rick Perry recently asked the government to cut by half a 2008 requirement to produce nine billion gallons of ethanol, 95 percent of which is currently made from corn.

"An important goal of our program is to influence public-policy instrument choices so the most cost-effective approaches are chosen and the risks known in advance," says Bento. "We want to be ahead of the curve and think of ways to improve policy by making it as efficient as possible, within the context of political acceptability."

Affecting the Future of Energy and Climate—Now

The Program in Environmental Economics and Energy Policy is gearing up at just the right time to influence the country's future energy and climate policy. In January, with the backing of a new president in the White House, Congress is expected

to quickly begin work on legislation to encourage conservation, increase America's sources of renewable energy, and reduce greenhouse-gas emissions. The world is waiting to see how aggressively and effectively a new administration will respond to the global climate crisis, says Bento.

On the energy side of the climate-change policy equation, the new administration must take into account such factors as agricultural responses to biofuel mandates and consumer transportation behavior, says Bento. Until now, economic models have focused on either the agricultural markets or transportation, but not the two together. Bento and his team of six graduate students have created a framework that simulates the system of interwoven interactions to take some of the guesswork out of public policy choices. Call it holistic policymaking. Biofuel production is an example of how applied economics can advance existing life-cycle analysis, providing an invaluable tool to unravel the complex web of interactions.

"We must model carefully the process of production of ethanol," he says. "For instance, how do agricultural producers respond to changes in feedstock prices and to government promotional schemes? Producers tend to meet a step-up in demand by increasing rotation of corn crops, altering tillage practices, and using more fertilizer to maximize yields, and some land-use practices change—all of which mitigates the environmental benefit. If I produce the ethanol needed to meet the mandates under the energy bill, do I have energy savings? Without careful economic analysis that advances current life-cycle analysis, we really don't know."

On the natural science and bioengineering side of the climate-change policy equation, CALS, a national leader in lab-to-field research, is positioned to move beyond corn-based ethanol to the next generation of biofuels: cellulosic ethanol, made from plant matter such as switchgrass and wood products. Bento's team will complement this effort with economic life-cycle analysis. This fall they will begin modeling the impact of "dedicated" energy crops—including switchgrass, miscanthus, and

Life-Cycle Analysis

A life-cycle analysis is the valuation of the environmental impact of a given product, service, entity, or policy.



The term "life cycle" refers to the idea that a holistic assessment requires looking at all levels and phases—production, manufacture, distribution, use, and disposal (including all intervening transportation steps necessary or caused by the product's or service's existence). The sum of all those steps, or phases, is the life cycle of the product, service, or entity.

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Antonio Bento and several of his graduate students discuss their economic model for holistic policy-making.

willow biomass—to help CALS agricultural researchers and biological and environmental engineers understand this full dimension of the newer biofuels.

Cents and Sense: “Cap and Trade” Systems

Just because a particular approach is the most cost-effective doesn't mean it will have political appeal. For example, there is general agreement that in order to help mitigate greenhouse-gas emissions, the United States, the world's largest energy consumer, should reduce demand for fossil fuels, such as coal and oil, which are the largest contributors to carbon dioxide in the atmosphere.



“On the energy side of the climate-change policy equation, the new administration must take into account such factors as agricultural responses to biofuel mandates and consumer transportation behavior.”

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Transportation is another culprit, responsible for about one-third of the country's emissions. One sure-fire way to inspire conservation is to raise prices. Slap a high tax on gasoline and consumption

drops because people buy more fuel-efficient cars, drive less, and find other ways to minimize the pain at the gas pump. Taxing the biggest polluting industries is another way to discourage emissions. Yet, there are but a few politicians who dare to suggest a new tax on businesses or citizens, especially with energy prices at historic levels.

Hence the political popularity of so-called “cap-and-trade” programs as an alternative to higher taxes. In cap-and-trade, the government sets national goals for emissions limits and then gives—or sells—allocations to energy companies, such as oil and coal producers, which can, in turn, buy or sell their “carbon credits,” creating a market that allows companies the flexibility to buy credits when they need them and sell them when they don't. Cap-and-trade systems encourage conservation because

The New Model

To date, there has not been a comprehensive model that simultaneously measures the economic costs, land-use impacts, and greenhouse-gas (GHG) emissions resulting from U.S. biofuel policies.

In his newly launched program, Bento's team has developed a general equilibrium model for the U.S. economy that integrates the behavior of these groups: households who make travel decisions and car purchases; landowners who make decisions in terms of broad agricultural uses (forestry, pasture, agriculture) and crop decisions (in terms of rotation, tillages, and land set aside for conservation); ethanol producers; fuel blenders; and food producers.

Because the model captures the behavior of all agents affected by biofuel policies, it can more reliably measure the overall economic costs and distributional impacts of different policy tools. Consider, for example, an increase in the corn-based ethanol mandate. The model predicts that agricultural producers will increase their production of corn (mostly turning to continuous corn rotations), reduce production of soybeans, and convert more land to corn that was previously idle. The model also predicts that overall fuel prices will rise. As a consequence, consumers will typically reduce overall vehicle-miles-traveled and look for more fuel-efficient vehicles.

The second important aspect of the project is the measurement of greenhouse-gas emissions. A hotly debated topic is whether life-cycle analysis properly captures the emissions resulting from biofuel policies. Typically, standard life-cycle models don't include behavioral responses to public policy and therefore fail to capture the greenhouse-gas emissions that result from behavioral adjustments to the policies.



companies that choose to pay for energy-saving technologies or reduce demand will ultimately have more credits to sell.

Cap-and-trade programs are popular in Europe as a way to reduce overall emissions, and several big states, including New York and California, are considering "regional" state pacts with neighboring states to promote similar policy schemes.

Later this year, a coalition of Northeastern states, which includes New York,

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will hold the nation's first auction of greenhouse-gas-emissions permits to power generators. Bento has been advising New York energy officials on the best way to approach cap-and-trade for maximum public benefit. He says the experience of cap-and-trade systems in Europe—where companies were initially provided allowances for "carbon credits" for free—offers valuable lessons in what not to do. A much better approach, he explains, is an auction system that sells the allowances, which generates revenue for the government. The revenue generated by auctioning carbon credits can then be used to pay for programs to promote technological development or refunded to citizens or businesses in the form of targeted tax breaks. Bento also advocates broadening the pool of companies involved in the allocation scheme to include energy providers, such

as electric and power companies, not only the suppliers. Whatever system this country eventually adopts for carbon emissions, Bento says, it should encourage reductions in energy consumption and support the development of technological innovations that will ultimately reduce the cost and reliance on fossil fuels.

Since coming to Cornell in the summer of 2007, Bento has been busy forming collaborations with faculty from other departments, including Biological and Environmental Engineering and Earth and Atmospheric Sciences. With input from faculty across disciplines and departments, he is fulfilling a dream of creating a program that will influence the direction of energy policy.

In addition to running large computational models to evaluate environmental public policy instruments, Bento's program sponsors policy dialogues and outreach activities, in connection with Cornell Cooperative Extension, to engage public policy officials at the local, state, regional, and national level, as well as the private sector and nongovernmental organizations.

In January 2009, Bento will be presenting the new biofuel model and preliminary findings at the American Economic Association meetings in San Francisco, and later in the year, to the United Nations.

"Launching this program has been an exciting endeavor, bringing together all these different components and working with different departments, very talented students, public officials, and private-sector entrepreneurs. Biofuels, climate, and energy," says the soft-spoken Bento, "—right now, these are the hot topics."



People

Cornell Entomologists Move Closer to Defeating Dengue and Yellow Fevers



Robert Barker, University Photography

Laura Sirot (left) and Laura Harrington discuss their mosquito-mating biology work.

Cornell researchers have identified a mating mechanism that could be adapted to prevent female mosquitoes from spreading the viruses that cause dengue fever.

Specifically, they have discovered 63 proteins that male mosquitoes transfer to *Aedes aegypti* females during mating and are thought briefly to change the females' physiology and behavior, in particular suppressing the females' appetite for mammalian blood.

The findings, published in the journal *Insect Biochemistry and Molecular Biology*, could lead to novel strategies to prevent the spread of dengue as well as mosquito-borne yellow fever viruses. "This is a new angle in our fight against vector-borne disease," says Laura Harrington, associate professor of entomology and the paper's senior author.

"Dengue fever is a socioeconomic disease that targets people in the tropics in developing nations," says Harrington. "Its incidence is on the rise. Our goal is to render the mosquito incapable of transmitting the disease."

Harrington, who has been fascinated with mosquitoes since she was an undergraduate at St. Lawrence University, says the World Health Organization estimates that as many as 50 million people are infected annually with dengue fever. In some parts of the world, the economic impact in terms of disruption to

quality of life and economic production rivals the combined burden of HIV, tuberculosis, and hepatitis. The next steps are to isolate, identify, and verify the targets of the mosquito proteins that regulate key post-mating behaviors such as reduced sexual drive or lack of appetite for blood. The researchers also will work to manipulate such physiological responses as increased egg production.

Laura Sirot, a postdoctoral researcher in molecular biology and genetics, is the paper's lead author, and Mariana Wolfner '74, Cornell professor of molecular biology and genetics, is a co-author.

The study was funded primarily through U.S. Department of Agriculture Hatch Funds. It complements and enhances Harrington's work as a member of a global team of scientists that received a \$19.7 million grant from the Foundation for the National Institutes of Health to cure dengue fever and control the mosquitoes that transmit the viruses that cause it.

Linda McCandless and Krishna Ramunajaran

Local Smithy Hammers Out Landmark Gate for Minns Garden

The initial idea was simple: Keep deer out of Cornell's Minns Garden. The result was far more elaborate: beautiful steel gates, adorned with intricate plant forms representing the flora in the garden, that span the spaces between the tall, bordering shrubbery.

The first, and largest, gate was installed and celebrated May 15 to thank artist-blacksmith Durand Van Doren, who crafted Minns Garden's new "West Gate." By summer's end he had finished the two smaller gates. The first gate is 24 feet wide, and the other two are each 6 feet wide.

In the summer of 2007, Hannah Carlson, a master's degree student in landscape architecture, began to create a design for the gates to close off the three spaces. At the same time, according to Cornell landscape architect Laurene Gilbert '84, project manager for this job, Van Doren's name was suggested.

For Van Doren, the Minns Garden project is a landmark in a long career as an artist-

blacksmith. The local ironworker collaborated with Carlson and Cornell horticulturalists and worked for six months hammering and shaping steel into a variety of intricate plant forms, ranging from daisies and daffodils to crocosmia and clematis.

"It's been fun and also my hardest work yet. I can definitely say I spared no effort," says Van Doren. "I credit Cornell for the freedom extended to me in working on this project. I'm looking forward to the additional components that are planned for the next phase." The next two gates include an arch and posts resembling the trunks of apple trees. "The chance to have my work in a place so beautiful and also historic means a lot to me," Van Doren says.

Van Doren, who has been forging for 35 years, belongs to the Artist-Blacksmiths Association of North America. His work can be seen at Cornell's Willard Straight Hall and Law School, as well as at the historic Great Camp Sagamore in the Adirondacks and

Shakespeare's Globe in London.

"It's very satisfying to do work on a project that is demanding and significant—it helps a smith rise to the occasion and brings out his best," says Van Doren.

The gates are being funded through maintenance management.

Joe Wilensky



University Photography

People

Student's Nonprofit Work Leads to Intergenerational Friendships



Mandy Hjellming '09 spent her summer "creating smiles that span generations" with GlamourGals, a dynamic nonprofit that brings teens and the elderly together

through monthly facials and makeovers.

The program, a unique way to foster intergenerational relationships, was founded by Cornell alumna Rachel Doyle '05, a graduate of the College of Human Ecology. Through 50 chapters in 14 states, high school girls travel to senior and assisted-living centers to give the residents makeovers.

This past summer, Hjellming helped Doyle with all aspects of the organization at the national level. She learned the ins and outs of running a nonprofit, from writing content

for the website and revising the business plan to developing new program materials and writing grants.

At Cornell, Hjellming is an Applied Economics and Management (AEM) major with a specialization in marketing and entrepreneurship and a minor in communication. She decided to apply to AEM because she knew that the skills and knowledge she gained would be necessary to run her own company in the future.

"My mother has told me since I was little that I won't be able to work for someone [else] for long," she says. "I like to do things my way."

That is why she so much enjoyed her summer internship.

"Every day I worked directly with the president and founder of GlamourGals, Rachel Doyle. Her passion, charisma, and work ethic inspire me."

Doyle founded the organization when she was only a junior in high school, in honor of

her own grandmother. Today she organizes and manages all aspects of the nonprofit program, including coordination of the more than 1,000 volunteers.

"Rachel taught me many things this summer about both the business world and life in general," says Hjellming. "She is a wonderful mentor, and her dedication and daily enthusiasm have positively influenced my knowledge and skills."

This fall, Hjellming will start her senior year at Cornell. In addition to being a Cornell Tradition Scholar, she has been a recipient of the Hung Wo and Elizabeth Ching Student Assistantship, the Robert Krawczyk Memorial Scholarship, and the Dana C. Goodrich Jr. Scholarship.

"After graduation, I plan to live in New York City," she says. "I see myself getting an MBA and running my own business. I also see myself continuing to be very active with Cornell because I just can't get enough of it!"

Marissa Fessenden

Mickey Rapkin '00 Explores A Cappella Subculture

Those wandering the Cornell campus may have ventured upon one of the university's many a cappella groups standing under an archway, jamming. Whether enjoyable or bizarre, there is no doubt: collegiate a cappella cannot be ignored, especially with Mickey Rapkin's new book, *Pitch Perfect: The Quest for Collegiate A Cappella Glory*, released this past June.

Mickey Rapkin '00, a CALS communications graduate, is now one of the senior editors at GQ magazine, where he covers pop culture and edits the "Verge" section.

"I had my own deep, slightly embarrassing history with collegiate a cappella," says Rapkin, "I sang with Cayuga's Waiters at Cornell. And so I knew there was this incredibly bizarre, very funny, and downright heartwarming story to be told about a cappella."

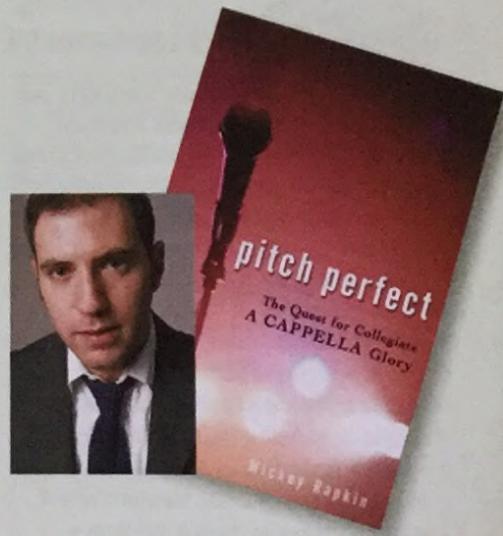
Rapkin found his journalistic beginnings writing for the *Cornell Daily Sun*, but he says his a cappella harmonizing with the all-male Cayuga's Waiters was the defining force of his undergraduate experience. "Besides the sheer joy of it," he explains, "the group gave

me more confidence than just about anything else I've done."

The book follows the fascinating trials and tribulations of three a cappella groups: the wild University of Virginia Hullabahoos, the legendary Tufts Beelzebubs, and the talented ladies of Divisi from the University of Oregon. A cappella superstar groups can make a hefty profit from gigs throughout the year. The book tells the story of the Hullabahoos performing to a sold-out audience at the Hard Rock Café in the Philippines, a venue where a week before Nick Lachey and 98 Degrees failed to sell out.

"I wanted this book to show people what it's like to be a member of an a cappella group, and why it's such a formative experience for so many."

Rapkin kept his a cappella past out of the book, but his sojourn with the Waiters marked a small milestone for the group. For his last concert, before graduation in 2000, the group hired a company to stream the show live on the web. It was expensive for the group and difficult to access for the



many Internet users still on dial-up but, Rapkin says, "It was worth it."

"I feel confident saying it was the first collegiate a cappella concert broadcast live on the web."

Marissa Fessenden

Graduate Greens Lives with Turf Art

Strollers enjoying the Ag Quad during graduation and reunions were treated to an unusual sight last spring; the letters C-A-L-S standing as tall as a person and made of green turf.

The installation was courtesy of Danielle Hodgins '08, an interdisciplinary studies major with a focus in horticulture. To create the sculptures, she built wooden frames of reused materials, then surrounded the frames with soil and sod.

The project was the second part of Hodgins's senior independent study, which focused on horticulture as both a subject and a medium of art. The first part of the study resulted in a large mural of the color spectrum of the plant world, which now graces the walls of the first-floor hallway in the Plant Science Building.

Originally from Syracuse, New York, Hodgins is still planning her future but knows that her career will definitely involve art, horticulture, and education.

The CALS sculpture is not the first one that Hodgins has constructed from turf. In 2006, she built a large cow sculpture outside of Morrison Hall, home of the Animal Science Department.

"People love to take their picture with these sculptures," Hodgins says.



University Photography

Hodgins also created a turf bobcat in fall 2006/spring 2007 at the New York State School for the Blind in Batavia and a turf salamander for the Ithaca Children's Garden. In April she led 4-H students in the construction of a turf sofa, the first piece of a set of "furniture" to grace the outside of the Youth Building at the NYS Fair.

This past spring, Hodgins worked with senior extension associate Marcia Eames

Sheavly and a group of students to create an acre-sized crop-art installation at the Blue Grass Lane Turf and Landscape Research Center on Warren Road in Ithaca.

"I would like to start working on another large-scale abstract piece," Hodgins says, "something that will be more permanent. If you know of anyone who might want a crazy turf project for their yard, let me know."

Marissa Fessenden

Join CALS Alumni Career Link

Become one of many CALS alumni who provide invaluable assistance to CALS students and fellow alumni who are exploring career options, seeking advice related to summer or full-time jobs, researching graduate and professional school programs, and more. Use your personal experience in a network of CALS alumni and students.

Last year, 282 students utilized the CALS Alumni Career Link to gain career information and advice from a pool of more than 500 alumni volunteers, while countless others visited the website to read profiles of the alumni members. CALS alumni from all backgrounds and fields are encouraged to join the network.

To make sure that contacts from others will be convenient for you, when you register to join Alumni Career Link, please be as specific as possible regarding the time, place, and manner in which you would like to be contacted. In the "job duties" section add details that you think are noteworthy, such as significant classes, job search/career advice, comments about life in the "real world."

To join and create a new profile, visit: <http://acl.cals.cornell.edu/login.aspx>.

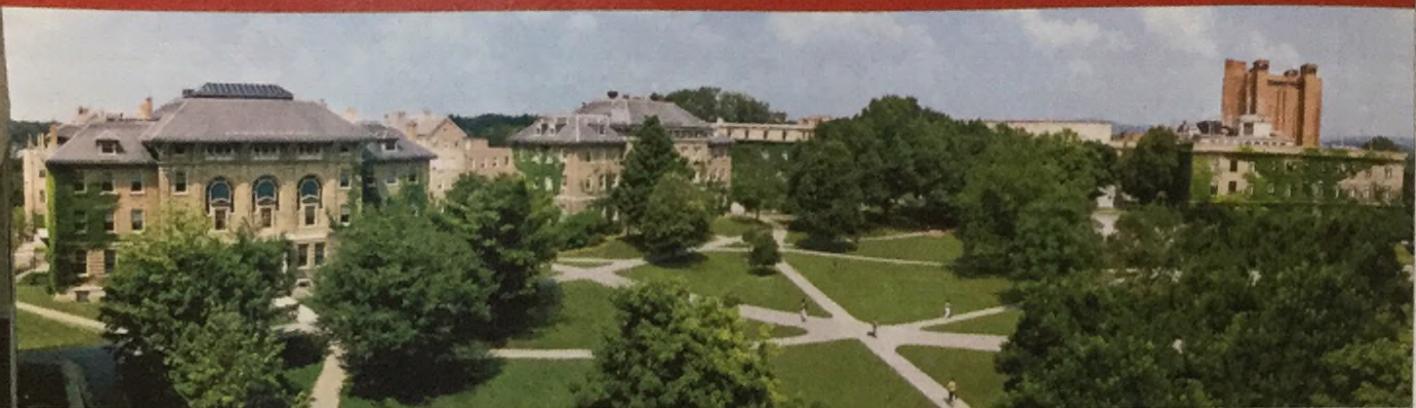
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The Alumni Career Link is a collaborative effort of the CALS Career Development Office, the CALS Alumni Association, and every department in the college.



Shaz Kahng '85, global business director for Nike, chats with Michelle Colban '08, senior student director of the CALS Alumni Association and other students after an alumni panel discussion.

<http://acl.cals.cornell.edu/login.aspx>



New President

Sandra J. Gardner '84 majored in agriculture economics. She completed requirements at Concordia College for New York State elementary education certification. She holds master degrees from Niagara University in business administration and educational leadership.

At an early age Gardner was familiar with Cornell as a member of the youth Polled Hereford Association, Future Farmers of America, and 4-H. Following graduation from Cornell, Gardner maintained her strong connections by working for Cornell Cooperative Extension. Her involvement in the CALS Alumni Association started in 1986 when she joined the Erie/Niagara New York District Leadership Team. Gardner has been involved in the Cornell Alumni Admissions Ambassador Network and maintains her roots in Cornell Cooperative Extension by serving as a 4-H leader.

Gardner started her career in education as an elementary teacher, with a special interest in teaching reading to children. She was named lead teacher for the UAW-GM Quality Educator Program for three consecutive years. She has served as an adjunct professor at SUNY Plattsburgh, teaching curriculum leadership. Currently she is the principal at Beekmantown Elementary School in West Chazy, New York.

Gardner and her husband Jim reside in Clinton County, New York, with their three sons.

Connecting with the University



It is with gratitude that I accept the opportunity to serve as the leader of the CALS Alumni Association. As I have reflected over the past few weeks on my goals and wish list of accomplishments for the upcoming year, I have frequently found myself recalling my early years as a Cornellian.

I was a naïve freshman who came from a small farm community to our large institution known as Cornell University. Throughout my four years I was blessed with people that supported me and allowed me to grow into the person I believe I am today. These people included those with direct connections to the university—professors, fellow students, financial aid staff, alumni—and others not directly connected to the university—Ithaca community members, parents of fellow students, and my family. All of these people had in common a belief in Cornell University and its founding mission, as expressed by Ezra Cornell in 1868: "I would found an institution where any person can find instruction in any study."

Ezra was able to see into the future with this founding statement. Cornell University has been, is today, and will continue to be an institution that values diversity and promotes life-long learning in all areas of study. As alumni, we have many opportunities to ensure that this diversity continues and to strengthen the Cornell connection to the world we live in. I encourage each of you to reflect on how the education that you received at Cornell and how the honor of being a Cornellian have impacted your life. I believe that you will be able to identify many ways that being an alumnus/alumna of CALS has made a difference in your life, the lives of others, and the communities in which you are involved. If you have not been directly connected to the university in some manner, consider rebuilding your connection. Your increased involvement will provide the respite of coming home again.

Several opportunities will be afforded you this year to make connections with CALS. We are planning a return to campus weekend retreat in the spring of 2009, the CALS Outstanding Alumni Awards dinner will take place in November, the careers exploration outreach program between alumni and students will be initiating events, and the capital campaign continues to be a priority for ensuring the financial stability and outreach of the university. Another high priority continues to be offering regional events for alumni to connect locally.

Our CALS Alumni Association is growing, thanks to the dedicated staff and volunteers who support this organization. My predecessors have served us with dedication, foresight, and loyalty. It is my hope to continue this leadership for a stronger college and Alumni Association. I encourage you to contact any of our district leaders or me to share your thoughts about how we can continue our life-long journeys of learning and growing.

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

ALUMNI NOTES

1940s

Allen H. Benton '48, MS '49, PhD '52 of Fredonia, N.Y. was a student of entomology, researching fleas thoroughly. His self-described "magnum opus" was his *Atlas of the Fleas of Eastern North America*, which he self-published, and whose 200 copies sold out almost immediately—to his own surprise. Now 86 years old, he has been retired for 23 years and is no longer active in entomology.

1950s

Dr. Anne LaBastille '55, PhD '69 of Westport, N.Y. was honored recently for her life-long career working for Adirondack wilderness preservation. In August at the Natural History Museum of the Adirondacks (The Wild Center) in Tupper Lake, N.Y., she received the Howard Zahniser Adirondack Award, given by the Association for the Protection of the Adirondacks. LaBastille is best known for her series of books, *Woodswoman*.

1960s

John J. Daly '63 of Round Hill, Va., followed his graduation from Cornell with three years in the U.S. Coast Guard during Vietnam, where he reached the rank of lieutenant commander. He then joined the National Broadcasting Company in New York City, where he worked in production, sales, and finance, reaching the position of vice president of network finance, all in a span of 21 years. Afterward, he moved to Radio City Music Hall as CFO and COO for five years, and then to the National Geographic Society as CFO, helping the company build its television division to broadcast its own cable channel. Currently, Daly is with Wachovia Bank in Virginia as vice president of investments. Personally, he is the proud father of three children, an avid golfer, and bridge player—and soon will retire.

Alan S. Palm '65 of Washington, D.C., has been taking advantage of the alumni audit program at George Washington University, taking history, American studies, religion, archeology, and museum studies classes. He has been doing some oral history for Alexandria archeology. He is planning to be a docent with the Historical Society of Washington.

1970s

Aaron L. Friedman '70 of Minneapolis, Minn., recently took over as chairman of the Department of Pediatrics at University of Minnesota Medical School, its first full-time head since June 2007. Before marking his return to the Midwest with this position, he had spent four years as head of the pediatrics department at Brown University, after serving his tenure at University of Wisconsin, Madison.

Albert F. Goetze III '72 of the Grand Cayman Islands, is currently one of two American citizens on the international staff of McCormick Global Ingredients Ltd., the company's spice-buying division. As chief spice buyer, Goetze, accompanied by a 14-member team, travels the globe to bid on spices and herbs at street markets alongside locals. He has twice served as president of the American Spice Trade Association and as a director of its board. His latest trip brought him to Vietnam this past April.

Susan Krasnoff Davis '77 of Marlborough, Mass., was recently named vice president of Infobright, an innovative analytic data warehouse provider. She is currently based in the company's Boston location, where she assumes responsibility for establishing and guiding Infobright's global marketing strategy, in addition to overseeing marketing operations. She brings more than 20 years of experience in marketing, project management, and software development.

Steven H. Strauss '77 of Corvallis, Ore., was recently recognized as a University Distinguished Professor at Oregon State University, where he is a professor in the Department of Forest Science and director of outreach in biotechnology. His research interests are in the fields of genetic engineering, genome mapping, and molecular population genetics of forest trees.

Howard J. Baum '79 of New York, N.Y., is the deputy director of the forensic biology laboratory in the New York City Chief Medical Examiner's Office. He was recently appointed director of the New Jersey State Police Forensic Science Laboratory. He is an expert on DNA analysis and a clinical assistant professor of forensics at New York University Medical Center. Responsible for the daily operations of the Department of Forensic Biology in the New York City Chief Medical Examiner's Office since 2000, he provided leadership for the identification of those killed in the 9/11 attack on the World Trade Center.

1980s

Thomas L. Ward '81 formerly of Rockville, Md., has been named director of the Leland C. and Mary M. Pillsbury Institute for Hospitality Entrepreneurship at Cornell's School of Hotel Administration. He will provide strategic and operational leadership, while directing the institute's business development, programs, and symposiums. After earning his BS from CALS, he earned an MBA from the Harvard Graduate School of Business in 1990. He spent five years in the U.S. Navy as an intelligence officer.

Ronald S. Ronsville '82 of Lansing, N.Y., is president of Perfect Painters Heritage Builders, Inc. and Heritage Park Town Homes, Inc. Additionally, he was recently honored by the National Association of Home Builders at its International Builders Show in Orlando, Fla. Ronsville also recently completed the course work required for Graduate Master Builder, the ultimate symbol of the building professional. He is a member of the local chapter of the Tompkins-Cortland Builders and Remodelers Association.

Paul R. Kohn '85, MS '89 of Tucson, Ariz., is the newly appointed dean of admissions at University of Arizona, wherein he has been working to increase the university's enrollment as well as the academic quality and diversity of the student body. In November 2007, Kohn was promoted to this position and that of vice provost for enrollment management.

Donald W. Watros '86 of West New York, N.J., was recently named vice chairman of Fortunoff Stores. He joined NRD Equity Partners in 2006 and currently serves as managing director of retail operations, which he will maintain alongside the Fortunoff assignment. Most recently Watros served as chief administrative officer for Saks Fifth Avenue.

1990s

Jennifer M. Krester '93 of Saranac Lake, N.Y., recently started as director of programs for the new Natural History Museum of the Adirondacks.

Nathan Basilleko '99 of Toronto, Ont., received his PhD from McGill University in 2004 and now serves as assistant professor in the Department of Geography at the University of Toronto at Mississauga.

Maureen E. Ryan '99 of Lake Villa, Ill., will follow nine years of service in the U.S. Army by relocating to Illinois to pursue a new career. She worked for the office of CALS Alumni Affairs during all four years that she attended Cornell and has fond memories of working around such positive people!

2000s

Michael L. Rapkin '00 of Brooklyn, N.Y., is an editor at CQ magazine and just published his first book, *Pitch Perfect: The Quest for Collegiate A Cappella*, a nonfiction look at the bizarre and inspiring world of collegiate a cappella. During his tenure at Cornell, Rapkin sang with Cayuga's Waiters, which served as inspiration for his book.

Kimberly L. McKinney '01 of San Antonio, Texas, recently graduated from the military medical school, Uniformed Services University of the Health Sciences. She had been a 2nd lieutenant in the U.S. Air Force before being promoted to captain at graduation. In June 2008, she started a pediatric residency in San Antonio.

Bethany S. Souers '02 of Rhinebeck, N.Y., began attending Ohio State College of Veterinary Medicine in September 2008, where she is pursuing a specialty in imaging. She previously graduated from Ross University College of Veterinary Medicine, where she was recognized for her academic achievements.

Stephanie A. Hiltz '04 of Pearl River, N.Y., recently graduated from the University of Bridgeport College of Chiropractic Medicine. She is practicing in Pomona, White Plains, and Manhattan, N.Y.

Ava Young Goodale '05 of Victor, Idaho, was recently appointed the new membership coordinator of Coastal Mountains Land Trust, which works to conserve land for the benefit of western Penobscot Bay. She has previously been involved in conservation initiatives locally through an internship at the Georges River Land Trust and has participated in conservation projects in Florida, Arizona, Wyoming, Idaho, Peru, and Brazil—where she worked and lived with the Kayapo Indians.

Joanna M. Souers '05 of Rhinebeck, N.Y., has completed her first of six years at Escuela LatinoAmericana de Medicina in Havana, Cuba. The medical school program includes three years of academic education and three years of clinical training. There are approximately 120 American students attending this program; all instruction is in Spanish. Prior to entering medical school, Souers worked on the Nyanza Project water-quality research in Tanzania, with a permaculture program in Nicaragua, and on a water quality and rainforest reforestation project in Costa Rica. Working on relief in New Orleans 9th Ward after Hurricane Katrina led her to medical school in Cuba.

Steven Dilamani '08 of Great Neck, N.Y., began working with a mid-sized software company in Manhattan named Callidus Software, Inc. In his spare time, he helps with sales and marketing for his family's product, Hangover Buster.

April L. Richter '08 of Manheim, Pa., accepted a position upon her graduation in January 2008 with the Hershey Company as an assistant food technologist.

Lillian "Na" Sin '08 of North Plainfield, N.J. is an actuarial student at Hewitt Associates LLC.



Prepared by
Lisa Gilbert '11

Outstanding

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 14, 2008. Of more than 80,000 CALS alumni, since 1977, only 193 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. Each has 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 each recipient are included here. More information is available on the web site at www.cals.cornell.edu/cals/alumni-friends/alumni-association/outstanding-alumni/index.htm.



Uma Lele, MS '63, PhD '65, is an internationally recognized economic expert in the complex interactions among agricultural policy, agricultural growth, and equity in influencing development.

The first woman to be awarded a PhD in agricultural economics at Cornell, Lele joined the World Bank in 1971. Her work on agricultural and rural development of Sub-Saharan Africa in the 1970s and 1980s was widely recognized.

In 1990 Lele moved to the University of Florida as graduate research professor and served as director of international studies. She was the founding director of President Jimmy Carter's Global Development Initiative in 1993. She returned to the World Bank and served as senior advisor prior to retiring from the bank in 1995.

At the World Bank, Lele co-chaired international taskforces that led to the formation of the Global Research on Environmental and Agricultural Nexus Initiative, as well as the China Council on International Environment and Development. She led evaluations of policies and programs on climate change, international financial stability, international trade, and health.

Lele continues to serve in advisory roles at the World Bank and other international organizations, including the U.N.'s Food and Agricultural Organization. She is a member of the CALS Alumni Association and President's Council of Cornell Women. She also has begun philanthropic activities in India to empower girl children and women living in poverty.

Lele lives in Washington, D.C.

Geraldine F.R. McManus '78 is the managing director of the Investment Management Division of Goldman Sachs & Co., where she leads an investment management team of seven professionals with \$6 billion under investment.

After graduating from Cornell, McManus worked for the International Financial Institution group at Citibank. She also worked for Salomon Brothers and Merrill Lynch before taking a three-year hiatus to spend time with her family. She joined Goldman Sachs in 1998.

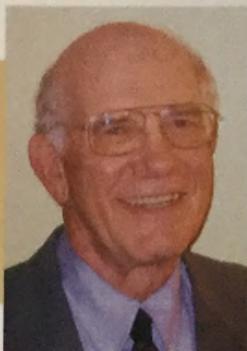
McManus is a member of the Undergraduate Business Program Advisory Council in the Department of Applied Economics and Management, for which she has served as event keynote speaker and panelist. She was a primary force in helping the council develop its diversity program, for which she contributed seed money for programming.

McManus also served on the Cornell University Council from 2003–2007. She participates in reunion campaign and major gift committees at Cornell.

She serves on the New Jersey Conservation Foundation board of trustees and volunteers at St. Benedict's Preparatory School in Newark, working with disadvantaged inner-city young men. In 2006, McManus personally arranged for a group of St. Benedict students to come to Cornell and spend a few days visiting the campus.

McManus lives in Far Hills, N.J., with her husband, Richard Hand, and their four children.

Alumni Awards



Mary A. (Mollie) Pulver '80 is the assistant vice president and relationship manager for the agricultural lending institution, NBT Bank, a top-100 U.S. agricultural bank. She works closely with the New York Bankers Association, Cornell Cooperative Extension, and FarmNet.

Upon graduation from Cornell, Pulver became a loan officer with Farm Credit and an appraiser for a private real-estate appraisal firm before moving to the commercial agriculture-finance world.

Pulver is a volunteer and leader for the CALS Alumni Association and ambassador in the recruitment of future Cornellians. In the fall of 1997, she took over as district director for the Alumni Association in the Mohawk Valley area, helping update its five-year plan and restructure its board of directors.

Pulver also has served as a member of the Cornell Alumni Federation and the Cornell Alumni Admissions Ambassador Network. She helped found the Liberty Hyde Bailey Leadership Society.

In 2008 Pulver was awarded the Jane Longley Cook '69 Distinguished Service Award by the National Agricultural Alumni and Development Association.

Pulver was Volunteer of the Year in her community in 2007. She volunteers with Court Appointed Special Advocates and the Peacemaker Programs of Herkimer and Oneida counties. She is also a member of the CASA advisory board.

Pulver lives in Little Falls, N.Y.

Richard F. Vincent '59 is the retired vice president of operations for Riviana Foods Inc. Currently he serves on the board of directors of Patriot Biofuels Inc. of Little Rock, Arkansas, and the Food Service Nutrition Advisory Council at Texas A&M University.

Vincent's career started with Oscar Mayer & Co., before graduate school at the University of Wisconsin. He then moved on to New Jersey and Chicago, Illinois, with Mars, Inc. and Nabisco Brands Inc. He also served as vice president of research and development for Uncle Ben's Foods.

Vincent's professional interest in biofuels meshes perfectly with his role on the Department of Biological and Environmental Engineering (BEE) Advisory Council. He is also a member of the Cornell Alumni Admissions Ambassador Network, Cornell Alumni Association of Greater Houston, and Cornell University Council. He currently chairs the Houston Tower Club Committee.

Vincent, who excelled as a collegiate wrestler, is passionate about Cornell athletics. In 2007, he was elected to the National Wrestling Hall of Fame. He has served as a volunteer coach for many local schools and as a member of the College Sports Council, USA Wrestling, and U.S. Olympic Committee.

He also currently serves on the national board of directors for Easter Seals, an organization with which he has been involved for many years.

Vincent lives in Houston, Texas, and has three children.

Gary D. Fenstermacher '61, PhD '70, is professor emeritus in the School of Education at the University of Michigan, where he served as a professor from 1996 to 2007. He is a national leader and an internationally recognized scholar in the field of education.

Fenstermacher first served as an instructor in the School of Education at New York University. After earning his PhD at Cornell, he served at the University of California, Los Angeles, as director of teacher education and head of supervised training. He was promoted to associate professor and became head of the program in history and philosophy of education, serving from 1974–1977.

He also taught at the Virginia Polytechnic Institute and State University and served as chair of the graduate program in education and as director of the Northern Virginia Graduate Center. Following that, Fenstermacher was appointed dean of the College of Education at the University of Arizona, Tucson, where he provided leadership for five years. In 1996, he joined the faculty at the University of Michigan.

Fenstermacher also was selected as a senior associate for the Center for Educational Renewal and as a senior fellow for the Institute for Educational Inquiry, both at the University of Washington.

In 1999, Fenstermacher served as the team leader for an external review of CALS Department of Education. He also chaired the Special Advisory Committee that oversaw the department's reorganization.

Fenstermacher lives in Tucson, Ariz., with his wife, Virginia Richardson.

Outstanding Alumni

(continued)



YOUNG ALUMNI ACHIEVEMENT AWARDS

Dale A. Porter '95, PhD '01, is a senior scientist at the Novartis Institute for Biomedical Research, leading teams working on cancer-drug discovery. He also has maintained an enthusiasm for teaching and training students and keeping close ties to Cornell.

Porter studied for both his bachelor's degree and PhD in Cornell's Department of Animal Science before he became a post-doctoral fellow at the Dana-Faber Cancer Institute. There, he identified HIN-1, a tumor-suppressing gene, characterized the IBC-1 (invasive breast cancer-1) oncogene, and worked on SAGE (serial analysis of gene expression), an analysis of human breast carcinomas.

In 2004 Porter embraced an invitation from CALS to be one of the first to host a career exploration trip to connect undergraduates with alumni working in science-related careers. He planned a comprehensive visit to his employer, Novartis Institute for Biomedical Research. Since that trip, he has played a key role in three other trips that have occurred in different regions.

An active alumnus, Porter has served as the Boston District director on the CALS Alumni Association board of directors.

Porter received the Howard Temin Career Award in 2003 from the National Cancer Institute, the National Research Service Award in 2002 from the National Institutes of Health, and the Catalyst Award for innovative drug discovery at Novartis.

Porter lives in Jamaica Plain, Mass.



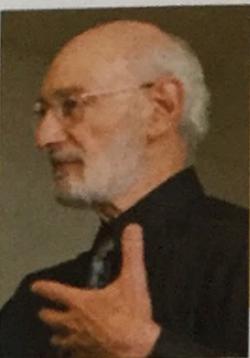
Katherine E. "Kate" Snow '91 is the co-anchor of the weekend edition of "Good Morning America" on ABC News, a role she has held since 2004. She reports on subjects ranging from immigration to daycare, energy policy to Oscar fashions, and stem-cell research to Katrina evacuees.

After graduation, Snow covered the 1992 Summer Olympics in Barcelona for NBC Radio. She then worked as a reporter for National Public Radio and for KOAT-TV before becoming a CNN congressional correspondent.

Snow joined ABC News in 2003 as White House correspondent for "Good Morning America." She covered President George Bush and his administration. She reported extensively on the global war on terror, the war in Iraq, social security, health care, and the economy. In 2004 she was the first network reporter to travel with Senator John Kerry during his bid for presidential nomination. Beginning in 2007, she followed Senator Hillary Clinton's presidential campaign, reporting from across the country.

Snow is an active volunteer for Cornell. In 2006, she participated in a career panel and guest lectured in two Communication courses. For several years, she has hosted a senior Communication class trip to New York City at the ABC News studios. She currently serves on the national board of directors for Big Brothers Big Sisters of America.

Snow lives in Westchester, N.Y., with her husband, Christopher Bro, and their two children.



OUTSTANDING FACULTY/STAFF AWARDS

Joseph M. Calvo is the William T. Keeton Professor of Biology and a faculty member in the Department of Molecular Biology and Genetics. He joined the Cornell faculty in 1964 and became a full professor in 1979.

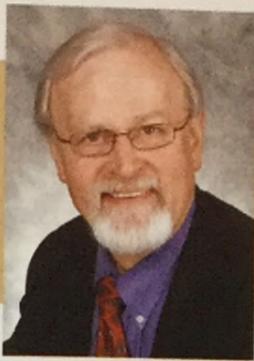
Professor Calvo teaches biochemistry and molecular biology at both the graduate and undergraduate level. Since receiving the Keeton professorship in 1983, Calvo has used his endowment to support a variety of projects relating to undergraduate education, including research opportunities for undergraduates, scholarship and renewal activities for senior lecturers, and a new freshman course, Milestones in Molecular Biology.

Calvo stands out especially for his commitment and contributions to undergraduate biology instruction. In 1971, he spent a sabbatical leave developing a new approach to personalizing the teaching of biochemistry to large numbers of students. That experience led to one of the most popular courses in biology, the auto-tutorial biochemistry course, BioBM330. He was awarded the SUNY Chancellor's Award for Excellence in Teaching in 1979 largely because of this teaching innovation.

Calvo's research is in the area of regulation of gene expression, specifically the amino acid, leucine. He and his co-workers discovered Lrp (leucine-responsive regulatory protein), a global regulator of metabolism in bacteria.

Calvo lives in Ithaca, N.Y., with his wife Rita A. Calvo, PhD '69, a senior lecturer in the Department of Molecular Biology and Genetics. They have three children.

Awards



Per Pinstrup-Andersen is the H.E. Babcock Professor of Food, Nutrition, and Public Policy and the J. Thomas Clark Professor of Entrepreneurship and Personal Enterprise in the Division of Nutritional Sciences. A member of the CALS faculty since 2003, he has distinguished himself with outstanding individual scholarship as well as engagement with multidisciplinary teams and practitioners in policy analysis, food systems, and policy making.

In addition to teaching popular graduate and undergraduate courses and advising students, Pinstrup-Andersen conducts research on government policy related to food, nutrition, and agriculture. His current interest is the impact of globalization on low-income people in developing countries and their nutritional status, with emphasis on obesity and chronic diseases.

Pinstrup-Andersen is currently leading an international collaborative effort to create a program enhancing undergraduate and graduate training in policy analysis for the global food system, with emphasis on developing countries and social entrepreneurship.

In 1993, Pinstrup-Andersen launched the 2020 Vision Initiative, the most comprehensive and ambitious research and dissemination program ever undertaken on global food security. In 2001 he was awarded the World Food Prize for contributions to the improvement of agricultural research, food policy, and the lives of the poor.

Pinstrup-Andersen lives in Ithaca, N.Y., with his wife, Birgit.

Moving?

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

Name _____

Class Year _____

I.D. # _____

Alumnus Faculty Friend

Former Address

New Address

Phone _____



Cornell Sheep Program BLANKETS

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

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

Lap robe (60 x 48 inches, 1 stripe)	\$80
Single (60 x 90 inches, 3 stripes)	\$111
Double (72 x 90 inches, 3 stripes)	\$122
Queen (78 x 104 inches, 3 stripes)	\$149

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

Additional information about the blankets is available at:
www.sheep.cornell.edu (click on "blankets")

Purchase at the Cornell Orchards, the Cornell Dairy Store, or from the Department of Animal Science in 114 Morrison Hall, Cornell University, Ithaca, NY 14853-4801 or by telephone (607-255-7712), fax (607-255-9829), or email cspblankets@cornell.edu.

End Note

Weill Hall Opens for Business

Bright White, Open Spaces, Natural Light



Kent Loeffler, Cornell University

Walking into Weill Hall, you notice its open spaces, stark whiteness, and flowing light throughout. With great expectations, the \$162 million, 263,000-square-foot building, designed by architect Richard Meier '56, BArch '57, opened officially in October. Weill Hall is "important for intellectual and physical connections" within the life sciences at Cornell, says Stephen Kresovich, Cornell vice provost for life sciences. The research facility is a keystone of the New Life Sciences Initiative—Cornell's approach to providing national and international leadership to the genomics-led science revolution in which CALS researchers play a leading role. The building carries the silver rating in Leadership in Energy and Environmental Design (LEED).

The atrium is the building's artistic centerpiece, featuring a wall of windows, dark granite floor, and four stories of balconies. The space is designed with clean, straight lines moving up to a large sky window. With work space for 400 to 500 people, the building provides faculty members and students with leading-edge laboratories and meeting places for interdisciplinary research and teaching in the biological, physical, engineering, computational, and social sciences.

The H. Laurance '60 and Nancy L. Fuller '62 Learning Center, a wing on the second floor, is designed to promote both formal and informal exchanges among researchers, faculty, and students. The wing features two state-of-the-art video-teleconferencing rooms for distance collaborations, both of which are served by a high-tech control room. The fourth floor features the university's Innovation Development and Economic Application (IDEA) Center, a business incubator to serve as a launching pad for Cornell startups. The center's layout is designed to facilitate the ability of occupants to develop proofs of concept and to support the need for protection of intellectual property.

Features that help the building meet a silver LEED rating, with the potential for gold after its first year of operation—a rarity among research facilities—include: construction debris recycling; Cornell's sustainable transportation management plan; a high amount of material manufactured within 500 miles of the site; use of recycled materials such as the white aluminum panels on the exterior skin; green living roofs; reflective, colored sidewalks to reduce heat; and energy-conservation measures such as reduced airflows in empty rooms and lighting controls with occupancy sensors.

Krishna Ramanujan

CREATIVE WAYS TO GIVE

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

The CALS Development Office is available to help you explore creative ways to meet your personal and philanthropic goals while making a significant impact on the College. For more information or to make a gift in support of one or more of these priority needs, please contact Mike Riley, Associate Dean for Alumni Affairs, Development, and Communications, College of Agriculture and Life Sciences, at mpr2@cornell.edu or (607) 255-7635.

Dean's Discretionary Fund

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

Water and Garbage and You, Oh My!

Help develop ways to protect water quality and teach the next generation of professionals how to realize this protection by funding Geographic Information Systems (GIS) and computational (MATLAB and/or COMSOL) facilities.
\$18,000 (Biological and Environmental Engineering)

Earn Bragging Rights!

Send an award-winning team of motivated Food Science students to compete for a national title for the best new food product in the U.S. at the Annual Meeting of the Institute of Food Technologists.
\$9,000 (Food Science)

Streamline Upstate Weather

After 100 years of recording weather conditions for research, education, and decision making activities, the New York State Agricultural Experiment Station is ready for an instrumentation upgrade to access real-time data.
\$5,000 (Plant Pathology)



A "Mean" Request

Purchase statistical software used by graduate students whose research focuses on economics issues related to agriculture, the environment, or international development.
\$500 (Applied Economics and Management)

International Support!

Help fund the study and research of Development Sociology international graduate students who often come from poor areas with little support, but bring back to their homes a wealth of knowledge.
\$25,000 (Development Sociology)

Bring a Star to Campus

Provide seed money for an annual, public seminar by a premiere Agricultural Sciences speaker.
\$1,000 (Crop and Soil Sciences)

Have a Rice Day!

Support a graduate student to spend a few weeks at the International Rice Research Institute learning about the world's most important crop.
\$4,000 (International Agriculture)

Can You See What I See?

Support Insectapalooza 2008—the Department of Entomology's annual open house that attracts 2,000-3,000 visitors each year.
\$4,000 (Entomology)

Hungry for Video Conferencing

Provide video conference services for a Nutritional Sciences seminar room in Savage Hall used for upper- and graduate-level nutrition courses.
\$20,000 (Nutritional Sciences)

Pitch a Tent!

Help shelter Natural Resources students with a gift of tents as they do weekend field trip course work.
\$500 (Natural Resources)

Save the Birds!

Help save the irreplaceable mounted birds and mammals used for teaching Vertebrate Biology in Stimson Hall by purchasing a display case and funding a conservator's work.
\$5,500 (Ecology and Evolutionary Biology)

A Place to Lay Their Head

Help supply furniture for student housing at the Cornell Biological Field Station, which is currently being renovated and expanded thanks to funds from the NY State Legislature and the National Science Foundation.
\$20,000 (Natural Resources)

Research Needed

Sponsor two full-year undergraduate research projects for the Food and Brand Lab.
\$23,000 (Applied Economics and Management)

High School Teachers' Workshops

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

Computers for Communication

Provide two computers for the Department of Communication graduate student common areas.
\$3,000 (Communication)

STAY CONNECTED VIA E-MAIL!

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

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

Visit the college's web site at

www.cals.cornell.edu

Students taking Dr. Kathie Hodge's course, *Mushrooms of Field and Forest*, take "fungal forays" in the field and in the lab. Dr. Hodge also hosts and edits the Cornell Mushroom Blog at <http://blog.mycology.cornell.edu>.

Kent Loeffler, Cornell University



Cornell University
College of Agriculture
and Life Sciences

Alumni Affairs, Development, and Communications

274 Roberts Hall

Ithaca, New York 14853-5905

CHANGE SERVICE REQUESTED