#MENTORSHIP: Students and Faculty Tag Team

BIG QUESTIONS

Cracking Climate Change
#CornellInstituteforClimateChangeandAgriculture

Feeding the Future
#FoodScience

Different by Design
#LandscapeArchitecture

Breakthroughs in Branching
#BiologicalSciences #MolecularBiologyAndGenetics

Dissecting Dynamics
#Communication

Cornell University
BIG DATA IS A BIG DEAL
Researchers in CALS harvest big data for fighting diseases, dissecting communication, mitigating climate change and tracking the future of commerce.

MOMENTUM FROM MENTORING
Meet some exceptional students and the mentors who have guided their trajectory.

CHEMICAL CONVERSATIONS
Eavesdrop on the interspecies spy games that use chemicals as a common language.

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INSIDE: A pine warbler sits among Gerbera daisies. The Cornell Lab of Ornithology selected this photo by Judy Lyle from Tallahassee, Fla., as the winner for best composition out of more than 4,000 entries submitted during the 2014 Great Backyard Bird Count. In addition to the photos, participants submitted data on 17 million birds during the four-day count, recording 4,296 species, nearly half of the world’s bird species.
As I look ahead to my second term as dean of Cornell University’s College of Agriculture and Life Sciences, I also find myself reflecting upon the college’s recent accomplishments. In June 2014, we launched the School of Integrative Plant Science with the goal of enhancing Cornell’s leadership in plant, soil and related microbial sciences. More recently, we were deeply gratified by U.S. News and World Report’s recognition of Cornell as the Best Global University for Plant and Animal Science, highlighting our world-renowned academic leadership across these critical disciplines. Bloomberg Businessweek identified the Charles H. Dyson School of Applied Economics and Management as having the top-ranked undergraduate business program in the Ivy League and ranking third, overall, in the nation. In the past few years, the number of applicants to our undergraduate programs has reached record highs across the college, yielding the most diverse student population in CALS’ history. New experiential learning opportunities have been launched for students, and multiple curricula have been completely revamped, including the Fall 2013 initiation of the new interdisciplinary environmental and sustainability sciences major. We are nearing completion of the Stocking Hall renovation and will be celebrating completion of the Warren Hall renovation later this spring. These accomplishments were made possible through the support and commitment of our faculty, staff, university leadership, students, alumni, state stakeholders and other friends of the college.

Our recently completed strategic plan (learn more on page 39) addresses many grand challenges that face our world today, from local to global scales, in the life sciences, the environmental sciences, in social sciences, and across food and energy systems. Our faculty, staff and students are already taking on many of these challenges. For example, the feature on big data (pages 12-17) shows the revolutionary ways we are harnessing new information science tools to probe the dynamics of public discourse and refine climate predictions to help protect vulnerable crops. Fifty years after Cornell pioneered the field of chemical ecology, our scientists continue to push the envelope in this discipline, thanks to new technologies and broad collaborations (pages 25-29).

The core of our mission will always revolve around supporting our students, who—through our resources, technology and programs—will become society’s leaders of tomorrow. Because CALS is at the forefront of finding solutions to today’s most difficult and critical challenges, we are attracting the best and most diverse students from around the globe, as illustrated by the promising students and their distinguished faculty and staff mentors highlighted in the photo feature (pages 18-24).

As always, thank you for your continued interest in and support of all that we do. This year of our Sesquicentennial Celebration coincides with one of the most exciting periods in the history of Cornell and CALS. Charter Day Weekend (more details on the back cover) provides a perfect opportunity to return to campus to join in the many festivities. I hope to see you on campus during this year of our Sesquicentennial Celebration. I look ahead to my second term as dean, and will be celebrating completion of the Warren Hall renovation later this spring. These accomplishments were made possible through the support and commitment of our faculty, staff, university leadership, students, alumni, state stakeholders and other friends of the college.

Kathryn J. Boor
Ronald P. Lynch Dean of the College of Agriculture and Life Sciences
VIRUS IS CULPRIT IN SEA STAR WASTING DISEASE  By Amanda Garris Ph.D. ’04

Since 2013, millions of sea stars native to the Pacific coast of North America from Baja California to southern Alaska have succumbed to a mysterious wasting disease in which their limbs pull away from their bodies and their organs exude through their skin—a disease researchers say could trigger an unprecedented ecological upheaval under the waves.

Ian Hewson, associate professor of microbiology, and colleagues identified the deadly culprit as the sea star associated densovirus (SSaDV), a type of parvovirus commonly found in invertebrates.

“There are 10 million viruses in a drop of seawater, so discovering the virus associated with a marine disease can be like looking for a needle in a haystack,” Hewson said. “Not only is this an important discovery of a virus involved in a mass mortality of marine invertebrates, but this is also the first virus described in a sea star.”

Hewson suggests that the virus has been smoldering at a low level for many years. It was present in museum samples of sea stars collected in 1942, 1980, 1987, and 1991, and it may have risen to epidemic levels in the last few years due to sea star overpopulation, environmental changes or mutation of the virus. Sea water, plankton, sea urchins, brittle stars, and sediments and water filters from public aquaria also harbored the virus.

The research lays the groundwork for understanding how the virus kills sea stars and what triggers outbreaks. The stakes are high, according to Drew Harvell, professor of ecology and evolutionary biology and a co-author of the study. As voracious predators on the ocean floor, sea stars are “keystone” species that have a large role in maintaining diversity in their ecosystem.

“It’s the experiment of the century for marine ecologists,” Harvell said. “It is happening at such a large scale to the most important predators of the tidal and sub-tidal zones. Their disappearance is an experiment in ecological upheaval the likes of which we’ve never seen.”

Both the National Science Foundation and Cornell’s David R. Atkinson Center for a Sustainable Future provided rapid response funds to Hewson and his co-principal investigator, Ben Miner of Western Washington University.
A LEADING LANDSCAPE  The bioswale garden at the Cornell Plantations’ Nevin Welcome Center is not just another pretty place. An analysis by the Landscape Architecture Foundation (LAF) found the bioswale, designed to mitigate the impact of storm runoff from the parking lot, eliminates an estimated 78,000 gallons of runoff per year, reducing annual storm water runoff from the site by 31 percent. The blooming biodiversity, which includes more than 50 species of drought and water tolerant plants, also reduced pollutants in parking lot drainage, concentrating heavy metals in bioswale soils and decreasing their concentrations in water flowing out. Plantations’ bioswale garden was selected as one of the LAF case studies as an example of an exemplary project with quantified environmental, economic and social benefits. “The bioswale garden has quickly become one of the premier gardens of its kind in the country,” said Christopher Dunn, the E. N. Wilds Director of Cornell Plantations. “It is inspiring other botanic gardens to create similar gardens in their communities and in their own backyards.” Photo: Chris Kitchen

Biodiversity and Bears

What is the best way to conserve biodiversity in Ecuador’s Andes Mountains? Start with the bears. A Cornell research team is joining efforts with local partners in Ecuador to help design a socio-ecological corridor that could help save endangered, threatened and endemic species in that country’s Andes region. The team is headed by Angela Fuller, leader of the New York Cooperative Fish and Wildlife Research Unit and assistant professor in the Department of Natural Resources.

Ecuador’s mountain forests are a hotspot of rich biodiversity, but many of those species are threatened by increased deforestation and fragmentation due to activities such as agriculture and cattle ranching. In 2013, the Secretary of the Environment of the Quito Municipal District in Ecuador established an ecological corridor and conservation program for the endangered Andean bear (Tremarctos ornatus) around the northwest area of the district. The Andean bear is considered an “umbrella species,” in that it has large spatial requirements and similar habitat needs as other species of conservation concern in the region.

Fuller’s team is helping expand that ecological corridor to connect to the Cotacachi-Cayapas Ecological Reserve to the north and the Illinizas Ecological Reserve to the south. In January, they traveled to Ecuador to meet with project partners and local communities and to begin assessing the issues that will influence the configuration of the potential corridor, such as biodiversity, sustainability, economic stability of local communities and social acceptability.

A MEATY INVENTION

Think tofu but with a creepy-crawly, sustainable twist: A Cornell food science team has developed a new protein product—C-fu, made entirely of crushed mealworms—which may help feed the world’s booming population, a projected 9 billion people by midcentury.

“C-fu can do a lot of things because it’s not just a single product. It’s a raw material that can be the platform for a whole new array of insect-sourced foods. It’s analogous to fresh cheese or tofu, which can be modified or reprocessed into hundreds or even thousands of very different foods,” said Lee Cadesky, a graduate student in the field of food science, who leads the team.

Fried, boiled, baked, dipped, grilled, fermented, salted or dried, C-fu has been described as “nutty,” “bready” and “eggy.” Fabulously dense in micro-nutrients, it requires a tiny fraction of land and water to produce compared with beef and chicken. Of this protein source, Cadesky said, “We’ve only scratched the surface. There are 1,900 edible insect species, and we think we can make C-fu from most, if not all, of them. We want to taste the whole edible taxonomy and create completely new foods that humans have never seen.”
**A PROBIOTIC A DAY**

Imagine a daily pill that can help control diabetes using the body’s own insulin. John March, associate professor of biological and environmental engineering, and collaborators have achieved this feat in rats using an engineered probiotic. Their special strain of Lactobacillus produces a protein that triggers insulin release, and diabetic rats given a daily dose for three months had up to 30 percent lower blood glucose levels than untreated rats. The probiotic converted a fraction of the cells on the inside surface of the rats’ upper intestine—approximately 1 in 1,600—into insulin-pumping pancreatic mimics. The technology is being licensed to BioPancreate, a wholly-owned subsidiary of Cortendo AB, a biopharmaceutical company incorporated in Sweden and based in Radnor, Pa., which will refine the therapy for human use.

**A NEW ANGLE ON ORCHARDS**

A Cornell-U.S. government research team is poised to transform the shape of trees and orchards to come, thanks to a $1.5 million grant from the National Science Foundation Plant Genome Research Program. The project, led by Kenong Xu, assistant professor of horticulture at Cornell’s New York State Agricultural Experiment Station in Geneva, will target the genes that control branch growth in peach and apple trees. Tree architecture is a hierarchical affair, with upper shoots and branch tips inhibiting the growth of those below them, and over time mutations in the gene network have produced beautiful and functional variations in branch angle: apple trees that weep, are prostrate, or rise in a straight column. A breakthrough in optimizing the angle of branches would allow high-density planting in orchards for more efficient use of land space, improved productivity, and increased industry profitability and sustainability.

**GIVING BIOFILMS THE SLIP**

Just as the invention of nonstick pans was a boon for chefs, a new type of nanoscale topography that repels bacteria holds promise for any surface where microbes are unwelcome guests—including food processing equipment, medical equipment and even ship hulls. Surfaces in regular contact with moisture are at high risk of biofilm formation, as microorganisms adhere, multiply and form stubborn colonies. The new technology, developed collaboratively by researchers from the Department of Food Science at Cornell University and Rensselaer Polytechnic Institute, creates nanoscale pores on a metal’s surface. The presence of pores changes the electrical charge and surface energy, preventing would-be colonists from sticking, as demonstrated in a test case using aluminum and lab surrogates of the human pathogens *E. coli* O157:H7 and *Listeria monocytogenes*. According to Carmen Moraru, associate professor of food science, it’s probably one of the lowest-cost ways to manufacture a nanostructure on a metallic surface and will be more effective than chemical or antibacterial options for equipment parts that are hard to reach for cleaning.

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**fortune in flux:**

Is affluence fluid (and fair)?

Most Americans hold fast to the belief that hard work will be rewarded economically. In a study of nearly five decades of income mobility, Professor of Development Sociology Tom Hirschl and colleagues tracked the changes in income of thousands of people over the course of their work life.

- 11.1 percent of workers will spend at least one year as members of the top one percent (a 1-in-9 chance), but most are short-timers: only 0.6 percent will stay there for more than a decade.
- 53 percent of workers will have at least one year among the top 10 percent.
- By age 60, almost 70 percent of the working population will experience at least one year in the top 20 percent of income earners. Of those, 20 percent will stay for 10 consecutive years or more.

Age 45 to 54 is the prime time to hit a year of affluence: 55.8 percent of those 45 to 54 will experience at least one year of household income in the top 20th percentile. Those who are older, white, married, and who have greater than 12 years of education and do not have a work disability are significantly more likely to encounter a year of affluence.

“Education, marriage and race are among the strongest predictors of top-level income, and in particular the race effect suggests persistent patterns of social inequality. It would be misguided to presume that top-level income attainment is solely a function of hard work, diligence and equality of opportunity.” - Tom Hirschl

For more information: DOI: 10.1371/journal.pone.0116370

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**College of Agriculture and Life Sciences at Cornell University**
MAKING THE MOVE TO MANN

After more than two decades in Kennedy Hall, the Department of Communication is moving across the Quad to a new home on the fourth floor of Mann Library. Renovation of the space has begun, making way for a layout that values connectivity and cooperation and reflects the evolution of the field in the digital age. At the heart of the design is the Hub (pictured above), a common area filled with moveable workspaces to invite spontaneous interaction, encouraging faculty and students to meet and work together. For the first time, graduate student and department faculty offices will be arranged into “neighborhoods” surrounding research labs. In addition to dedicated laboratories for media effects, intercultural communication and social media, several flex research spaces will welcome ad hoc teams to collaborate. With a $5 million capital campaign underway to fund the remodel, the move is expected to be completed just in time for fall semester.

LEADERSHIP TRANSITIONS IN 2015

Three leadership transitions are bringing new perspectives and experiences to the college’s associate deans. This team reports to and works closely with the dean.

Susan Brown became an associate dean in CALS and the Goichman Family Director of the New York State Agricultural Experiment Station (NYSAES) on Jan. 2. Brown had served as associate director of NYSAES since July 1, 2013. Among her responsibilities was stewarding the NYSAES strategic planning process, in concert with a faculty committee and community input. As a faculty member in the section of horticulture in the School of Integrative Plant Science, she runs one of the largest tree fruit breeding programs in the world. Her professional achievements have been recognized with a 2013 SUNY Chancellor’s Award for Excellence in Faculty Service and a 2012 CALS Alumni Association Outstanding Faculty Award. The New York State Senate named her a Woman of Distinction in 2014.

“Implementation of our new strategic plan is my highest priority, as it provides new ideas, including efforts to better inform consumers and the industry about what we do at NYSAES,” Brown said. “Another priority is growing our funding sources and bringing greater visibility to our campus.”

The other two transitions are related: On July 1, Beth Ahner will become a senior associate dean in CALS, as current senior associate dean Jan Nyrop will become director of the Cornell University Agricultural Experiment Station (CUAES) on Sept. 1.

Ahner is currently chair of the Department of Biological and Environmental Engineering. Her research explores basic science in pursuit of better engineering solutions. In particular, she seeks to understand how organisms adapt to the stress of trace metals in the environment and in turn, how they influence the form of metals in the environment. In her courses, she teaches students to recognize the complexity of environmental problems and to implement efficient and environmentally sound solutions to them.

“I look forward to the challenges of a new role in CALS,” Ahner said. “It will be rewarding to work closely with the department chairs and leadership team to support the amazing work that goes on throughout the college.”

Nyrop has served as a CALS senior associate dean since January 2007. In that role, his responsibilities have included faculty affairs, department and program reviews, sponsored research oversight, management of core research funds, and academic aspects of facilities and human resources. His academic appointment is in the Department of Entomology with responsibilities for research, teaching and extension. The goal of his research is to develop concepts and tools that support biologically based management of arthropod pests.

“CUAES plays a crucial role in providing facilities and resources that enable faculty and staff to contribute towards nutritional security, food safety and sustainable development of communities in New York, the region and the world,” Nyrop noted. “I look forward to working with faculty and staff to identify how this important mission should continue to evolve in response to a rapidly changing world.”
FROM CORPS TO CROPS  By John Carberry

The Northeast Beginning Farmer Project is taking on a new mission designed in part to help returning veterans find futures in farming, thanks to a grant from the U.S. Department of Agriculture.

The Northeast Beginning Farmer Project, part of the Cornell Small Farms Program, was awarded $712,500 through the National Institute of Food and Agriculture’s Beginning Farmer and Rancher Development Program. The money will be used to create community-based training programs and farmer-to-farmer networks to support what organizers call two underserved groups—military veterans and “advanced beginners” who have been farming from four to seven years.

“Supporting new farmers is core to the mission of the Cornell Small Farm Program and our numerous partners,” said Anusuya Rangarajan, a senior extension associate in Plant Science and director of the Small Farms Program. “This USDA investment will allow us to build new pathways for veterans entering agriculture and for entrepreneurs growing their farming businesses.”

Rangarajan said the federal funds—to be supported by another $218,000 from the Local Economies Project of the New World Foundation and $100,000 from the New York Farm Viability Institute—will be used to create new communications tools and educational strategies to attract and keep military veterans in farming. She and her team plan to create a permanent, statewide network linking veterans and their service providers to agricultural support resources. The program’s organizers also hope to develop and demonstrate new educational approaches to get veterans interested in farming.

On behalf of the College of Agriculture and Life Sciences, we commend the collaborative work that will continue to make these crucial efforts successful, and we are grateful for the USDA’s support of this key program,” said Kathryn J. Boor, the Ronald P. Lynch Dean of the College of Agriculture and Life Sciences. “This initiative reflects our Land-Grant Mission, and its outcomes speak to our delivery of knowledge with public purpose. We are honored to play a part in serving those who have served our country.”

REGиональные продукты = сельская революция? By Amanda Garris Ph.D. ‘04

Conventional wisdom holds that re-localizing food systems is not only good for urban consumers hungry for ripe tomatoes and crispy apples, but it also benefits rural communities through greater profits for farmers. A team led by Todd Schmit, an associate professor in the Charles H. Dyson School of Applied Economics and Management, has been awarded a $500,000 grant from the National Institute of Food and Agriculture to put this hypothesis to the test.

“There is unmet, growing demand for local products, but the idea that rural-urban food linkages are a genuine benefit to rural communities hasn’t been verified, although the USDA has invested over $300 million in local food initiatives in primarily urban areas in the last five years,” Schmit said. “And, ultimately, we want to know do they create wealth for farmers and in rural communities?”

The two-year case study will be based on GrowNYC’s Greenmarket, which runs 54 farmers’ markets in the New York City area, supplied by more than 240 fishermen and farmers from across the Northeast. In addition to measuring the economic impact of the sales at the markets, they will use GIS (geographic information system) to map where wealth is created and analyze the profitability—or losses—in moving products from rural to urban markets. Their accounting will also develop a framework to measure community wealth and capital beyond dollars and cents, including natural, social, intellectual and cultural capital.

“For example, if a farmers sells in the city rather than in their local farmers’ market, is there a negative flow of social capital, because the farmer is not interacting with more local customers? Does the higher income from selling in the city lead to the ability to retain greater habitat for wildlife and therefore increase natural capital?” Schmit said. “We are looking at broader ways to define wealth indices.”

To solve this complicated equation, Schmit will work with a team of collaborators including David Kay, development sociology senior extension associate; Jennifer Minner, assistant professor of city and regional planning; and Becca Jablonski B.A. ‘03, Ph.D. CRP ’14, a postdoctoral fellow in the Department of Agricultural and Resource Economics at Colorado State University.
STARTUP GRADUATES FROM MCGOVERN INCUBATOR

By Anne Ju

bolstered by a $2.3 million venture capital investment, an agricultural technology startup has moved on from its first home in Cornell’s life sciences business incubator, a little more than a year after it arrived. Agronomic Technology Corp., which makes the software Adapt-N, is the first fledgling business to “graduate” from the three-year-old Kevin M. McGovern Family Center for Venture Development in the Life Sciences. Co-founded by Steve Sibulkin, Holly Trytten, and Greg Levow ’04, Agronomic Technology Corp. offers software to help farmers optimize nitrogen fertilization, based on work from the lab of Harold Van Es, professor of soil and water management. Taking science out of the lab and into the marketplace involves many complex moving parts, noted McGovern Center Director Lou Walcer. In Agronomic Technology’s case, “the university’s technology licensing did things right, Harold Van Es as a scientist did things excellently, the center did its part right, and the Agronomic Technology team did their part excellently,” Walcer said. “And now they’re on their way.”

FUELING CLASSROOM CURIOUSITY

By Alex Koeberle ’13

In high school classrooms around the United States, a kit developed at Cornell and brought to market by the Center for Technology Licensing (CTL) is introducing students to the science of biofuels.

Developed by Corinne Rutzke, M.S. ’98, Ph.D. ’00, a senior research associate in biological and environmental engineering, and co-author and inventor Michael Rutzke, Ph.D. ’01, a senior research associate in crop and soil sciences, the Biomass to Biofuel Kit for Advanced Placement students challenges students to design their own scientific experiments in converting plant material to ethanol biofuels.

“Just as space exploration inspired learning in the 1960s and beyond, the global environment and bio-based solutions inspire learning today. Agricultural, bio-based topics are an excellent platform for education because agriculture offers both touchable, recognizable, relevant aspects of everyday life, and abstract-thinking challenges that are at the cutting edge of science, engineering, technology and math,” said Corinne Rutzke, who also serves as the director of the Bioenergy and Bioproducts Education Programs funded through a grant from the U.S. Department of Agriculture. “We are hoping that access to this tool, and others like it, will help teachers engage students in math and science.”

The biofuels kit guides students in running a five-day experiment in 40-minute classes, evaluating how factors such as pH and heat affect the digestion of cellulose into glucose, the building block for ethanol biofuels. The lessons, geared toward high school students in Advanced Placement sciences classes, also demonstrate that scientific experiments do not always need to be elaborate and expensive. Students can go anywhere, even their own backyards, to find plant biomass raw material—such as grass and leaves—for the experiment, Corinne Rutzke said.

After a prototype kit was vetted by local science teachers, Corinne Rutzke turned to CTL to scale up and market the kit through a licensing agreement with the Carolina Biological Supply Company. CTL, a university-wide technology transfer service, assists faculty, staff and students in bringing ideas and products to the marketplace through help with licensing, marketing research and industry networking events.

“Our goal is to transfer Cornell ideas to the market to benefit the world,” said CTL technology licensing officer Jeff Fearn ’82. “Not every product idea has to be high tech. The AP Bio Kit is an example that’s really unique and has a lot of potential benefit to students.”

NEW ALFALFAS ADAPTED FOR NORTHEAST PESTS AND PRODUCTIVITY

By Alex Koeberle ’13

ew York farmers foraging for alfalfa varieties have three new, robust options. Developed by professor of plant breeding Donald Viands; senior research associate Julie Hansen ’80, M.S. ’88, Ph.D. ’89; and research support specialist Jamie Crawford ’01, the varieties were selected for higher yields, forage quality, and insect and disease resistance. A major accomplishment is the resistance of Seedway 9558 SBR to the root-crippling alfalfa snout beetle, the result of a collaborative effort of the team with entomology professor Elson Shields as well as plant scientists, entomologists, extension educators, and farmers who tested it across the state. Seedway 315LH combats the potato leaf hopper, an insect that can drastically decrease yields, and Seedway 215CR increases pasture field longevity, a project spearheaded by the late Royse Murphy, professor emeritus of plant breeding. All varieties are currently available to growers in New York and the Northeast through Seedway, Inc.

Corinne Rutzke, M.S. ’98, Ph.D. ’00, a senior research associate in biological and environmental engineering, walks students through steps in the Biomass to Biofuels Kit. Photo: Robyn Wisnua
CALS PROFS BOLSTER WEST CAMPUS COMMUNITY

By Alex Koeberle ’13

Located just below Libe Slope and home to more than 1,000 transfer and upper class undergraduate students, the five residence halls of the West Campus House System offer a living-learning community for students—and the resident faculty who participate as house professor-deans.

“Ezra Cornell did not want students just to live in dorms, he wanted them to live in a community,” said Garrick Blalock, Flora Rose House professor-dean and an associate professor in the Charles H. Dyson School of Applied Economics and Management. “I think West Campus is exactly the type of model Ezra would have envisioned for today.”

Blalock is one of three CALS faculty members serving as house professor-deans, living in the residence halls with their families. The unique arrangement fosters informal interaction between students and faculty members in a community that emphasizes social and cultural programming, including weekly house dinners, musical performances and opportunities for intellectual exploration.

“We want to bring the intellectual richness of the Ag Quad and all the opportunities on central campus to the houses,” Blalock said. “The Ag Quad can seem pretty far from West Campus, so we have a speaker series with many CALS faculty and bring the community here.”

“We also plan events for students to relax and explore the campus and Ithaca,” said André Dhondt, Alice Cook House professor-dean and the Edwin H. Morgens Professor of Ornithology in the Department of Ecology and Evolutionary Biology.

Past events have included visits to Fuertes Observatory, a weekly knitting club, pumpkin picking and even a yearly trip to Niagara Falls. Residents have also volunteered with Into the Streets and the Ithaca Children’s Garden and participated in other special events.

“I noticed a huge, blank cement wall in the Flora Rose House dining room and thought what a great chance to create something new,” Blalock said. “We even had a seminar showing students how they can make beautiful artwork with limited artistic experience and basic materials.”

Now in its tenth year, West Campus was intended to be a natural extension of the experience students share as first-year students on north campus, but West Campus living helps faculty, too. Each of the house professor-deans cited the ample luncheons, house dinners and social gatherings in their apartments as great ways to learn from the students.

“It’s a community within a larger community,” said Jeff Hancock, William Keeton House professor-dean, and professor in the departments of Communication and Information Science. “The faculty and student interaction results in a community with a unique flavor.”

ISLAND ENTERPRISE

By Amanda Garris Ph.D. ’04

A team of five graduate students was awarded first place in the annual Better Philadelphia Challenge for their proposal to improve food security in Pennsylvania’s Delaware River Valley over the next century. Landscape architecture students Li-Yu Pan, Chen Sun and Lishutong Zhang collaborated with regional planning students Akshali Gandhi and Robert Hanifin on the Delaware Valley FOODWORX proposal to transform Petty Island—an uninhabited 292-acre island in the Delaware River—into a lynchpin of food, economic and ecological security for the greater Philadelphia area. Their proposal included infrastructure for alternative transport including ferry, kayak and tramway, a center for urban agriculture development and education, a farmers’ market, a seed bank, and a towering sky farm (pictured at left), a futuristic prototype for sustainable, vertical farming in an urban setting.
**MEAL AS METAPHOR**

*By Valeria San Juan ’16*

Picture this: 20 hungry college students, a three-person restaurant staff, two very patient professors, a breathtaking view of the Ecuadorian Andean mountain range, and a street bustling with life unique to New Year’s Eve. Looking back at my experience with the service learning course IARD 4940: Special Topics in International Agriculture and Rural Development, I realize that our first meal in Ecuador was a metaphor for our month-long experience—hectic and confusing, but very fulfilling.

Before going to the restaurant, we planned, placing our orders two hours before arriving. When we arrived, few meals were ready, and missing ingredients forced some to make last-minute order changes. Likewise, fall semester was filled with preparation for partnering with community organizations in Ecuador working with handicrafts, eco-tourism, conservation and coffee production. We read, participated in activities and learned from guest speakers to help prepare us for whatever Ecuador had in store. But once there, our plans changed. My team had readied accounting software for the eco-tourism group Red Ecoturistica de Intag to help with their bookkeeping and reservation practices. However, when we arrived at their office, there was no internet connection to access the online accounting software. So, just like changing our orders, we changed our plans. We fumbled for a bit but quickly changed directions and focused on completing a marketing project to increase their international visibility and help them capture a new customer segment.

Despite our flexibility during our first dining experience, many dishes still arrived very late. My sautéed chicken in mushroom sauce arrived well after most of the class had their food, so team members shared theirs with me. This cooperation was crucial throughout our time in Ecuador; when the conservation team needed help with their reforestation project to prevent hill erosion, the other teams volunteered their time and labor to plant trees alongside a mountain hill.

Throughout dinner, conversation flowed, a first hint of the comradery that would develop during the trip. Even though we had spent the past semester working in separate teams, everyone came out from that dinner extremely satisfied and ready to welcome the New Year. My time in Ecuador left me with a similar feeling of fulfillment. I worked toward something greater than myself; I worked to support the community’s efforts to develop sustainable economic alternatives to mining, and along the way I gained new skills and connections.

Valeria San Juan is a senior majoring in international agriculture and rural development.

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**SIMIAN CENSUS: BLOGGING FROM BALACHA SUR**

*By Julia Dagum ’16*

We did a census of Balacha Sur, and the morning started off with some challenges. With low expectations for the census, we trudged up the muddy hill, slipping and tripping on thorny vines. Suddenly, we heard a loud cacaawww! It was the crow of a male Bioko drill monkey, one of the rarer primates found in this region. The sound was terrible but so exciting! When we finally heard a loud call again, we sat on the edge of a ridge that opened up into a foliage-filled canyon. Below there was a group of five Bioko drill monkeys ascending the hillside. I was able to see them clearly through my binoculars, and I even got a view of their colorful backsides. We were lucky to see them because they would have run away if they had not been fighting over a mate. It was the most amazing wildlife sighting of the trip so far and quite possibly one of the best moments of my life.

Julia Dagum is a junior studying environmental and sustainability sciences. She spent fall semester on Bioko Island, Equatorial Guinea, through a program offered by Drexel University.
SPAWNING NEW SCIENTISTS AT SHOALS
By Kate Bemis ’15

I walked into the first lab on shark biology at Shoals Marine Laboratory to find more than 30 species of frozen sharks, skates and rays on the tables. Wow—what amazing diversity! Each student chose a species to study, dissect and prepare its skeleton. The instructions: Go for it. No lab manual, just learn by doing. My species, the gulper shark, Centrophorus granulosus, lives in deep waters all over the world, but we don’t know the most basic information about its biology, lifespan, reproduction or range. How could we expect to make reasonable decisions about its conservation or even know if the species is in trouble? Later that summer, in a small boat on the open ocean, we dropped our lines 60 meters into the water to fish for spiny dogfish, Squalus acanthias. What else was below the surface? There must be so many living things—many yet unknown. Realizing this inspired me to start asking my own research questions.

Soon after my class at Shoals, I began collaborating with John Galbraith at the National Oceanic and Atmospheric Administration’s (NOAA) Northeast Fisheries Science Center (NEFSC) in Woods Hole, Mass., to help identify rare fish collected by their survey cruises. After working with Galbraith onshore, I spent six wonderful weeks living offshore on the NOAA ship Henry B. Bigelow, the 208-foot research vessel used for NEFSC research, conducting bottom trawl surveys from Maine to Cape Hatteras. From the flying bridge, the sea stretched to the horizon. But if you were patient and observant, pilot whales, leatherback turtles and large sharks would appear. We sampled fish 24/7 at depths of 20 to 400 meters. During this time I collected samples for my honors research on two rare species of dragonets that live on the outer continental shelf at depths up to 350 meters, where the water is always cold.

My collaboration with NEFSC was the first of many marine opportunities: two summers at the Smithsonian working on fish taxonomy, traveling to work in natural history museums and field stations in Australia, learning to scuba dive in Honduran coral reefs, and studying fish tooth replacement using CT scanning. None of this would have happened, of course, if I had not had that first exciting experience at Shoals Marine Laboratory that got me to start asking questions about fish. The chance to be immersed in marine biology and to learn hands on by direct experience is difficult to duplicate on campus. In its nearly 50-year history, Shoals Marine Laboratory has offered such chances to thousands of undergraduates. Making scientists is what Shoals is all about.

Kate Bemis was the winner of the 2014 John M. Anderson Prize for Excellence in Natural History at Shoals Marine Laboratory.

CLASS IN SESSION: CHANGE 101
By Amanda Garris Ph.D. ’04

For 75 minutes, the ideas came at a pace of one every four minutes. Solutions for rural education, for the low graduation rate of African American men, for ethically sourced fashion, and support for victims of on-campus sexual assault. These big ideas were the final projects for a class offered through the Charles H. Dyson School for Applied Economics and Management—Social Entrepreneurs, Innovators, and Problem Solvers—which aims to equip students with the skills they need to be agents of change.

Led by Anke Wessels, executive director of the Cornell Center for Transformative Action (a Cornell affiliate), the class attracts students from across the college and university interested in socially conscious entrepreneurship.

“While the lens of the course is social innovation and social entrepreneurship, we emphasize the importance of compassion, creativity, and seeing things from others’ perspective when working to resolve social problems,” Wessels said. “In fact, most students remark how their stereotypes and assumptions about the ‘other’ fell away during the course, and they value the opportunity to develop a more complex understanding of issues through the experiences of their classmates.”

Coursework includes reflection, group work, and a clinical internship with a local social change organization, as well as students developing their own big idea for social change. Wessels said an essential step is developing trust, so students can listen deeply and speak openly about racism, poverty and privilege as they work toward solutions.

“While it is extremely important that students have a deep understanding of the problems they hope to address, our focus is on the infinite number of possible solutions,” Wessels said. “They are exposed to many examples of creative social entrepreneurs re-conceiving how the economy can be used to create wellbeing. For students, this context of abundant possibilities tends to spark creativity and optimism in new and powerful ways.”

The emphasis is on projects that are financially sustainable, address root causes, are attentive to shifting circumstances, and are able to iterate in response to reflection, measurement and feedback. Students also have the opportunity to further their ideas through the not-for-profit incubator affiliated with Cornell.

“As far as I know, Cornell is the only university in the country that has a non-profit incubator affiliated with it,” Wessels said. “Non-profit social entrepreneurs can begin raising tax-deductible grants and donations under our tax-exempt status and receive back office business services as well as mentorship.”
BIG DATA is a BIG DEAL

By Amanda Garris, Ph.D. ’04

Your route to work today. A re-tweet during a presidential debate. The dishwasher running at 7 p.m. Thanks to the convergence of sensors, Global Positioning System (GPS), digital communications, and wireless connectivity, they are all now potential data points. The transformation of behaviors into bytes of data is mirrored by an explosion of information about the natural world, from the identification of an individual’s unique genetic mutations to the chemical identities of tiny particles aloft in the stratosphere. Welcome to the era of big data, hailed as a breakthrough as revolutionary as the microscope. Researchers in CALS are reaping a new kind of harvest from big data, developing tools to fight disease, mitigate climate change, and gain new insights into the dynamics of human communication and the future of commerce.
BIG BUSINESS

As an expert in technological change, digital business strategies and the process of innovation in businesses, Aija Leiponen has been eagerly tracking the rise of big data in commerce. Her previous research has shown that tapping into a breadth of information—from university research and consumers to suppliers and competitors—is a precursor to innovation in companies. Big data promises dramatic changes for both businesses and consumers.

“We are really observing a data explosion,” said Leiponen, an associate professor in the Charles H. Dyson School of Applied Economics and Management. “For instance, big data are created by the internet of things, in which sensors embedded in objects relay information through the internet. It is cheap to connect products with transponders or wirelessly readable tags, so a producer can know where everything is, offering a very detailed view into the supply chain.”

Big data is already changing decades-old models for doing business, even at 300 miles per hour, 27,000 feet in the air.

“Huge leaps have been made in sensors, such that some airplane engines wirelessly relay performance data in real time on specific airplanes back to the manufacturer,” she said. “It’s part of a changing model for that business: instead of purchasing engines, aircraft makers can pay by the hour for their use.”

Such “servitization” based on data and enabled by communication networks is spreading to myriad industries. Leiponen predicts that it won’t be long before big data is used in ways that are more obvious to consumers. With larger and larger broadband pipes for information and wireless technology linking objects to the network—the impact may crop up in the power grid.

“Smart meters in the home will let you know what appliances are used when, allowing companies to manage demand as the sensor conveys a dynamic picture of energy use, Leiponen said. “That can then be incorporated into the spot price offered to households.”

A new development is that data itself is becoming a resource with economic value, in particular data about human behavior, harvested from all of our purchasing and other trackable behaviors. While many companies perceive this information as important, defining the monetary value for

“An economy will emerge to realize the value of this data, but what is special about data as a product? It’s not delimited, copyrightable; it’s an intangible good that can be at the same time an intermediate and a final product. We don’t yet have enough data on big data—a huge research opportunity.”

-AIJA LEIPONEN, associate professor in the Charles H. Dyson School of Applied Economics and Management

Photo: Robyn Wishna
different pools of behavioral data—as well as rules for its appropriate use—is still challenging.

"An economy will emerge to realize the value of this data, but what is special about data as a product? It’s not delimited, copyrightable; it’s an intangible good that can be at the same time an intermediate and a final product," Leiponen said. "We don’t yet have enough data on big data—a huge research opportunity."

In this case, the regulations are playing catch up with the economy. Data brokers are already finding new ways to capitalize on consumer behavioral data. Leiponen noted that several are already under review by the Federal Trade Commission seeking to gather information about what is collected, how it is used, and whether consumers have the ability to access and correct their information or to opt out of having their personal information sold.

"Big brother and big data go hand in hand," Leiponen said. "Consumers sell data on the cheap, in essence donating valuable data to companies."

#EMPATHY

It’s precisely the opportunity for real-time, real world observation of human behavior that encouraged assistant professor of communication Drew Margolin to turn to Twitter to study the shape of discourse—who speaks, who speaks to whom, and what do they say? Tweets offer some real advantages over more traditional experimental methods, where surveys and sterile rooms can add up to self-consciousness.

"The main thing that’s different is the ability to get fine-grained behavioral data," he said. "You don’t have access to people’s thoughts, but you’re seeing so much behavior in the real world."

This ability to observe communications in a “natural habitat”—perhaps a comfortable chair in the den in front of the television with phone in hand—is enticing to Margolin. One area he has studied is political discourse, and the choices Tweeters face between imitation and confrontation.

Looking at tweeting during the presidential debates, he found that retweeting of elites replaced users’ more typical interactions, netting an overall decrease in the diversity of voices and quality of exchange.

Another advantage of Twitter data is the ability to track emerging ideas in response to an unexpected event, from a natural disaster to a terrorist attack, again, in real time.

"You can’t simulate things like a terrorist attack. It’s a unique case of unanticipated, unrehearsed human behavior, and memory can be very unreliable," Margolin said. "For example, being asked who would you call if you were involved in a terrorist attack is different than who you actually call."

It’s led him to see the very human inclinations in the sea of data: emotions like fear, sadness and empathy. For example, Twitter data after the Boston Marathon bombings in 2013—180 million total tweets—showed that activity was greater in people who we might infer had a strong connection to the place—based on the geo-tags on their tweets. Another example is a school shooting in Florida, where people who had been in a location which also experienced shootings tweeted their support, with messages like “we are with you … we feel solidarity with you.”

"In real time you can see the raw expression of emotion, before national scale attention floods in and the national media has framed the event," Margolin said. "Our analysis showed that the immediate expression of fear was also directly related to the subsequent expression of solidarity."

-DREW MARGOLIN, assistant professor of communication
“The topology of the network can tell you a lot about the biology of the system. Just like airline hubs, there are proteins—a very small fraction—that are super-connected, which has implications for the robustness of the network and its resilience in the face of malfunction.”

-HAIYUAN YU, assistant professor of biological statistics and computational biology

For the practical purposes of first responders or government agencies seeking to reduce or quell fear in neighboring populations after a terrorist attack, his findings suggest that fear will spread to those communities with the most similar personal experiences—a related event may bring empathy from a community, but it also means reliving its most fearful moments, too.

TAPPING INTO TOPOLOGY

The ability to look at a whole network is an advantage that social and natural sciences alike embrace. The networks that Haiyuan Yu, assistant professor of biological statistics and computational biology, studies are not peer to peer; they are protein to protein. Mapping the network created by the interactions among proteins—5,000 in the yeast he studies and 20,000 in humans—is key to understanding, diagnosing and curing diseases, from cancer to muscular dystrophy.

“Of all the proteins in a cell, none act alone,” Yu said. “The whole cell is connected by

HOW PRECISION ANALYTICS ARE CHANGING HABITAT CONSERVATION

By Gustave Axelson

Most of the 500,000 acres of rice country in between the Sierra Nevada and Coast Range in California dry out in late winter, as farmers prepare for seeding in spring. Last February, some of the Central Valley’s rice fields instead held two to four inches of water, disturbed by the march of long-billed dowitchers, rhythmically pumping and probing like an advancing army of sewing machines. Those farms were paid to put the water there, in a wager that the migrating birds would come. And eBirders helped place the bet.

“When you look at the eBird maps, there’s clearly a mismatch,” said The Nature Conservancy (TNC) California scientist Mark Reynolds. “There’s a lot of shorebird occurrence throughout the valley, but then the satellite imagery shows there’s not a lot of water availability on the ground.”

Last winter Reynolds and TNC California launched a first-of-its-kind conservation partnership with Steve Kelling, Cornell Lab of Ornithology information science director, and the eBird program to rectify that mismatch. The project combined precision big data analytics from eBird—fueled by the more than 230,000 birder checklists submitted to eBird from California—with NASA satellite technology and a market-based mechanism to pay farmers to provide shorebird habitat, developed by TNC economists.

“Something like this has never been done before, where citizen science is joined with high-performance computing and NASA satellite imagery to provide habitat conservation at a very fine scale—at the scale of a rice field,” Kelling said.

eBird statisticians and computer scientists used the checklists in the database to build predictive models of where shorebirds would be present throughout the Central Valley in February and March. The results were like a weather map for birds, showing where clusters of shorebirds would congregate. These shorebird forecasts, paired with NASA imagery of surface water availability across the Central Valley, made it possible to see where wet habitat was needed.

Forty rice farmers enrolled in the pilot program, called BirdReturns. More than 10,000 acres of rice fields were flooded in four-, six- and eight-week contracts. It’s part of an emerging discipline in ecological science called dynamic conservation, where habitat is created over shifting periods of time and ranges of places to meet the changing needs of migratory wildlife. TNC called their flooded fields “pop-up wetlands,” like the trendy ephemeral restaurants that set the culinary scene abuzz.

The pop-ups produced some eye-popping results in their first year—surveys on the BirdReturns fields showed more than 220,000 birds representing 57 species, including every migratory shorebird species in the Central Valley. Recorded shorebird densities averaged well over 100 birds per acre in March, 10 times the number of shorebirds found in other areas outside the project.

“This was the original vision for eBird,” Kelling said, “directly applying bird-watcher checklists to the conservation of birds.”

Excerpted from the Autumn 2014 issue of the Cornell Lab of Ornithology’s Living Bird magazine.
His approach is to test for the interactions of each protein with all the others in the lab and then build the network. Mapping the interactions as a network can yield insights not available if they were looking at individual pairs of proteins, because the connectivity of the network can reveal crucial information.

"The topology of the network can tell you a lot about the biology of the system," Yu said. "Just like airline hubs, there are proteins—a very small fraction—that are super-connected, which has implications for the robustness of the network and its resilience in the face of malfunction."

While protein networks can be robust to random genetic errors, the flip side is that they are much more fragile in the face of a targeted attack—like cellular acts of terrorism that target network hubs. Knowing a protein's position in the network helps Yu understand its potential impact and has great predictive power, for example in the area of drug side effects.

"About 20 percent of drug candidates fail in early clinical trials due to safety issues caused by side effects," Yu said. "Understanding and predicting what causes side effects is of paramount importance to human health and the pharmaceutical industry."

Yu’s lab looked at the protein targets of drugs in the framework of the human protein interactome network, the web of physical interactions among molecules. They found that what mattered was not the total number of a drug’s targets, but that the number of essential targets—proteins that were hubs of their networks—determined the occurrence of its side effects. The findings will shed light on new factors to be incorporated into the drug development pipeline.

They have just completed a project mapping the interactome network for fission yeast, which Yu calls a ‘forgotten organism,’ which has a lot of pathways in common with humans for fundamental processes such as how genes are turned off and on. All 5,000 fission yeast proteins were tested for interaction with each other and with three replicates—using brute force in the lab over three years—yielding 75 million prospective pairs to analyze. Yu’s lab was able to identity about 2,300 that interacted. Big data allowed Yu to find his those needles in the haystack.

Using the big data approach has led them to discover several novel factors that are involved in gene regulation that were previously unknown.

“It really highlights the role of big data in discovery. When you look at the whole system you don’t miss things,” he said. “I feel really lucky to be doing biology right now.”

**PARSING PREDICTIONS**

When climate scientists use big data to study whole systems, it encompasses plant life, soil moisture, biogeochemistry, the oceans and the atmosphere. That’s why, when it comes to the absolute size of big data, the bragging rights in CALS currently rest with the atmospheric scientists.

“Big data is what atmospheric scientists have been calling ‘data’,” explained Toby Ault, an assistant professor of earth and atmospheric sciences.

“Big data is what atmospheric scientists have been calling ‘data,’” explained Toby Ault, an assistant professor of earth and atmospheric sciences. “Our capacity to generate data can exceed our ability to interpret the results. Big data can be a big mess.”

Ault works with data measured by the petabyte—one million gigabytes—using one of the largest public access research science databases to

-TOBY AULT, assistant professor of earth and atmospheric sciences
generate global climate simulations. To understand climate modeling, Ault suggests picturing a really good video game, where the water flowing looks like real water, because the game is built on the physics of motion and energy exchange.

It also relies on real-time, highly detailed data collected via satellites. To look at global climate models, he uses a grid of collection sites extending like a column from the ground into the upper atmosphere, and at time points as frequent as every 20 minutes, collected over years.

“In essence, the models capture the whole system on the earth to better make predictions about climate change, based on the most optimistic or pessimistic assumptions regarding the adoption of mitigation strategies,” Ault said. “For example, if you want to simulate a particular future period, climate models allow you to compare and contrast what happens with and without an increase in atmospheric carbon dioxide.”

His analyses have resulted in some dire odds for the American Southwest and the Great Plains. Due to global warming, the chance of a decade-long drought in the Southwest is at least 50 percent. Furthermore, the chance of a “megadrought,” one that lasts over 30 years, is very high before the end of this century in both areas, unless greenhouse gas emissions are lowered drastically in the next ten years.

Today, Ault is drawn to predictions about time periods from ten days to ten years in the future and mitigating the impact of climate change on farmers’ livelihoods. For example, small fluctuations in the onset of spring can have major impacts on the time to plant corn or the potential for damage to tree fruit due to the danger of early frost on emerging buds and flowers. Ault’s models predict that both early springs and early fall frosts will increase in the next several decades, indicating that farmers will need both weather prediction tools and plant varieties adapted to the new normal.

“This is really exciting to me—the interplay between natural variation and human activity. It’s very applied,” he said. “Farmers and growers don’t really care about the weather in 2100, but when to plant in a particular spring, that has important social implications.”

BIG DATA, SMALL PARTICLES

The work of Sara C. Pryor, professor of earth and atmospheric sciences, focuses on understanding causes of climate variability and change in order to make better projections of future regional and local climates.

“Aerosol particles are the largest source of uncertainty in the science of climate change and prediction, particularly at the regional scale,” said Pryor, who was recently made a Fellow of the American Association for the Advancement of Science. “They are important because they can both reflect light and cause cloud formation, so they tend to lead to surface cooling and offset some of the warming caused by greenhouse gases,” she said.

The abundance of these aerosols also has some down-to-earth implications for human health. Millions suffer impaired health due to the effects of aerosol exposure. Given that aerosol particles’ impacts on climate and health are strongly influenced by their size—from ten times smaller than a typical virus to the width of a human hair—Pryor’s work tracks processes occurring across scales from micrometers to kilometers.

Pryor’s research aims to quantify aerosol concentrations, size and composition in time and space, model their influence on climate, and determine how and where they are removed from the atmosphere. She uses both ground-based and satellite radiometers, in addition to in situ instruments that measure aerosol concentrations and fluxes every second in dozens of size classes. She also conducts simulations using increasingly detailed and sophisticated numerical models.

All of this leads to huge data volumes. For example, Earth Observing Systems operated by NASA generate over four terabytes of data every day. Pryor’s group has recently completed simulations on a 12-kilometer grid across the entire continental United States, with 32 vertical layers through the atmosphere, and simulating the concentration of more than 200 gases and 32 aerosol particle types and sizes. The resulting output is also many terabytes in size.

“These data volumes represent both an unparalleled opportunity for generating new insights into the function of the atmosphere and interaction with the earth’s surface and for evaluating the models we use for predictions,” Pryor said.

One of her projects is focused on examining the dual role of forests in contributing to both the formation and removal of aerosols—and how those roles could change under different climate warming scenarios. Forest canopies release biogenic volatile organic compounds (BVOCs) that can form aerosols. On average, warmer temperatures tend to lead to higher BVOC emissions, potentially increasing regional aerosol concentrations that in turn can reflect away more sunlight and thus suppress greenhouse gas warming locally and regionally.

However, her recent research has shown this effect is very dependent on adequate water supply: It ‘switches off’ during drought. This evidence of the complexity of the biosphere’s response to warming is an insight made possible by big data and the technology that feeds it, and Pryor said it’s just the beginning.

“Availability of ‘big data’ means we can ask different questions, generate new hypotheses, but it also requires that we develop and apply new tools to optimally use complex data streams from different sources that have different characteristics, uncertainties and scales,” she noted. “I feel a real sense of optimism—it’s a great time to be a scientist!”

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-SARA C. PRYOR, professor of earth and atmospheric sciences

College of Agriculture and Life Sciences at Cornell University
Like + Follow = Share: Mentorship Matters

No matter the route to CALS, the direction life takes after graduation can be profoundly impacted by mentoring along the way. Partnership and collaboration have long been hallmarks of the College of Agriculture and Life Sciences, powered by connections among faculty, staff and students. While faculty point students toward opportunities and lead by example, the students energize and inspire their mentors in equal measure. These students and their mentors have shared expertise, shared experiences and now shared photos.

Let us introduce you to the promising young talent at CALS and the faculty members who are guiding their way. We have a molecular biologist investigating neurons, a food science student studying milk shelf life, a communications majors with an eye on medical school, a horticulture professor whose research blooms, and the first-ever dual major in landscape architecture and fine arts.
It was a “gut feeling” rather than a long deliberation that brought Albert Zhang ’15 from New Brunswick, Canada, to Cornell, where he is now working with Chun Han to decipher the secret of dendrites—those branches that extend off nerve cells and collect synaptic or sensory information—particularly their development and degeneration in the sensory neurons of fly larva. Zhang, a biological sciences major and recipient of the Dextra Undergraduate Research Grant, was the first student tapped by Han, the Nancy M. and Samuel C. Fleming Assistant Professor in the Department of Molecular Biology and Genetics, to join his lab. Together they explore how dendrites in fly larva’s sensory neurons degenerate during metamorphosis and what mechanisms control this process, ultimately deciding whether the neurons die or assume a different function in fly adulthood. Meanwhile, Han enjoys watching his undergraduate students metamorphose into seasoned researchers, tailoring their research projects to suit their own evolving interests while staying true to the focus of the lab. It is the perfect fit for Zhang, who is interested in exploring all aspects of biology, including a concentration in marine biology. Just like the dendrites, he loves branching out.

Rachel Erlebacher ’16 didn’t have to look far for an opportunity to get hands-on experience working on climate change efforts last summer. The environmental science and sustainability major took an internship at Cornell Cooperative Extension Dutchess County, only a few miles down the road from her hometown of Pleasant Valley, N.Y. Erlebacher interviewed farmers in the Hudson Valley about their perceptions of climate change and what they are doing to adapt to it. Taking care to use neutral phrases like “extreme weather” and “climate variability” so as not to influence their responses, Erlebacher videotaped the interviews, and throughout the fall she worked as a research assistant under Allison Chatrchyan, the director of the Cornell Institute for Climate Change and Agriculture (CICCA), editing the footage into five- to ten-minute clips and posting them on YouTube to be used for peer-to-peer education and outreach. They will be an asset to Chatrchyan—who has worked as an associate program officer for the United Nations Environment Programme in Paris among other positions—as she facilitates research, education and outreach to reduce the agricultural sector’s collective impact on the climate, while also helping farmers become more resilient to climate change. Erlebacher says Chatrchyan’s career trajectory has given her a new perspective on the environmental field and is following in her global footsteps by heading to Australia for spring semester.
The Dutch surname Klaver means 'clover' in English, so it's only fitting that Tim Klaver was raised surrounded by horticulture in North Holland, where his family operates a tulip farm. Klaver is currently an intern on this side of the pond in the Section of Horticulture's Flower Bulb Research Program with professor Bill Miller in the School of Integrative Plant Science. Every year Cornell hosts one such Dutch student intern, and Klaver was enthusiastic about signing up, given his ... roots. While he has plenty of practical work experience with tulips, the native of Spanbroek came to Cornell to expand his knowledge of other flowers, such as daffodils and hyacinths, making ornamental floriculture expert Miller the perfect mentor. Miller, like Klaver, has horticulture in his blood, having been raised by a professor who earned an M.S. and Ph.D. from Cornell's floriculture and ornamental horticulture department in the 1950s, and who experimented in the very same greenhouses he and Klaver work in now. With a childhood spent among commercial greenhouses in California, Miller's main academic interests are floriculture, greenhouse cropping systems and the physiology of ornamental plants. He conducts research that provides New York and North American growers with the means to produce a more environmentally friendly product efficiently, research that Klaver is keen to take note of, as his interest in tulips isn't only academic. Having previously studied business at Clusius College Hoorn in Holland, he hopes to take what he has learned at Cornell back to his home country to launch his own tulip company.

Student. Athlete. Entrepreneur. Crepe maker. Forrest Crawford '15 has carved out several unique niches at Cornell, not the least of which is being the first ever undergraduate dual-degree in landscape architecture and fine arts. When Forrest came to Cornell he already had his associate's degree in visual arts with a focus on ceramics and sculpture. With his sculptures growing more material- and landscape-based while also increasing in size, "the art department didn't know what to do with me," Crawford says. But Landscape Architecture Department Chair Peter Trowbridge knew exactly how Crawford should make the most of his unique skill set, helping him to embrace his iterative process. After 40 years at Cornell, it's not surprising that Trowbridge has become something of a touchstone for those who have passed through the department's doors over the years, including Crawford. Students from as far back as the 1970s still contact him, and those who are asking for recommendations no longer seek internships and first jobs, but deanships. Trowbridge relishes observing the long arc of his students' careers and the way their fresh ideas inform his own private practice. And while Trowbridge points out that landscape architecture is aptly called a practice, in that it is a lifelong project that requires repetition, Seattle-native Crawford is familiar with other forms of practice as well, playing for the men's Varsity Baseball team and co-owning Collegetown Crepes, a food truck that serves up savory and sweet treats late at night at the corner of Dryden and Eddy.
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Cliques that Click

Spring 2015

Associate Professor of Communication Poppy McLeod's Group Communication Lab studies the factors that affect communication, language and decision making within and between human groups, particularly the way personalities affect—and are affected by—group dynamics. Navigating group dynamics is nothing new to lab members Amy Christophe ’16, who grew up with three older Cornellian brothers, and Elijah Joseph Weber-Han ’16, who spent five years in the United State Marine Corps, which is what drew them to working with McLeod. Majoring in communication with a minor in biology, Christophe has worked with the lab for three semesters studying small group behavior, research she hopes will strengthen her ability to one day run her own pediatric neurology practice. A transfer student from SUNY Broome Community College, Weber-Han says that his interest in communication stretches back to his childhood, when he used to listen to old-time radio dramas with his father. Hailing from Hoosier country, Weber-Han is now majoring in communication with a minor in video production, focusing on the socio-cultural side of technology and communication. He hopes to expand on his current group dynamics research in graduate school by exploring cooperative artificial intelligence (AI), specifically how to make AI that actively collaborates with humans. He not only relishes the research but also the sense of community that McLeod instills in the lab itself. McLeod makes it a point to populate her lab with graduate and undergraduate students and have them work closely together. As a result, the undergraduates are able to develop a deeper interest in research, and the grad students hone their own mentorship skills. At the same time, McLeod says she learns a great deal from both undergraduate and graduate students, finding inspiration in their ideas, experiences and perspectives on research and life.
It could be said that Aileen Chang ’15 is the embodiment of the college’s breadth and depth of disciplines and mission of sustainability. A dual major in applied economics and management and natural and environmental systems, with a minor in real estate in the School of Hotel Administration, one of Chang’s goals is to bring together business and environmental science around the shared theme of sustainability in the community. It’s this commitment and passion that fuels this native Californian’s academic interest and is also reflected in her involvement with the CALS Student Advisory Council, where faculty adviser Mark Wysocki, senior lecturer in the Department of Earth and Atmospheric Sciences, finds her energy inspiring. Director of undergraduate studies in Atmospheric Sciences and faculty adviser to the Cornell Chapter of the American Meteorological Society, Wysocki helps the students on the council—which holds an advisory position to Dean Boor—prioritize issues, shape their proposals and interact with the administration. In addition to his passion for his research in air pollution, forecasting and weather analysis, his greatest enjoyment comes from engaging with his students, and he remains constantly awed by their ideas and their commitment. Also a member of Cornell University Sustainable Design, Chang’s commitment to improving the student experience can be seen in several recent initiatives of the CALS Student Advisory Council: working with the administration to improve student course evaluations, approving special funding requests and installing additional outdoor lighting along Tower Road to increase visibility and safety for all pedestrians.
Whether hailing from North Carolina, California or Korea, Cornell has offered unparalleled opportunities and an environment of collaboration to three women at different points in their academic careers. Wendy Wolford, a professor of development sociology whose research addresses agrarian change with a focus on social movements and the struggle for access to resources, was lured to CALS from the University of North Carolina at Chapel Hill after a decade, thanks to the intelligence and energy of Cornell students, and their drive to do meaningful work and make a difference in the world. Youjin Chung originally hails from Korea, but came to Cornell by way of the United Kingdom, where she studied and worked for a non-governmental organization that specializes in international development. It was there that Chung worked on issues of land, food security and gender and the ways those areas intersect. Hoping to gain a scholarly perspective on those issues, she discovered Professor Wolford's writings, which led her to Cornell. Now a third-year Ph.D. student in development sociology, Chung is researching gender dimensions and the implications of a large-scale land acquisition for industrial sugarcane production in coastal Tanzania. In the western hemisphere, Wolford is working with Alex Schmall '16, who has wanted to explore the social justice side of agriculture ever since she was a child growing up in the small farm town of Madera, Calif. It was there, she says, right outside her front door, that she saw immigrants from Mexico, Guatemala and El Salvador picking the fruit that Americans would eat but that the workers themselves could not afford. She is passionate about global health, nutrition and development and is double majoring in international agriculture and rural development and development sociology with minors in global health, nutrition and health, and international development. She has traveled to every country in Central America—including working on organic farms in Costa Rica and Nicaragua and serving as a medical translator in Mexico. Wolford relishes the collaboration within her research group and cites Chung and Schmall as the kind of hard-working, committed students for which she moved to Ithaca. "To have eight or nine other people around you who are interested in the same questions but looking at them from a different angle, how fabulous is that," she says.
A Moveable Feast
Spring 2015

When was the last time you heard a college instructor described as “amazing,” a “guardian angel” and a “fashionista?” That’s how students describe Alicia Orta-Ramirez, director of the Undergraduate Program in the Department of Food Science. Since coming to Cornell from Michigan State University in 2007, she has played a pivotal role in the development of the department’s undergraduate students; helping them navigate rigorous schedules, connecting them with educational and extracurricular opportunities, and helping them cope with academic as well as personal pressures. She has been a mentor to transfer student Susana Jimenez ’15, who left chemistry behind and embraced food science as a major. It was a prescient decision, as Jimenez is co-captain of the MARS 2014-2015 Product Development Team and the Cornell IFTSA (Institute of Food Technologists Student Association) Team, which has been on a three-year winning streak for developing a new food idea and carrying the concept through marketing and production. Her Mars Product Development teammate Maia Vernacchia ’15 decided to study food science at CALS because it combined her lifelong love of baking with her interest in chemistry (with additional credit to Alton Brown’s Good Eats and Cornell’s introductory food science class’ ice cream making project). A Cornell gymnast who has been selected as a recipient of the SUNY Chancellor Award for Student Excellence, Vernacchia is minoring in nutrition and plans to embark on a career in product development, having recently worked on the Shakeology line of products for Beachbody. Sam Reichler ’15 started his food science career in Orta-Ramirez’s Food Microbiology Lab and is now exploring his keen interest in shelf-stable food with the Milk Quality Improvement Program, where he is currently researching mold growth. Reichler served as teaching assistant for Orta-Ramirez’s Food Analysis class and, as part of an independent study, also helped set up a new lab activity that uses readily available instrumentation for a hands-on experiment that will prepare food science students going onto internships. When not in the lab, Reichler co-captains the Food Science college bowl team, which Orta-Ramirez advises. The team won nationals two years ago, and he is hopeful they will retake the title when Cornell hosts the North Atlantic competition this spring. With such diverse and driven students, it’s no wonder that Orta-Ramirez takes great satisfaction in sharing in their journeys as they progress from shy, tentative freshmen to confident seniors thriving in their disciplines.
Every Friday morning since 2004, the CALS Plant-Insect Group has met via conference call to share ideas and talk research. They’re a diverse bunch: entomologists, neurobiologists, ecologists, chemists and evolutionary biologists on the Ithaca campus and in Geneva, N.Y. Above all, they are chemical ecologists, working to decode the complex chemical signals bacteria, plants and insects use to communicate. These signals make up a lush information landscape that scientists are studying to better understand their function and how they can be used to fight human disease and deter agricultural pests.
Like the Plant-Insect Group, the field of chemical ecology—the study of the chemicals that mediate interactions between organisms—is interdisciplinary. Spurred by discovery of the first insect sex pheromone in 1959, researchers raced to identify other insect pheromones and their roles, hoping to harness them for pest control. In 1965, Cornell University took the lead when Paul Chapman, then chair of the Entomology Department at the New York State Agricultural Experiment Station in Geneva, brought together experts in chemistry, neurobiology and entomology to identify and interpret the heretofore hidden language of insects (see sidebar). Fifty years later, scientists at Cornell continue pushing the envelope on chemical ecology thanks to new technologies and broad collaborations.

Chemical ecology research today falls on a continuum; instead of focusing exclusively on one end—for example, studying just the chemical cues that attract pollinators or mates—researchers are increasingly looking at chemical signals from a systems perspective.

“Plant reproduction through pollination happens in the context of other things, like defending against pests—not in a vacuum. We need to study the whole plant to understand this,” said Robert Raguso, professor and chair of the Department of Neurobiology and Behavior.

Twenty years ago when Raguso began studying how moths find flowers to pollinate, most research focused on visual cues like flower color. But Raguso knew that some plants, like gardenias and jasmine, produced highly scented flowers; could their strong scent draw would-be pollinators? To test this idea, Raguso used hawk moths and a series of carefully designed experiments to see whether and how moths responded neurophysiologically to the airborne volatile organic compounds (VOCs) that flowers emit. He found that he could alter moth behavior by manipulating the VOCs of various flowers while controlling for other factors like flower color and form.

“Floral volatiles really matter, and they have highly variable functions: attracting pollinators, serving as insect ‘reminders’ for specific flower types, or repelling unwelcome visitors,” Raguso said.

André Kessler, associate professor of ecology and evolutionary biology, is digging deeper into these functions by studying how insects induce chemical changes in plants they feed on.

“In the 1950s, scientists thought the secondary chemical compounds plants produce, which have no nutritional value to the plant, were a waste byproduct of photosynthesis. But many were toxic, so it was suggested they may have a defensive function,” Kessler said.

After extensive studies examining the wound and infection process inside plants, scientists found that these compounds are in fact primarily used to fend off pests or mount a defense against infection. Further studies found that plants also release different volatile chemicals when damaged by plant-eating insects. In 2001, Kessler published research that partially explained why. He found that not only do the plant volatiles that damaged plants release signal nearby plants to ready their direct defenses for an impending attack—for example, by increasing toxin or sap production—they also serve as alarm calls for insect allies to come to the plant’s indirect defense.

Many natural enemies of plant-eating insects have close mutually beneficial relationships with plants, which offer food or shelter in exchange for predators’ pest-eating services. In a 2011 paper, Kessler concluded that these resources—not the plant’s volatile chemicals—were the evolutionary impetus for such mutualisms. This is because broadcasting a chemical alarm isn’t always directly beneficial to plants.

“We found instead that the induced response—these VOCs—was just being released into the environment for whoever could

Neurobiology and behavior professor Robert Raguso instructs graduate student Michael Wolfin on volatile collection from Trillium flowers in Cornell’s Mundy Wildflower Garden. Photo: Lindsay France/University Photography

“Floral volatiles really matter, and they have highly variable functions: attracting pollinators, serving as insect ‘reminders’ for specific flower types, or repelling unwelcome visitors.”

-ROBERT RAGUSO, professor of neurobiology and behavior
read it. Plant-eating insects are major agents of natural selection on the chemical transfer of information to all organisms,” Kessler said.

Many insects subvert plant alarm signals to find hosts and overcome their natural defenses. For example, bark beetles are attracted to damaged pine trees by the VOCs they emit and by the specific pheromones the beetles emit calling for a mass attack. But if a tree’s emissions are too high, beetles will avoid it because this signals a tree that’s better defended.

Nature is replete with these interspecies spy games. Raguso cites several examples of flowers that look and smell like rewarding treats for insects but have no nectar.

“Some orchids smell like a female bee or wasp in heat, so male insects try to copulate with the flower. There are also flowers that smell like rotting flesh or feces and fool female insects to laying eggs in these places, during which they transfer pollen between these deceptive flowers,” Raguso said.

This is where scientists get into the game, eavesdropping on chemical conversations to manipulate the behavior of insect pests in crop systems. Since their discovery, scientists have created and used synthetic pheromones to attract pests to monitoring traps and disrupt their mating behavior. Mating disruption has been especially successful. By randomly releasing pest-specific female sex pheromones into a field, males are inundated with signals and unable to locate mates. Kessler calls it one of the best working chemical ecology applications.

Growers also use pheromones to monitor pest populations in their fields to better time and reduce pesticide spraying. Lures can be a combination of insect sex and aggregation pheromones. But researchers are finding that paying attention to the full information landscape, not just insect signals, may offer better solutions.

“If we can understand the chemical ecology of how plants and insects interact, how insects are using these volatile signals, we can exploit them to deter chemicals via electrodes, while the wind tunnel is a controlled environment in which to quantify the behaviors of flying insects elicited by wafting chemicals. Both tools drastically cut the time needed to isolate pheromones for field testing and allowed Roelofs to identify sex pheromones of more than 100 species, including the coding moth, redbanded leafroller and grape berry moth.

“We had researchers from around the world come to our group to learn our techniques, especially the electroantennogram method of identifying pheromones,” said Roelofs, emeritus professor and Liberty Hyde Bailey Professor of Insect Biochemistry.

The work of Roelofs, Eisner and Meinwald not only deepened our understanding of chemistry and basic biology in nature, it led to safer methods of integrated pest control that allowed farmers to significantly reduce their pesticide use.

“The great advantage I had in pioneering pheromone research was that I was at the Experiment Station in Geneva and interacted as a chemist with the entomologists there on their specific crop pests so that pheromone identifications were put into immediate practical applications.”

-WENDELL ROELOFS, emeritus professor and Liberty Hyde Bailey Professor of Insect Biochemistry.

In 1964, Wendell L. Roelofs was doing postdoctoral work in chemistry at the Massachusetts Institute of Technology when his adviser showed him a posting for a chemist position in Paul Chapman’s entomology department. At the time, Roelofs’ focus was pharmaceuticals and he knew nothing about insects, but he applied for and got the position.

Roelofs’ hiring was the first step Chapman made in 1965 to develop a research program on pheromones of moth pest species at the New York State Agricultural Experiment Station (NYSAES) in Geneva. It was a controversial move.

“People thought he was nuts bringing a chemist into the entomology department,” said Charles Linn, senior research associate and head of the chemical ecology program at NYSAES.

When Linn came to Cornell in 1980, he joined Roelofs’ “dream team” at NYSAES, part of an interdisciplinary group of CALS scientists who helped found and advance the new discipline of chemical ecology. Working together, chemist Jerrold Meinwald and Thomas Eisner, a professor in the Department of Neurobiology and Behavior, braved this new world with Roelofs to develop research methods that were considered risky and controversial.

But those risks paid off, Linn said.

“You can trace the work of all the leading chemical ecologists in the world today to the original Cornell team. They pushed the field forward. They had far-reaching insights, and they were right,” he said.

At CALS, Roelofs’ entomology colleagues took him under their wings and into the field. Learning alongside experts in insect behavior, he developed more robust behavioral tests for pheromones to supplement and inform his chemical analyses. He’s responsible for the emergence of the electroantennogram (EAG) and wind tunnel as key tools for pheromone identification and research. The EAG measures the electrical response of a moth’s antenna to different sex attractants and proposed harnessing them for more economical pest control. Today, the environmental movement continues to give chemical ecology principles greater traction—especially in the field of agroecology—to create sustainable, resource-conserving agriculture systems.

Meinwald, Roelofs, and the late Eisner have earned many awards in science for their groundbreaking work. But for Roelofs, who called Meinwald and Eisner leaders of “one of the best chemical ecology groups in the world” at the time, the legacy of which he is most proud is the next generation of leading scientists.

“This [environment] helped me to establish a pioneering group of brilliant postdocs and graduate students, who went on to establish their own research groups that continued to push back the frontiers of this field,” he said.
past five years, he’s been working to find a chemical cocktail to attract female grape berry moths. Loeb and his colleagues, chemist Wendell Roelofs (now retired) and entomologist Charles Linn, already had synthetic pheromone lures to attract males, but monitoring them wasn’t providing growers much actionable information. This was because the greatest damage was being done by the second and third generations of moths; monitoring females and their life cycle would give growers a much better read on when action was needed.

So the team started looking at context, turning to the kairomones emitted by grapevines as possible candidates. While pheromones are chemicals that organisms release to elicit a response in members of their own species, kairomones are chemical signals between species—often released to the benefit of the receiver but the detriment of the sender. Since the grape berry moth, like many other insect pests, is a host specialist—feeding and laying eggs mainly on grapes—Loeb assumed that chemical signals from grapevines were attractive.

After culling through 20 potential compounds, Loeb, Roelofs and Linn finally found a unique blend of seven being emitted from healthy grapes that attract male and female grape berry moths.

“We expected to find a unique signal, and we did. But we didn’t find a unique compound,” Loeb said.

Instead, the moths located grapevine hosts by tuning into a subset of common plant volatiles when present in specific ratios. While the chemical blend doesn’t work sufficiently well as a lure to be practical for growers, Loeb is encouraged about next steps.

“As we learn more about the genetic and molecular basis of these compounds, we may be able to breed plants to make them less chemically apparent to pests, or even repellent, based on the chemicals they emit,” he said.

The finding that VOCs emitted by plants can attract or repel certain pests is central to the development of “push-pull” systems of pest control. In such systems, pests are “pushed away” from cash crops by repellant plants, then pulled toward and “trapped” in highly attractive species growing around the cash crop. The system was pioneered in 2000 by the International Center for Insect Physiology and Ecology in Kenya, working with smallholder farmers to protect their corn crops from a stem-boring pest.

For Kenya’s subsistence farmers, synthetic insecticides are both too expensive and ineffective against stem-boring larvae. By intercropping a repellant legume with their corn and planting a type of local grass around the crops as a trap, farmers controlled the pests so well that Kessler said the crops looked like they’d been conventionally sprayed. Scientists also found that the repellant legume emitted chemicals into the soil that tricked parasitic witch weed seeds into moving toward its roots instead of the corn’s, resulting in the seeds’ “suicide germination” near these non-host plants.

In Colombia, Katja Poveda, assistant professor of entomology, has developed a push-pull system for potato farmers to combat the tuber moth. She first tested different varieties of local potatoes, screening them to find one whose chemical signals were more attractive to the moth than the kind farmers were growing. By intercropping with this variety and spraying with garlic and pepper extract, the system reduced damage to the potatoes at the same rate as insecticide sprays. But Poveda’s further studies found that the system’s success varied by location; at some sites it decreased pests, but at others it attracted them. Again, as chemical ecologists are finding, success hinges on context.

“The success of local practices, such as using trap plants for pests or using a flowering plant to attract pollinators or predators to a field, depends on the local and surrounding biodiversity. The current theory suggests that farms surrounded by some natural areas will profit the most from local management practices, and we’re currently working in cabbage, strawberry and potato to test if this is true,” Poveda said.

Studying the broader information landscape of insects and plants is unlocking another novel method of pest control: fear. While most biocontrol pest management programs focus on introducing predators into fields to eat pests, Jennifer Thaler, associate professor of entomology, has found that this method can have a bigger effect if prey can sense the presence of predators through chemical signals.

Working with beetles and caterpillars, Thaler found that when predatory insects are released into a field of plant-eating
insects, 85 percent of the reduction in plant damage is because the predator is present, not because the pest got eaten. This effect spanned generations, with the offspring of scared insect pests laying fewer eggs that hatch into larvae that eat less and grow more slowly.

“We really need to pay attention to these fear factors. We see long-term, cross-generational consequences of being exposed to a predator,” Thaler said.

Paying attention to chemical communications in context has led at least one CALS scientist into groundbreaking territory.

During his postdoctoral research, Stephen Winans, professor of microbiology, was studying how Agrobacterium—a model organism for studying plant disease—was able to perceive wounded plants by detecting diffusible chemicals released from wound sites. While investigating this, Winans had another idea: Could this bacterium also use chemical signals to detect sibling bacteria? In the early 1990s, Winans and his team became the first to demonstrate that Agrobacterium produces pheromones and uses them to coordinate cell functions.

“These bacteria synthesize specialized pheromones all the time and release them into the environment, but these chemicals accumulate to detectable levels only when large populations of bacteria are present. The bacteria therefore use these molecules to estimate their population density for coordinated behaviors,” said Winans, who popularized the term quorum sensing to describe the phenomenon.

Today, Winans studies similar signaling systems in other bacterial families, learning as much as possible about the mechanisms behind them. His research has already led to new treatments for life-threatening infections caused by antibiotic-resistant Staphylococcus and Pseudomonas aeruginosa.

“We can exploit these systems for medicine by using the pheromones to direct genes involved in the biological mechanisms that cause disease, or by using pheromone mimics to interfere with their communication,” Winans said.

Discoveries like Winans’ and those of other CALS scientists are painting a very different picture of our natural world. Instead of passive plants, we find active players coordinating their responses and those of the insects around them. Instead of automaton microbes, we find a team of single-celled organisms working toward their deadly goals. Chemicals are the common language.

And though scientists have yet to demonstrate whether human pheromones play key roles in coordinating our behavior, inside CALS, something is definitely in the air.

“We can exploit these systems for medicine by using the pheromones to direct genes involved in the biological mechanisms that cause disease, or by using pheromone mimics to interfere with their communication.”

-STEVE WINANS, professor of microbiology
THURSDAY, JUNE 4

Self-Guided Tours of Sneé Hall Atrium
10 a.m.-4 p.m., Sneé Hall Atrium
Visit the Timothy N. Heasley Mineralogy Museum and inspect our mastodon and fossil exhibits while keeping an eye on the earth’s latest rumblings with the Sneé earthquake seismograph. Enjoy a stroll with the self-guided tour of the Engineering Quad Rocks.

Beebe Lake Natural History Walk
3-4 p.m., tent on Beebe Beach
Did you know that Beebe Lake was originally a forested swamp and is a part of Cornell Plantations? Join botanist Robert Wesley in a stroll around the lake to learn more about the history, flora and fauna of Cornell’s favorite natural area. Meet at the tent on Beebe Beach.

FRIDAY, JUNE 5

Self-Guided Tours of Sneé Hall Atrium
10 a.m.-4 p.m., Sneé Hall Atrium
Visit the Timothy N. Heasley Mineralogy Museum and inspect our mastodon and fossil exhibits while keeping an eye on the earth’s latest rumblings with the Sneé earthquake seismograph. Enjoy a stroll with the self-guided tour of the Engineering Quad Rocks.

Harvesting Heritage: Agrobiodiversity, Historic Seed Catalogs and the Importance of Preserving Both
10-11 a.m., Room 160, Mann Library
The historic seed and nursery catalogs in the Ethel Z. Bailey Horticultural Catalog Collection represent a treasure trove of information for historians of agriculture, art and popular culture. This talk will spotlight the importance of genetic diversity to sustainable agriculture and the collaboration between Mann Library and the Biodiversity Heritage Library to preserve the renowned catalog collection of the L. H. Bailey Hortorium. This lecture is sponsored by Mann Library and the School of Integrative Plant Science.

Plantations Botanical Garden Highlights Tour
10-11 a.m., Nevin Welcome Center, Plantations Road
Enjoy a relaxing guided tour through the botanical garden and discover the beauty and diversity of Plantations’ numerous theme gardens. This one-hour tour will highlight the Bowers Rhododendron Collection, Robison Herb Garden, Young Flower Garden, Tropical Container Garden and more. Afterward, you can browse the gift shop and exhibits at the Nevin Welcome Center.

Cascadilla Gorge Hikes
10-11:30 a.m. and 2-3:30 p.m., College Avenue entrance to the trail, adjacent to the Schwartz Performing Arts Center
Join us for a guided hike led by Cornell Plantations staff to learn about the history of the Cascadilla Gorge Trail and the six-year effort to rebuild this iconic trail. Wear sturdy hiking shoes and dress appropriately for the weather. The round-trip one-mile hike is moderately strenuous and involves some steep stair climbing. Dr. Friday hikers have the option to take the #10 TCAT bus back to campus instead of returning on the trail.

CALS Admissions Information Sessions
10:30-11:30 a.m., G10 Biotec
CALS Admissions Information Sessions focus on freshman and transfer admissions and include a general overview of the College of Agriculture and Life Sciences, an explanation of the admissions process, a glimpse into how the admissions committee evaluates applications, and plenty of time to answer questions about both academic and student life. Visit http://cals.cornell.edu/admissions/visits/ to view the information session schedule and to RSVP online.

Plantations Mundy Wildflower Garden Tour
11 a.m.-noon, Mundy Wildflower Garden, Caldwell Road entrance
Enjoy a variety of flowers, from anemones to zizzia and everything in between, as you explore Cornell Plantations’ wildflower garden with our native plants gardener Krissey Boys and staff botanist Robert Wesley. Meet at the Caldwell Road entrance to the garden (across from the Arboretum).

All-Alumni Lunch Block Party
11:30 a.m. -1:30 p.m., Barton Hall
Newly redesigned and jam packed full of energetic music, fabulous food, children’s entertainment, and more surprises—you won’t want to miss this destination event! Lunch tickets available on site.

Liberty Hyde Bailey Lecture: Any Challenge, Any Century
1:20-3:30 p.m., Call Alumni Auditorium, Kennedy Hall
The next 150 years will present challenges to our planet and its people, from adapting to climate change to the pressures of population growth and common chronic illnesses. Researchers in CALS and Cornell are doing their part to prepare communities for long-range sustainability and resilience in the face of change. Join a panel of experts for discussion of the future of healthy water, healthy foods and healthy humans.

Moderator: Kathryn Boor, The Ronald P. Lynch Dean of Agriculture and Life Sciences
Panelists: Michael Gore, associate professor, Plant Breeding and Genetics; Ludmilla Aristilde, assistant professor, Biological and Environment Engineering; Michael Ullmann ‘80, vice president, general counsel of Johnson & Johnson

Landscape Architecture Open House
1-3 p.m., 440 Kennedy Hall (gallery)
The undergraduate landscape architecture degree is the only one of its kind in the Ivy League. Visit the studio and mezzanine, enjoy drinks and snacks, and chat with faculty, staff and fellow alumni.

Plantations Botanical Garden Mini Tours
1-4 p.m., Nevin Welcome Center, Plantations Road
Don’t have a lot of time to spend? Take a mini-tour. Approximately every 20 minutes, docents will lead 15-minute tours highlighting some significant plants and “must see” areas within the extensive botanical garden collections.

Olin Lecture
3:45-5:15 p.m., Bailey Hall
The Olin Lecture was established at Cornell in 1986 through a generous gift from the Spencer T. and Ann W. Olin Foundation. Each year, the Olin Lecture brings an internationally prominent speaker to campus to address a topic relevant to higher education and the current world situation. The lecture is free and open to the public.

Tour of the Cornell Insect Collection
3-4 p.m., second floor of Comstock Hall
Tour the world famous Cornell Insect Collection, home to the most beautiful and bizarre insects in the world. With more than seven million insect specimens representing about 200,000 species, the collection offers fascinating examples of insect beauty and diversity. http://cuic.entomology.cornell.edu/

Natural Resources Faculty and Alumni Mixer
3:30-4:30 p.m., Fernow G24
Join DNR faculty and other alumni for a mixer in the newly renovated Fernow Hall. Get an update on the environmental science and sustainability curriculum and learn how Cornell’s environmental commitment is being implemented on campus and throughout our teaching program.

Special Earth and Atmospheric Sciences Seminar: Natural Resources–The Critical Role of Earth Science
3:30-4:30 p.m., Snee 214G
This special lecture will be presented by John F.H. Thompson, World Family Professor in Environmental Balance for Human Sustainability. Thompson has an impressive background in both academia and the minerals industry. He is currently a member of the World Economic Forum’s Global Agenda Council: Future of Mining and Metals and the Advisory Board for the related Mining and Metals in a Sustainable World 2050 initiative.

JOIN CALS FOR REUNION WEEKEND: JUNE 4–7, 2015
Keep tabs on all reunion events at: www.alumni.cornell.edu/reunion

Help PeriodiCALS Go Green. Opt to receive the magazine online at periodicals.cals.cornell.edu
The Charles H. Dyson School of Applied Economics and Management Reception
4-5:30 p.m., Warren Hall Central Lounge
The Dyson School invites you to a reception to mingle with classmates, meet old and new friends, learn what’s happening at the school and explore the newly renovated Warren Hall. Remarks by Dyson School Director Chris Barrett at 4:30 p.m.
Pre-registration is requested but not required.

SATURDAY, JUNE 6

Reunion Run
7:30 a.m., Barton Hall, Garden Ave. entrance
Pre-registration is required for the two- or five-mile courses.

CALS Reunion Breakfast and College Open House
8-10 a.m., Trillium, Kennedy Hall
Don’t miss the annual CALS Reunion Breakfast. Enjoy fellowship with Dean Kathryn Boor, alumni, faculty and friends of the college while learning about exciting CALS programs. Guests are welcome to enjoy a free continental breakfast and listen to a college update from Dean Boor. Peter Schott ’81, CALS Alumni Association president, will host the association’s annual meeting. Remarks begin at 8:45 a.m.

Plantations Spring Plant Sale
9 a.m.-noon, Plant Production Facility, 397 Forest Home Dr. (across from Flat Rock)
Take home some of Plantations’ gardeners’ top picks for your own home landscape. This spring’s offerings will include a wide variety of perennials and some new additions to the horticulture trade.

Alumni Reception and Open House at Mann Library
9:30 a.m.-12:30 p.m., Mann Library
CALS, CHE and other Cornell alumni are cordially invited to explore the fusion of modern and classic that makes Mann Library, in the words of our students, “the best place to discover new ideas.” Come explore our collaborative learning technologies, fresh study spaces, rich collections and summer exhibits and join us for a light lunch served right at the Mann circulation desk!

Tour the Museum of the Earth
10 a.m.-5 p.m., Museum of the Earth, 1259 Trumansburg Road, Ithaca
Tour the Museum of the Earth (affiliated with Cornell’s Department of Earth and Atmospheric Sciences) and its collections. Follow the major transformations of life through the ages as displayed through fossils and videos, observe the seismograph display and collect fossils from the Devonian seas of Ithaca. Fun for all ages. Free admission is offered to alumni and families (please show Reunion button). Donations are appreciated.

On the Move: Tours of the Department of Communication’s New Space in Mann
10 a.m.-noon, fourth floor, Mann Library
The Department of Communication will host hard hat tours and answer questions about its new facilities on the fourth floor of Mann Library. Come see the space in its current state, hear about the status of moving plans, and get updated on the exciting faculty research that will flourish in the new space.

Plantations Botanical Garden Mini Tours
10 a.m.-noon, Nevin Welcome Center, Plantations Road
Don’t have a lot of time to spend? Take a mini-tour. Approximately every 20 minutes, docents will lead 15-minute tours highlighting some significant plants and “must see” areas within the extensive botanical garden collections.

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10-11:30 a.m. and 12:30-2 p.m., College Avenue entrance to the trail, adjacent to the Schwartz Performing Arts Center
Join us for this guided hike by Cornell Plantations staff to learn about the history of the Cascadilla Gorge Trail and the six-year effort to rebuild this iconic trail. Wear sturdy hiking shoes and dress appropriately for the weather. The round-trip one-mile hike is moderately strenuous and involves some steep stair climbing.

State of the University Address
10:30 a.m., Bailey Hall
Cornell University President David J. Skorton will deliver his annual Reunion State of the University Address. All registered Reunion attendees and their guests are welcome.

All-Alumni Lunch Block Party
11:30 a.m.-1:30 p.m., Barton Hall
Newly redesigned and jam packed full of energetic music, fabulous food, children’s entertainment and more surprises—you won’t want to miss this destination event. Lunch tickets available on site.

Plant Biology Reunion Gathering for the Plant Sciences
11:30 a.m.-1 p.m., G22 Plant Science
Please join plant sciences for light refreshments and an opportunity to reminisce with friends, faculty and alumni. Historical Cornell photos will be on display.

Biological and Environmental Engineering Alumni Gathering
11:30 a.m.-1:30 p.m., lobby of Riley Robb
Enjoy a light lunch while visiting with fellow alumni and current and former faculty. Lab tours will be available.

Tour of the Cornell Insect Collection
Noon, second floor of Comstock Hall
Tour the world famous Cornell Insect Collection, home to the most beautiful and bizarre insects in the world. With over seven million insect specimens representing about 200,000 species, the collection offers fascinating examples of insect beauty and diversity. http://cuic.entomology.cornell.edu/

Wine Tasting
1-3 p.m., Trillium, Kennedy Hall
Savor the flavor of New York State wines and meet winery owners at this popular annual reunion event. Free admission to all alumni and guests, 21 years of age and older.

Special Lecture on Sustainability
1-2 p.m., Statler Auditorium
Join the Veterinary College, Atkinson Center for a Sustainable Future, CALS, and other university partners for this compelling discussion about sustainability. For more details, visit http://www.alumni.cornell.edu/reunion/.

Plantations Comstock Knoll Rhododendron Tour
1-2 p.m., Nevin Welcome Center, Plantations Road
Join gardener Phil Syphrit for this tour of one of the most beautiful places on campus: the Bowers Rhododendron Collection on Comstock Knoll, home to more than 130 varieties of rhododendron and azalea.

Allan Hosie Treman ’21 Memorial Concert featuring The Hangovers
2:30-3:30 p.m., Nevin Welcome Center
Relax and enjoy this performance by The Hangovers, the popular a cappella subset of the Cornell Glee Club. This year’s concert will be held under the tent at the Nevin Welcome Center in the botanical gardens on Plantations Road. Accessibility for disabled persons is limited. Refreshments provided.

Cornelliana Night
9:30 p.m., Bailey Hall
Join the Alumnae Chorus and the Alumni Glee Club in songs of Cornell. Reunion attendance and giving will be recognized. A real-time, live stream of Cornelliana Night at Bailey Hall will be available for viewing on a large screen at our overflow location in David L. Call Auditorium at Kennedy Hall.

Ongoing Weekend Events
Check the reunion program or website for times.

Cornell Plantations
At the botanical garden you can take a mini-tour, pick up a visitor map and explore on your own, browse the exhibits and gift shop in the Nevin Welcome Center, or just relax and enjoy the beauty and serenity of the gardens and grounds. www.cornellplantations.org.
Free parking is available at the Nevin Welcome Center, or you can ride our shuttle van from Barton Hall (Garden Avenue side) or the Peterson parking lot across from the Dairy Bar/Stocking Hall on Tower Road. Plantations shuttle service is provided from noon to 5 p.m. Friday and Saturday only.

Mann Library Ongoing Exhibits
8 a.m.-5 p.m. Thursday and Friday, 9:30 a.m.-5 p.m. Saturday

Knowledge with a Public Purpose: Portraits of Some of the Shapers of Cornell’s Land-Grant Mission
Mann Gallery, second floor
Fostering knowledge as a public good has been a cornerstone of Cornell’s history from its earliest beginnings. In commemoration of Cornell’s Sesquicentennial, this interactive exhibit highlights some of the remarkable threads in Cornell’s history that have shaped this university’s development as the country’s only land-grant Ivy League university.

In Vibrant Color: Historic Seed and Nursery Catalogs from the Ethel Z. Bailey Catalog Collection
Mann Library Lobby and Top Shelf Gallery, first floor
The Bailey Horticultural Catalog collection at Cornell is considered second only to that of the National Agricultural Library. A summer exhibit at Mann Library presents views of some of the collection’s extraordinary gems and puts a spotlight on current work to preserve and share these materials with the global community.
ALUMNA FIGHTS EBOLA ON THE FRONT LINES IN LIBERIA  By David Nutt

As the largest Ebola epidemic in history ravaged West Africa, Karlyn Beer ’06, an Epidemic Intelligence Service officer with the CDC’s Waterborne Disease Prevention Branch, traveled to Liberia. In that nation’s Maryland County, Beer spent a month surveying the county health team’s protocols for safely caring for Ebola patients and grappling with the complexity of preventing further transmission.

“Let’s say you’re a health official and you intercept a car carrying someone who is sick; what do you tell them? Where should they go?” she said. “Do you have an ambulance that you can transport them in that can then be sanitized with chlorine? Is there a clinic with capacity to isolate the person from other people?”

After returning to the United States, Beer started aggregating the results of her surveys. That data will help Liberian officials and others better prepare for combating Ebola outbreaks.

Her interest in fighting diseases, she said, can be traced back to her time at Cornell. As an honors undergraduate researcher in Dean Kathryn J. Boor’s Food Safety Lab, Beer investigated Listeria monocytogenes. There she learned researchers need to stay in touch with the people whose lives and diseases they are studying. She also gained valuable perspective on scientific progress from mentor Boor.

“Science is hard. You don’t leave work every day with a fuzzy feeling like you’ve done something good for the world.” Beer added. “Kathryn was such a great role model for seeing the amazing things that you are doing, even if every single day doesn’t feel like a success.”

ALUMNI NOTES

SHREWD INVESTMENTS AHEAD  By Sarah Thompson

Last year, fellow alumni elected Liz Everett ’97 and Mike Troy ’81 to serve four-year terms on Cornell’s Board of Trustees, the governing body responsible for charting the university’s academic and financial direction. Though Everett and Troy have been active alumni for years, the trustee role offers them a broader platform for helping to ensure the continuity, balance and value of a Cornell education.

For the university, financial sustainability remains an overarching concern. Everett said that less government funding for everything—from scholarships, to research, to training—requires more creative thinking about how to fund Cornell’s priorities.

Troy, a retired partner at Goldman Sachs, said that the board will need to take a critical look at those priorities in light of financial constraints.

“I have two sons at Cornell. I teach here as a visiting lecturer,” he said. “Ultimately, the economic model has to deliver excellence. I want to ensure that my kids and future students have the same overall, balanced experience between academics and extracurricular activities.”

Troy said that another major challenge is to correct a tuition system where wealthier students pay full tuition, low income students qualify for substantial financial aid, and many middle income students fall through the cracks. But a fix may mean making tough decisions about Cornell investments in other areas.

“We may not be able to be all things to all people,” he said. For Everett, failing to act to increase access to a Cornell education could threaten the diversity that she said is not only a main driver of Cornell’s founding vision of “any person, any study” but also its future.

“The value of diverse experiences and perspectives on campus, not just race and gender, is immense. Engaging students, professors and researchers to find solutions outside of their silos is why we’ve had so much success,” she said.

Everett, who also spent her career in finance, said CALS excels in embracing this approach, citing the top-ranked Charles H. Dyson School of Applied Economics and Management’s multifaceted programs and creation of the new School of Integrative Plant Science. It’s a model Everett believes also could keep alumni connected by showcasing the diverse paths—beyond development—for getting and staying involved.

“It’s a lifelong reinvestment,” she said. “We want people to be engaged with their time and expertise.”
**DREAM BIG, START SMALL**  
*By Rose Linehan, EN ‘17*

María Pacheco, M.P.S. ’90, is a Fulbright scholar, consultant to the United Nations Foundation, and founder of Wakami, a company changing the way craftspeople enter the international market.

Pacheco’s family moved to the United States when she was 12 and returned to Guatemala after four years. Her time in the U.S. allowed Pacheco to see her war-torn, poverty-stricken country with fresh eyes. Despite the devastation she saw, Pacheco maintained a vision of a peaceful, prosperous Guatemala, and that dream propelled her through school and back to her native country.

“I decided I couldn’t change the world, but I could create my own world,” Pacheco said, describing her first project after graduation, an organic farming program in a rural Guatemalan village. She went on to foster another program in which women supply hand-woven products to various international companies.

“It’s through a business-driven model that we can create sustainable change,” she said, summarizing what these experiences taught her.

In 2006, having seen the success of her previous projects, Pacheco decided to start her own business. She and her cousin, Queta Rodriguez, founded Wakami, a lifestyle brand specializing in handcrafted bracelets made by Guatemalan women. Wakami now employs hundreds of artisans and exports its products to a dozen countries. Pacheco plans to expand the product line and find more international distributors.

“Wakami is a Mayan word which means ‘it already is,’” Pacheco said. To the people at Wakami it means that Pacheco’s serene dream for the world already exists and “we just have to find a gate into it.”

Pacheco stressed that the key to creating sustainable, localized businesses is to start by asking community members what change they want to see, what skills they can contribute and what local resources might be put to use to create products.

She said rural villages have all they need to become productive, and she dreams of “a system where we export products from the villages instead of exporting people.”

**MAY BERENBAUM WINS 2014 NATIONAL MEDAL OF SCIENCE**

May Berenbaum, Ph.D. ’80, is sympathetic to those who fear spiders, beetles and other creepy-crawlies. As a young person, she too fled from the sight of insects. But as an undergraduate biology major at Yale, she discovered one semester that the only course that fit her schedule was on arthropods, and so she dove in.

In late 2014, President Barack Obama awarded Berenbaum a National Medal of Science in recognition of both her scholarly work and her “enthusiastic commitment to public engagement that inspires others about the wonders of science.”

“I think one of the reasons I was even considered for the national medal is that I work a lot with public engagement. And that’s in large part because I can totally relate to people who are afraid of insects,” Berenbaum said.

Her public engagement includes six books about insects for laypeople and a yearly “Insect Fear Film Festival” hosted at Urbana-Champaign. The festival showcases Hollywood’s use and misuse of insects in film, interspersed with her own video clips providing scientific education about arthropods.

Berenbaum’s scholarly contributions are also extensive: She has authored over 230 peer-reviewed publications and 35 book chapters, and she was researching honeybees and their interaction with pesticides a decade ago, just as colony collapse disorder devastated hives and the agriculture that depends upon them.

“There’s really been a sea change in attitude in terms of re-evaluating how pesticides are used,” Berenbaum said. “What was called colony collapse disorder still remains a mysterious phenomenon, but we’re definitely better off than we were 10 years ago.”

Berenbaum notes that her National Medal of Science continues a proud Cornell tradition. Since U.S. presidents began awarding the medals in 1962, four Corneliens have received the award for insect-related research: Professors Wendell Roelofs (1983), Tom Eisner (1994), and Jerrold Meinwald (2014), and alumna Berenbaum.
alumni notes

WOODSWOMAN FUND HONORS LABASTILLE
By Celina Scott-Buechler '18

Women have played a key role in conservation science since the founding of the field, and in the past century few played a larger role than the late author and scholar Anne LaBastille '55, Ph.D. ’69. Her Thoreau-inspired “Woodswoman” book series spurred women to study the natural sciences, and a new $300,000 self-sustaining scholarship funded by her estate will provide financial assistance to female doctoral students studying conservation or natural resources.

“She was truly a trail-breaker, a fiercely independent woman who could never sit still. Whenever she hit a wall, she broke right through it,” said Leslie Surprenant, the director of the Office of Invasive Species Coordination at the New York State Department of Environmental Conservation and a close friend of LaBastille.

In addition to publishing more than a dozen books and 150 popular articles, LaBastille became the first female Audubon Society tour guide, operated one of the first eco-tourism businesses in the United States, and created a natural wildlife reserve surrounding Lake Atitlan in Guatemala to protect the flightless giant grebe, for which she was awarded the World Wildlife Fund gold medal in 1974.

“I think her greatest legacy is to the women in natural resources and conservation,” said Gemara Gifford, a current graduate student in Natural Resources. “I see a lot of aspects of what I’m trying to do in the work she did, and know that I probably wouldn’t be here if she hadn’t paved the way for women.”

MICHAEL SCHWERNER ’61 EARNED POSTHUMOUS MEDAL OF FREEDOM

Fifty years after civil rights worker Michael “Mickey” Schwerner ’61 was slain in Mississippi by members of the Ku Klux Klan, President Barack Obama presented the Presidential Medal of Freedom to his family Nov. 24 at the White House. A development sociology major, Schwerner was working for the Congress of Racial Equality to educate and register African-American voters when he and coworkers James Earl Chaney and Andrew Goodman were murdered. Their deaths ignited outrage, prompting Congress to pass the Civil Rights Act and the Voting Rights Act. The medal’s citation concludes: “James Earl Chaney, Andrew Goodman and Michael Henry Schwerner still inspire us. Their ideals have been written into the moral fabric of our nation, from the landmark civil rights legislation enacted days after their deaths to our continued pursuit of a more perfect union.”

THE FARM BEHIND THE DRIVE-THROUGH
By Krisy Gashler

When ordering a Sausage McMuffin at McDonald’s, most of us are thinking about wherever we need to rush after our quick breakfast. Michael Thompson ’77 is thinking about every step of the supply chain that grew the food, processed and distributed it, and made it accessible throughout the country and much of the world.

As president and CEO of Fair Oaks Farms, Thompson supplies sausage, bacon, and other meat and poultry products to grocery stores and restaurants, including McDonald’s and Walmart. Thompson took over ownership of Fair Oaks Farms in 2003, after spending 20 years managing supply chains and operations for McDonald’s.

“I had this unique background of understanding the whole process, farm to fork,” Thompson said. “I had North America and some global responsibilities in my role at McDonald’s, and being at that position, learning about suppliers, learning about raw materials, those experiences helped me to understand the food business at the level I needed to be an entrepreneur.”

Since Thompson took over the Wisconsin-based Fair Oaks Farms, revenue has increased 200 percent and staff has tripled, from 100 to 300 people. The company has been recognized by the Department of Commerce, the American Meat Institute, the National Safety Council, and the state of Wisconsin. In 2010, Thompson was invited to participate in President Barack Obama’s White House Forum on Modernizing Government.

One of the most rewarding aspects of Thompson’s work is being able to support his customers’ goals and objectives; for example, McDonald’s new thick-cut, hickory smoked bacon was developed at Fair Oaks Farms.

“I’m very proud of being a Cornell grad, and I believe the benefits of being a business management graduate have followed me throughout my life and my career,” Thompson said. “The leadership characteristics that you see every day on campus—that resonated with me and helped me to become the leader I am today.”
Two-Minute Commencement Speech

By Kraig Adler

We asked professor emeritus Kraig Adler for a succinct commencement speech, with only two minutes on the clock. Ready, set, go!

One of my greatest joys as a Cornell professor has been to watch the remarkable transformation that undergrads undergo. Many freshmen, as I experienced in teaching introductory biology starting in 1972, came in thinking they already know a lot and that college was just an extension of high school. They were in for a shock. For them, the weeks seemed to go by very slowly. They couldn’t keep up with all the reading. The tests were too challenging. And they didn’t like the place. The word “hate” was even used, and some students were in tears. As I told many of them who came in for office hours, they may not like Cornell now, but soon they will figure out how to succeed here, and by the time they graduate they won’t want to leave. Surely none of them believed me at the time.

You, too, are a different person now from the one who entered Cornell just a few years ago. You may not feel it, but your teachers know it. Your friends know it. And your parents know it. You have learned how to succeed here, and this is one of the most competitive campuses in America. To be sure, not everyone succeeds at the same level, but every one of you is more capable now than you were as a freshman. You have more self-confidence because you have prospered in a tough place. You are going to graduate! You know how to organize your life and establish priorities. You know what you are good at and what you are not so good at. (Both are important to know about oneself.) You know how to interact with a wide range of people from many different places. You know how to find information and think critically about it, how to teach yourself and how to make decisions. You are going to do well in this world.

When I look at the graduate students coming into my department from the best universities across America, I think about how they compare to the Cornell seniors we are sending out. I think our students are usually better prepared than the ones coming in. I thought that 40 years ago, and I believe it is still true today. I am incredibly proud of Cornell students and how quickly they mature while they are here. But now you have to leave. Some of you may be in tears now but not because you hate the place. You are going to be an alum! Not just for four years but forever. You have earned the Cornell label. Relish it.

Kraig Adler is a professor of biology emeritus in the Department of Neurobiology and Behavior.

Help Wanted: Alumni Advisers

By Amanda Garris, Ph.D. ’04

From resume critiques to mock interviews, a pilot online advising platform is connecting alumni with students seeking to hone their job search skills. The Evisors program, launched in January for alumni and students of the Charles H. Dyson School of Applied Economics and Management, is a streamlined way for students to seek career guidance. If successful, the platform is expected to roll out to the rest of the college.

“We want our students to go out and change the world,” said Rebecca Joffrey, the director of interactive services with CALS Student Services. “It is incredibly valuable to have alumni make themselves available to students and be a part of helping them figure out their path. The Evisors technology makes it easy to engage.”

The premise of the Evisors program is to create an online community of thousands of advisers offering a diversity of perspectives, through a platform that is easy for alumni to use. A social media-savvy successor to the CALS Alumni Career Link database, Evisors allows advisers to import their LinkedIn profiles and list their availability and offerings. In the pilot program, students searching for career guidance can make appointments for phone meetings conducted via Evisors, knowing that the alumni are truly available to help. And the CALS Career Services team can precisely track how many students are using and benefitting from the system.

Joffrey hopes the pilot program, made possible by support from the CALS Alumni Association and the Dyson School, will attract a pool of thousands of alumni advisers and spur even more ways for alumni to connect.

“Evisors allows us to include alumni directly in student development and training programs,” Joffrey said. “It provides the sort of experience and interface that students have come to expect in today’s social, mobile world.”
**KRISTIN ALONGI M.S. ’10**

There are two lessons that have greatly shaped my leadership style: the importance of being an advocate for my team and transparency. When I first joined Rich’s in R&D as a product developer, I learned this advocacy piece. I went to my manager with news of a plant trial that was not as successful as planned. Concerned with how she would respond, I was taken aback by her support and time spent coaching me through potential solutions. It had a profound impact on my development, as I realized that true leaders build this trust and dedicate themselves to setting their teams up for success. This year, I moved into a new role, building a cross-functional pizza product development team. I took this first lesson and paired it with one from my current manager: using transparent communication to build this foundational layer of trust. With my team, I am not only an advocate for them but I clearly communicate expectations, share feedback on performance early and often, and hold them accountable through candid conversations. This transparency paired with advocacy helps drive engagement and performance, while the trust allows us to grow, achieve and learn together.

**Kristin Alongi, M.S.’10**, is a process manager with Rich Products Corporation in Buffalo, N.Y. She first came to Cornell as a Food Science Summer Scholar in 2007 and now serves on the Advisory Council for Cornell’s New York State Agricultural Experiment Station in Geneva.

**PATRICK HOOKER ’84**

I can trace my career path back to a turning point one week in the summer after my freshman year of high school. The legendary ag teacher André Lepine tracked me down and insisted I go to the Future Farmers of America (FFA) summer leadership camp. There, it was fascinating to meet a new set of people who had never seen me before, react to them and see how you can define yourself in a new setting. After I was elected camper of the week—a minor leadership opportunity—it inspired me to run for office in my local FFA chapter, which set me on a new trajectory, eventually leading to being New York State FFA president. The experience of traveling around the state and meeting everyone in the industry showed me the importance of being well-informed and decisive, and the die was cast for me to move away from hands-on agriculture and into policy. As a leader in government agencies, two things have hit hard over the years. Being professional and not tolerating harassment or anything off-color allows people to relax and focus on their jobs. The second thing—and it amazes me to this day that it’s not a given—is to always be absolutely ethical and follow the law. Lastly, I try hard to keep a smile on my face and on those around me. Our work is fast paced, and it always feels easier if we are in a good mood!

**Patrick Hooker ’84** is deputy secretary for food and agriculture for New York, where he oversees the Department of Agriculture and Markets and the State Liquor Authority. He has also served as New York Commissioner of Agriculture and director of agribusiness development for the Empire State Development Corporation.

**JOHN NOBLE ’76**

As I hire people for leadership positions, I often talk about respect: respecting yourself and having a good life balance but also respecting the work life balance of those who work with you. It shows in the thousands of interactions we have with people every day—you can call this a leadership style or you can call it a culture. Another thing I try to emulate is playing well in the sandbox together. It’s so much easier to get things done in a group, and if you enjoy working with people, what you can achieve in a group is much greater than what you can as an individual. I also tell aspiring leaders to be engaged with all aspects of their broader industry. For me, one formative experience was LEAD NY; the program puts people from lots of different aspects of the food system together to learn and be challenged. I was very humbled by the knowledge and perspectives in my group, and staying humble is important.
ALEX RUIZ ’90

At heart, I am an entrepreneur. I organize and manage my agency with considerable initiative and risk. As a leader, it’s important to value, understand and grow talent, because an agency is only as good as its people. As a manager, my main responsibility is to help staff members build their careers. I’ve learned to pay attention to the people who impacted me along the way, looking for the things that I admire in their leadership style and incorporating it into my own and who I am. One manager taught me the importance of fearlessness: that having courage was the first step to finding answers. From another, I learned how powerful it can be to envision where you want to be in the future—to be able to say it out loud—to gain confidence and shape your direction. Vision questing has been an effective way for me to live my life and build my career. And I have seen the power of working extremely hard. A highly motivated leader can drive the success of the whole company, while developing respect and credibility.

Alex Ruiz ’90 is senior vice president of client services for Tenthwave LLC, a digital marketing agency in New York City, and currently serves on the Alumni Advisory Board of the Charles H. Dyson School of Applied Economics and Management.

GERALDINE MCMANUS ’78

You could say I have learned a lot from “adverse selection.” When I started out, at a firm I loved, some of my coworkers were not kind at all. I used to look at them and think, ‘Don’t let me end up like this—callous and abrasive.’ I already knew then that I wanted my style to be very different. My father used to say, “You can’t have two sets of morals; you can only have one,” and I have tried to live that way. I spend a lot of time interviewing people when we are hiring, because their core values are important in the workplace. There is no room for someone who is cutthroat or trying to get ahead at the expense of others, no matter how smart they are. I want the work environment to be stable, where people feel comfortable expressing themselves so they can focus on work and not office politics. When you see junior employees take up smoking cigars or wearing a particular brand of watch to emulate the boss, you know the same thing is happening with modeling the behavior of their supervisors. I want my example to be a good example and a kind example.

Gerrie McManus ’78 is a managing member of Granger Management and serves on the CALS Advisory Council.

OUR APOLOGIES!

In the photos that appeared on pages 36 and 37 of the Fall 2014 issue of periodicALS, the Vergara [above] and Bishop families [below] were incorrectly identified.

And because I’m in the seventh generation in a family business, I’m particularly aware of how important it is to have a plan for businesses to transition. It requires good strategic planning and thinking in the long term—five, 15 or 50 years ahead. Just look at the model that Ezra Cornell had, with a legacy that has lasted for 150 years.

John Noble ’76 is president of Noblehurst Farms and president and chief executive officer of Synergy Dairy in Linwood, N.Y. He is currently a Cornell Trustee and was a member of the first LEAD NY class.
Bugging out!

**Solenopsis invicta**

These vicious visitors from South America are invasive and insatiable, with an appetite for the eggs and young of ground-nesting birds and reptiles. Commonly known as RIFA, the red imported fire ant not only has a bite with a lingering sting, but their mound-building can also lead to plant root and crop damage that can alter ecosystems.

**Anthrenus grandis**

Now controlled by integrated pest management methods that boast lower pesticide use and higher yields, the cotton boll weevil devastated the U.S. cotton industry by the 1920s. But there was a silver lining for the town of Enterprise, Ala., which honored it with a statue because it forced local farmers to transition to the more profitable peanut plant.

**Glaucopsyche xerces**

The dune dwelling Xerces blue butterfly, the first American butterfly species driven to extinction by urban development, lives on as the namesake for an invertebrate conservation organization, The Xerces Society.

**Melanoplus spretus**

In 1875, the now-extinct Rocky Mountain locust created the largest recorded locust swarm in human history, a colossal 1,800 miles long and 110 miles wide and dense enough to block out the sun.

**Daktulosphaira vitifoliae**

A North American soil pest ex-pat that devastated the European wine industry in the 1800s, grape phylloxera was foiled by the use of resistant rootstocks from American wild grapes, a discovery that saved the French wine industry. Cheers to that!

In October, the Department of Entomology celebrated the 150th anniversary of Cornell with the largest Insectapalooza to date. Meet some of the featured small but mighty creatures that have had an outsized impact on history and culture.

Drawings by agricultural sciences major Olivia McCandless ’17
$18.5 MILLION GRANT TO BOOST BREEDING OF GLOBAL STAPLES

By Amanda Garris Ph.D. ’04

To streamline the breeding of five staple crops—wheat, rice, maize, sorghum and chickpea—the Bill & Melinda Gates Foundation has awarded Cornell $18.5 million for a project that will put modular, open-source breeding software resources into the hands of plant breeders in the developing world.

“This is a significant moment in the history of breeding, with genomes making their way into the heart of applied plant improvement,” said Susan McCouch, professor of plant breeding and genetics and the project’s principle investigator. “We can finally use genome-wide approaches to model plant performance in real time using tools that are shared across diverse species and regions of the world.”

The Genomic and Open-source Breeding Informatics Initiative (GOBII) takes aim at a hurdle created by the era of genomics: big data. According to McCouch, millions of data points are being accumulated on hundreds of thousands of new breeding lines—the basis for new varieties—in breeding programs run by CGIAR, a consortium of 15 research centers around the world. The centers are populating databases with genetic profiles—the genotypes—as well as breeders’ observations on traits—or phenotypes—that will make or break harvests in the coming century. The databases will include information about drought tolerance, disease resistance and yield.

“No one can handle the volumes of data. Massive quantities of phenotype and genotype data are overwhelming to most public sector breeding programs,” McCouch said. “On this project, we think of ourselves as the back office. The grant allows us to move forward with what’s essentially a service project to develop and deliver useful tools and information to public sector breeders around the world.”

GOBII will bring together software engineers and geneticists with plant breeders at three CGIAR centers in Mexico, India and the Philippines. Ithaca collaborators on the grant include Mark Sorrells, professor of plant breeding and genetics; Lukas Mueller, Boyce Thompson Institute associate professor; Qi Sun, Computational Biology Service Unit senior research associate; and Ed Buckler and Jean Luc Jannink, USDA Agricultural Research Service geneticists.

Together they will develop databases and software tools that will allow breeders to use genomic information from the start to finish, from identifying diverse farmers’ needs, to developing analytical tools to help breeders make selections among breeding lines, and ultimately integrating the new tools into existing information systems used by each CGIAR center.

“What we hope to do is help breeders make selections more efficiently, using genomics to eliminate breeding lines with poor breeding value, and increase the probability of finding what they want,” McCouch said. “Ultimately, our goal is to increase the rate at which smallholder farmers in the developing world benefit from advances in the application of genomics to plant breeding.”

IMPLEMENTING THE CALS STRATEGIC PLAN 2014–15: AN UPDATE

The new strategic plan defines priorities that will keep the college nimble, proactive and well positioned to meet the needs and aspirations of students and stakeholders for decades to come. Work around this year’s objectives is well underway in the four focal areas of food and energy systems, the life sciences, the environmental sciences, and the social sciences. Our continuing commitment to the Land-Grant Mission is being addressed through efforts to promote engaged learning and research, including student opportunities for internships, externships and international experiences and facilitating the impact of research through media, connections with policymakers and extension teams. Among the values espoused in the plan is inclusion in the campus community, beginning with attracting a diverse and top-tier student body through undergraduate admissions. For more information or to read the complete plan, visit strategicplan.cals.cornell.edu.
O
ver 20 years ago as an agricultural economics major, I never could have imagined how Cornell’s vast resources would play a role in two key transitions in my professional life—beginning my first career in finance and second in entrepreneurship.

When I arrived on campus and signed up for classes, I had an associate’s degree in accounting from Finger Lakes Community College but no clear plans for where I was driving my “personal bus.” Not only did classes build the foundation for a career in the business world, they also gave me an inkling of my own potential. Finance was arguably the toughest class in my major, and acing it gave me the confidence that I could perform and excel in an internship on Wall Street, which changed my life. Econometrics introduced me to multi-variant analysis, Beta, and why R-squareds matter, concepts I later used in making investment and financing decisions. I surprised myself by doing well enough in finance and econometrics—and liking them so much—that I was selected as a teaching assistant. Courses in business policy introduced me to the case method, which requires personal and professional experiences to analyze a business situation and determine the proper course of action. This was excellent preparation for joining the First Scholar Program at First Chicago (now JPMorgan) after graduation—a management training program combining rotations with the part-time MBA program at Northwestern’s Kellogg School of Management.

Cornell also helped me find internships that were pivotal in my path, making industry connections that would reappear throughout my career. My first internship through the Sponsor for Educational Opportunities Career Program allowed me to try my hand with a quantitative asset management group (i.e., hedge fund). There, I met several titans of Wall Street, including Jamie Dimon, with whom I later worked at Bank One/JPMorgan. This changed my life and set me squarely on the path to finance. A connection through a friend in the ILR school helped me land an internship at FirstUSA bank. Years later I returned there and became an inventor of a predecessor of Blink, which is used in contactless cards that communicate using RFID (e.g., Speedpass and EZPass). All of these experiences served as preparation for business school at Kellogg and numerous roles I played over 16 years at JPMorgan.

In 2012, I left the world of finance to become CEO of Team Express, a 200-employee sporting goods equipment and apparel company and began my transition toward entrepreneurship. Now, almost 20 years later, Cornell continues to play a significant role as I continue in the world of entrepreneurship. In 2010 I was invited to be a member of the Cornell Council, which reconnected me with the incredibly vast resources of the Cornell community—and allowed me to check on my niece, who is in the Class of 2015. I reconnected with faculty, including Professor Cindy van Es, for whom I TA’ed econometrics and who was a mentor as I completed my honors thesis my senior year. In the fall of 2013 she invited me to speak to her Men of Color Skills Seminar, where among other things, I tried to alleviate some of the collegiate angst many students feel by encouraging them to “keep working hard and they would be just fine.”

Although my roots are in the Dyson School, my connection to Cornell continues to expand across the campus and presents opportunities to interact with students and professors and keep in touch with ongoing research. In 2013, along with a partner I became a Marriott franchisee and through a Hotel School professor enlisted some Hotel students to assist in the design and market analysis for two $150 million full-service hotel projects. I was also approached to advise on an anaerobic composter project in Chicago that will use food waste from manufacturers and restaurants to generate compressed natural gas and enriched compost used in urban farming. CALS and New York State are coincidentally working on a similar project, and we are exploring potential synergies between our projects. The personal connections I made as a student live on—I’m even advising a former suite-mate who is COO of a middle market sports agency and marketing firm on capital raising, corporate finance, and operational capacity strategies.

I recently joined the founding management team for PRE Brands (www.prebeef.com) as CFO and COO. PRE is a Chicago start-up bringing healthy, tasty grass-fed beef to mainstream retail at an affordable price. I’m excited to share what I learn from this chapter of my career with Cornell students in the future, as well as becoming better acquainted with and contributing to the myriad of entrepreneurship, private equity, and venture capital initiatives at Cornell. Who knows what the next 20 years have in store?
Agricultural Sciences
Get a broad overview of agriculture, as well as more intense study and hands-on experience in one of five concentrations: animal science; crop production and management; sustainable agriculture; applied economics and management; education and communication.

Animal Science
Prepare for study in veterinary medicine or careers in animal production, biotechnology, and conservation, in a program that has been nationally recognized in animal breeding and genetics, nutrition, physiology, growth, behavior, and management.

Applied Economics & Management
The Charles H. Dyson School of Applied Economics and Management provides management education and the opportunity to specialize in accounting, agribusiness management, applied economics, entrepreneurship, environmental and resource economics, finance, food industry management, international trade and development, marketing, or strategy.

Atmospheric Science
Examine the behavior of weather and climate, and gain experience in the analysis, interpretation, and forecasting of meteorological events.

Biological Engineering
Integrate engineering and biology to solve some of the challenges facing our world, such as ensuring an adequate and safe food supply, protecting natural resources, and developing systems that monitor, replace, or intervene in the mechanisms of living organisms.

Biological Sciences
Study the fundamentals of biology while concentrating on: animal physiology; biochemistry; computational biology; ecology & evolutionary biology; genetics & development; insect biology; marine biology; microbiology; molecular & cell biology; neurobiology & behavior; nutrition; plant biology; and systematics & biotic diversity.

Biography & Society
Examine the social, political, and ethical aspects of modern biology research and practice.

Biometry & Statistics
Apply statistics, mathematics, computing, and other methods to solve problems in diverse fields, from the life and social sciences to business and finance.

Communication
Study communication processes and put theory to use in understanding audiences, shaping messages, and interacting with individuals and technologies. Focus areas include: environment, science and health; media studies; information technologies; and social influence.

Development Sociology
Contribute to understanding societal development and factors to solve social problems, both local and global, in a program that is well known for international, domestic, rural, environmental, agricultural, and population studies.

Entomology
Get an education in biological and environmental sciences, with a special emphasis on insects—the most diverse group of organisms on Earth. The Department of Entomology was the first of its kind in the U.S., and remains one of the largest programs in the nation.

Environmental Engineering
Prepare for careers in the technical management of natural resources, including work in water, soil, and air quality, in a program that incorporates engineering and the study of the natural environment.

Environmental & Sustainability Sciences
Gain a comprehensive and integrated view of the biological, physical-chemical, ecological, and social dimensions of environmental and natural resource issues. Concentrations include: environmental biology & applied ecology; environmental policy & governance; environmental economics; biogeochemical sciences; or a student-designed concentration.

Food Science
Explore food systems from processing and packaging to distribution, evaluation, and safety, and solve real-world problems by combining chemistry, microbiology, nutrition, and engineering. Focus on food science or food operations and management.

Global and Public Health Sciences
Explore multidisciplinary solutions for population-level health issues, with a focus on disease prevention and health promotion, epidemiology and biostatistics, and resource-challenged environments.

Information Science
Examine the cultural, economic, historical, legal, and political contexts in which information systems are employed and understand their impact on individuals and institutions. Areas of study include: human-centered systems; social systems; and information systems.

International Agriculture & Rural Development
Learn about the challenges and opportunities that exist in less-developed countries, with concentrations in economics and development, agricultural food systems, and environment and ecosystems. Overseas experiences and studies are incorporated into the major.

Landscape Architecture
Design outdoor areas including parks, restored wetlands, urban plazas, historic sites, and botanical gardens. Also work in urban development, land use planning, conservation, historic preservation and ecological designs.

Nutritional Sciences
Understand relationships among human health and well-being, food and lifestyle patterns, food quality and agricultural systems, and social and institutional environments, while drawing on chemistry, biology, and social sciences. Focus on: human nutrition; community nutrition; international nutrition; and molecular nutrition.

Plant Sciences
Study the biology, growth and development of plants, as well as the use of plants for food, fiber and ornamental purposes. Concentrations include: evolution, systematics and ecology; plants and human health; plant genetics and breeding; plant physiology and molecular biology; and sustainable plant production and landscape management.

Science of Earth Systems
Build the foundation for the future management of our planet by studying the Earth’s system, with a focus on understanding and managing the resources of the lithosphere, biosphere, hydrosphere, and atmosphere.

Viticulture & Enology
Prepare to become a leader in the wine industry. The program includes coursework in winemaking, vineyard development, economics, and management.
A FESTIVAL OF IDEAS AND IMAGINATION

CELEBRATION

IDEAS

IMAGINATION

INSPIRATION

CEREMONY

APRIL 24–27, 2015

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