

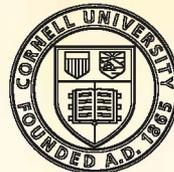
periodiCALS

THE MAGAZINE OF CORNELL UNIVERSITY'S COLLEGE OF AGRICULTURE AND LIFE SCIENCES

VOL. 7 • ISSUE 1 • 2017



BREAKING NEW GROUND: THE URBAN ISSUE



Cornell University





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[VOLUME 7 | ISSUE 1 | 2017]

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LEFT: Adult Magellanic penguins preen on the beach after feeding in Punta Tombo, Argentina, in this photo by interdisciplinary studies major Anahita Verahrami '17. Verahrami traveled to Patagonia with the class Ecology and Conservation of Wildlife in the Neotropics for two weeks of field research in January. "At this location, we could get unbelievably close to the penguins," Verahrami said. "Visitors are restricted to walkways that snake through the colony, but the penguins can cross over them and often stop right by your feet! So it was a great place to observe general behaviors like their 'donkey bray' vocalizations and uncommon ones such as their beak 'sword fights'."



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A SCOOP FOR THE SCOOP?

We are listening—tell us what you think of *periodiCALS* magazine. Fill out the short, confidential survey at the link below to be entered into a drawing for a pint of Cornell Dairy ice cream delivered to your doorstep. You choose the flavor. Six lucky winners will be selected on May 30. Winners outside the continental United States will receive a Cornell Store gift certificate. Please fill out the survey by May 26 at cals.cornell.edu/scoop



dean's message



Cornell University may be located in central New York, but its connections to New York City are wide-ranging, as you will see in this issue of *periodiCALS*. Programming in the College of Agriculture and Life Sciences has driven the evolution of food and agriculture—from farmsteads to city rooftops to our finest restaurants—for more than a hundred years. The range of our expertise is particularly evident in NYC. From Professor Nina Bassuk's work with urban horticulture to Cornell Cooperative Extension's program to safeguard the NYC water supply, we are sparking discovery and implementing change in urban agriculture, sustainability, and food entrepreneurship in one of the most exciting cities in the world.

Food entrepreneurship is one area in which we are further expanding CALS' reach in New York City through a new partnership with the New York State Department of Agriculture and Markets. Cornell's Food Venture Center has already helped entrepreneurs launch more than 13,000 new food products into

the market from its lab at the New York State Agricultural Experiment Station in Geneva, N.Y. Now we are hiring two new extension specialists, in food product safety and in urban agriculture, who will be located in the Department of Agriculture and Markets' Brooklyn office. When those staff members are in place, we will open a satellite office of the Food Venture Center in New York City to work directly with city-based food entrepreneurs of all sizes to turn their concepts into innovative and safe commercial food products.

The satellite location is strategically placed to meet the ever-increasing demand for food processing and food safety expertise in this urban setting, and it will also help connect small-scale city food processors with products grown in upstate New York. So, for example, if a food entrepreneur in the city wishes to create a new line of tomato-based sauces, we can connect that person with a farmer upstate to ensure that the products are

locally grown and locally manufactured.

In addition to meeting the needs of food entrepreneurs, our work also supports the city's citizens through projects that link urban ecology and resilience. Whether it is landscape architects designing areas that can mitigate superstorm-sized flooding or projects that protect urban gardeners from soil contaminants, our work in the city is innovative and practical, and it touches lives across the five boroughs.

I am so proud of the role CALS plays in shaping the future of food, sustainability, and biodiversity—locally and globally—and I am equally grateful for your interest and your support.

Kathryn J. Boor

Ronald P. Lynch Dean of the
College of Agriculture and Life Sciences



The Brooklyn Grange, a commercial rooftop farm in New York City, was the site of an alumni farm-to-table dinner in June 2016 showcasing Cornell's work on local food systems and sustainable agriculture.

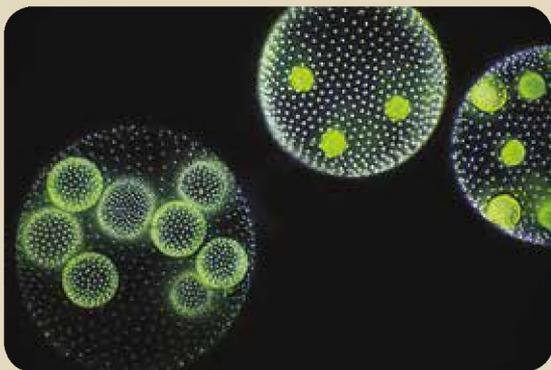
PLANTS' CHEMICAL MESSAGES KEEP PESTS MOVING

Think of it as a “neighborhood watch” for plant life. A new study by André Kessler, assistant professor of ecology and evolutionary biology, and Kimberly Morrell, Ph.D. '15, explains how plant-to-plant communication keeps insects on the move and distributes damage evenly across a field. When leaf beetle larvae eat goldenrod, the injured plant emits a chemical signal using VOCs (volatile organic compounds). This tells the insect that the plant is damaged and a poor source of food—time to move on—but the airborne message is also a warning to neighboring plants to ramp up their own chemical defenses. “To our surprise, the larvae avoided VOC-exposed plants in the same way they avoided actually damaged plants,” Kessler said. They discovered that VOCs caused the larvae to move two plants over before feeding again. “If you have plant populations that are very dense, like goldenrod or agricultural crops, plant-to-plant communication can play a very important role in the distribution of plant-eating insects,” Kessler said. He noted the potential for no loss in yield in an agricultural field if insect feeding is evenly distributed across all plants and is kept at tolerable minimum levels for each individual plant, making VOC manipulation a promising avenue to protect crops from insect damage, at least for relatively mobile pests.



MICROALGAE CREATE GREEN FUEL, REDUCE FOOD INSECURITY

Industrial cultivation of marine microalgae may soon become a top-tier contender for combating global warming while simultaneously providing energy and food security, according to a new study published by the Cornell Algal Biofuels Consortium. Microalgae—single-celled, microscopic organisms—can be a rich source of lipids for aviation and shipping fuel production. In addition, the protein-rich, nutritious by-products of fuel production can be added to feeds for domesticated farm animals, including chickens and pigs, or aquacultured animals, like salmon and shrimp. “I think marine microalgae can provide food security for the world,” said Charles H. Greene, professor of earth and atmospheric sciences, and lead author of the paper. “They can also provide our liquid fuel needs, not to mention their benefits in terms of land use. We can grow algae for food and fuels in only one-tenth to one one-hundredth the amount of land we currently use to grow food and energy crops.” Marine microalgae need not compete with terrestrial agriculture for arable land, nor does growing them require fresh water. Many arid, subtropical regions—such as Mexico, North Africa, the Middle East and Australia—would provide suitable locations for producing vast amounts of microalgae. “We may have stumbled on to the next green revolution,” Greene said. “We got into this looking to produce fuels, and in the process, we found an integrated solution to so many of society’s greatest challenges.”



MERLIN BIRD PHOTO ID MOBILE APP LAUNCHES

The Merlin Bird Photo ID mobile app has officially taken flight. Thanks to machine-learning technology, the recently launched app can identify hundreds of North American species it “sees” in photos. The app was developed by Cornell Tech and California Institute of Technology computer vision researchers in partnership with the Cornell Lab of Ornithology and bird enthusiasts. “When you open the Merlin Bird Photo ID app, you’re asked if you want to take a picture with your smartphone or pull in an image from your digital camera,” said Merlin project leader Jessie Barry of the Lab of Ornithology. “You zoom in on the bird, confirm the date and location, and Merlin will show you the top choices for a match from among the 650 North American species it knows.” Like any good birder, the system considers species that would be found at that specific time of year and in that location using information from the eBird program, which collects an average of 7 million bird observation records each month from around the world. How good of a birder is Merlin? Accuracy is around 90 percent for a good quality photo, but the odds of getting an accurate match go down if the photo is fuzzy or if the bird is obscured. Down the road, the Merlin team will produce versions for South America, Europe, Asia, Africa and Australia, and developers hope to create an open platform that can be used to make visual classification tools for other organisms, from frogs to ferns.





LYNN PERRY WOOTEN NAMED NEW DEAN OF DYSON SCHOOL

Lynn Perry Wooten, senior associate dean for academic and student excellence at the University of Michigan, has been named the David J. Nolan Dean of the Charles H. Dyson School of Applied Economics and Management. Wooten, also a clinical professor of strategy, management, and organizations at Michigan's Ross School of Business, will begin her appointment at the Dyson School on July 1.

The Dyson School is shared between the Cornell SC Johnson College of Business and the College of Agriculture and Life Sciences.

"For a while, I have been fond of Ezra Cornell's ethos of 'any person ... any study,' and now I have the honor to live this ethos by serving as dean of the Dyson School," Wooten said. "I am looking forward to working with Dyson's faculty, staff, and students, and excited about how at Dyson, education and research focus on business as a vehicle for making the world a better place."

Wooten received her bachelor's in accounting in 1988 from North Carolina Agricultural and Technical State University, her MBA in 1990 from Duke University, and her doctorate in business administration in 1995 from the University of Michigan's Ross School. Since 1998 she has served in numerous roles at the Ross School, including co-faculty director of the Center for Positive Organizations and the Executive Leadership Institute, and associate dean of undergraduate programs.



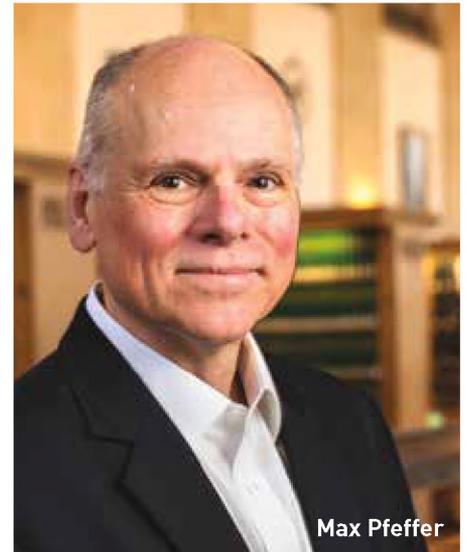
Robyn Wishna

Jan Nyrop



Matt Hayes

Amy McCune



Max Pfeffer

LEADERSHIP TRANSITIONS IN 2017

Three transitions will bolster the senior leadership team that oversees the college's agricultural experiment stations, faculty and department affairs, sponsored research, and the academic aspects of facilities.

Jan Nyrop, associate dean and director of the Cornell University Agricultural Experiment Station, became the interim director of the New York State Agricultural Experiment Station in Geneva, N.Y., on March 1. Nyrop served as a senior associate dean from 2007 to 2015, when he was named director of the Cornell University Agricultural Experiment Station. A professor of entomology, Nyrop has expertise in the biologically-based management of arthropods in horticultural crops.

In senior leadership, on May 1, Amy McCune will become a senior associate dean, and Max Pfeffer, current senior associate dean, will move into the newly created role of executive dean.

McCune, an evolutionary biologist who specializes in investigating the history of life through the study of fishes, has

served as chair of ecology and evolutionary biology for six years. In that time, she has served on both the CALS strategic planning and restructuring committees as well as a variety of university-wide committees, including committees for Educational Policy and Management, Finance and Policy, the General Committee of the Graduate School, and University Strategic Planning.

The new executive dean position was born out of key priorities identified during the college's strategic planning process. Pfeffer, professor of development sociology, has served as a senior associate dean for seven years. During this time, he has been involved in many CALS initiatives, including strategic planning. In his new role, he will focus on special initiatives for the college and for Dean Kathryn J. Boor, building on recommendations in the CALS Strategic Plan and the CALS Taskforce Structure Report. He will also continue some ongoing duties, including representation of CALS on the Vice Provost of International Affairs International Council and the exploration of new joint programming with international partners.

5 BOTTOM-LINE LESSONS FROM THE BIG LEAGUES

Can business lessons be learned from studying the NFL, MLB, NBA, NHL, and NCAA? Kevin Kniffin, visiting assistant professor in the Dyson School, used data from the world of competitive sports to derive five principles for effective leadership and management.

1

PLAY “LEFTY” WHEN YOU CAN

In a right-handed world, playing “lefty” can be a great advantage. Researchers have found that left-handed athletes perform disproportionately better than their right-handed opponents in interactive sports like tennis, fencing, badminton, and boxing. Meanwhile, in non-interactive sports—such as darts, bowling, and gymnastics—lefties have no edge at all. The lesson? In direct one-on-one contact, there is an explicit advantage to being contrarian. Dare to be different. Embrace the unexpected. You just might generate an innovative approach.

2

MEET LESS AND HUDDLE MORE

Nothing brings a team closer together, at least physically, than a group huddle. The huddle can also be a model for efficiency when applied to a business. Researchers are increasingly questioning if organized meetings are really necessary—and if so, do they need to last as long as they do—when a quick huddle can accomplish just as much in a fraction of the time. Many hospitals have already adopted team huddles to share important patient information faster and more frequently, leading to safer care.

3

ENVIRONMENTAL NUDGES CAN ENHANCE PERFORMANCE

Athletes often get a big boost on the field from music: They perform better and feel as if they are exerting less effort. Research shows that music can also have a positive impact on the workplace environment. This is especially true for happy music that has an upbeat rhythm. People who are listening to cheerful music become more cooperative and supportive of each other. A little music can be a big nudge in helping coworkers sync up.

4

DON'T OVERVALUE POTENTIAL

Choices in the NFL draft aren't so easy to make. Research shows that teams greatly overvalue top draft picks, but the real value is in the second-round picks, which have lower salaries and yet possess nearly as much potential as the top draft picks, making them the more cost-efficient choice. In hiring, rather than evaluating potential, organizations should try to focus instead on a subject's achievements to accurately assess actual worth.

5

MENTORSHIP MATTERS FOR EVERYONE

Discipline, determination, hard work, and focus might not be enough for greatness. Sometimes talent needs to be cultivated. For example, research shows that first-ballot Hall of Famers in Major League Baseball have far broader and deeper mentorship networks compared with those players who never reached the Hall of Fame. Want to build a robust workplace team? Be a mentor to your employees and team members. A little guidance, support, and wisdom can go a long way toward helping people reach their fullest potential.

FOR MORE RESEARCH RELATED TO SPORTS AND ORGANIZATIONS, FOLLOW @KEVINKNIFIN ON TWITTER.

CALS in QUOTES

“A single gram of soil has billions of cells, thousands of species and far more genetic information than the human genome. Microbes, in a sense, rule the world: In their multitudes, they help regulate our biosphere and have profound effects on plants and animals, and on what our climate future will be like.”

Dan Buckley, professor in the School of Integrative Plant Science, in a *Cornell Chronicle* story on the 2017 World Economic Forum IdeasLab session on microbiome science.

“I’m a strong believer that every new science discovery goes hand-in-hand with new technology development. And with every new tool, you discover something new.”

Mingming Wu, associate professor of biological and environmental engineering, in the *Cornell Chronicle*, on a new technique yielding insights into how cancer cells ‘talk’ to their environment.

“How far can you push a consumer’s concept of what kale is, before it’s not kale anymore?”

Hannah Swegarden, a graduate student in the School of Integrative Plant Science, speaking with NPR’s *The Salt* about a CALS project to develop new varieties of kale tailored to American palates.

“New Yorkers need to wake up. We’ve banned fracking to produce our own [natural gas], but we are importing shale gas. We need to take responsibility.”

Robert Howarth, David R. Atkinson Professor of Ecology and Environmental Biology, commenting to *Politico* on New York state’s renewable energy credibility.

“I have heard from countless professors and scientists that it was a field class or a research internship, like what we offer [at Shoals Marine Laboratory], that made them want to become a scientist. And even if you don’t choose to pursue science as a career, you will have a better understanding of science, and we need that so much in this world where challenges exist because many Americans don’t even trust science. Having that immersive experience with science, first-hand, hands-on, yourself, will help you decide whether or not you trust science.”

Jennifer Seavey, executive director of the Shoals Marine Laboratory, in the *Cornell Chronicle*, discussing the value of undergraduate research.

“It’s very important to recognize the benefits of all the species within the crop field—that includes both the crops and the weeds—not to mention cover crops. Weeds can offer ecosystem services, such as soil erosion protection and pollination services for the benefit of insects. They can be part of a restorative cycle.”

Kristine M. Averill '05, M.S. '09, weed research associate in the School of Integrative Plant Science, in the *Cornell Chronicle*, providing a new perspective on weeds.

SKY'S THE

**Rapid urbanization is reshaping civilization.
We look to the rooftops for sustainable solutions.**

By Jennifer Savran Kelly

Several years ago, professor of natural resources Marianne Krasny stood on the observation deck at the top of the Empire State Building, looking out over New York City. Among the crowded expanse of skyscrapers and lights and the uninterrupted flow of traffic below, Krasny saw vast areas full of possibility—the largely untapped terrain of Manhattan’s flat rooftops. Her first thought: solar panels.

THE LIMIT



Krasny is driven largely by her concern over climate change. Her work as director of the Civic Ecology Lab takes her into communities that have suffered from climate-related and other disasters, discovering urban stewards restoring the places they call home. It's convinced her that urbanites have become the new caretakers of the land.

As we are increasingly a species of city-dwellers, Krasny's perspective may prove to be crucial. Since May 2007, U.S. cities—comprising a mere 3.5 percent of the country's total land area—have been home to more than half of the country's population, according to the United States Census Bureau. And by 2050, a steady rise in global population and urbanization will likely add 2.5 billion people to the world's cities. In the face of urban growth on this scale, how do we plan to feed, clothe, and provide energy and opportunities to people both inside and outside of our cities?

"I don't have all the answers," Krasny says, "but it's time to fund local innovations that we can test by trial and error."

Several CALS faculty members have set their sights on such urban innovations. With varied areas of focus, from climate change to food and social injustice to human health, they nevertheless agree that challenges related to these issues can be traced to the severe lack of space in increasingly population-dense cities.

"We need to get beyond the rhetoric about what it takes to have a sustainable city," says Thomas Whitlow, associate professor in the School of Integrative Plant Science. "Cities require a much larger area of land to supply the resources necessary to support the city. So where is the tipping point? To maintain human health and well-being now requires a different kind of mindset."

Conversations with faculty around CALS revealed consensus about one creative avenue for coping with the scarcity of urban land: Flat, uninhabited rooftops provide new terrain on which to build elements of healthy, sustainable urban communities. Far from being a novel idea, urban rooftops have been explored by the likes of scientists, farmers, and architects for years. From "green roofs," which use living plant matter and soil to absorb, collect, and reuse rainwater that would otherwise pick up harmful pollutants as it runs off into local bodies of water, to rooftop farming and recreation, innovators have been tapping rooftop real estate to improve many aspects of people's lives.

Now, CALS faculty with expertise ranging from landscape architecture to natural resources aim to advance these innovations. Operating within a Land-Grant college that focuses on environmental sustainability, health, and social justice across many disciplines, these CALS researchers are uniquely situated to adopt the new kind of mindset necessary to solve problems posed by increasing urbanization.

Here they discuss the innovative ways they are both using and envisioning urban rooftops, including healing communities after a disaster, providing equitable access to wireless Internet, and even saving lives.

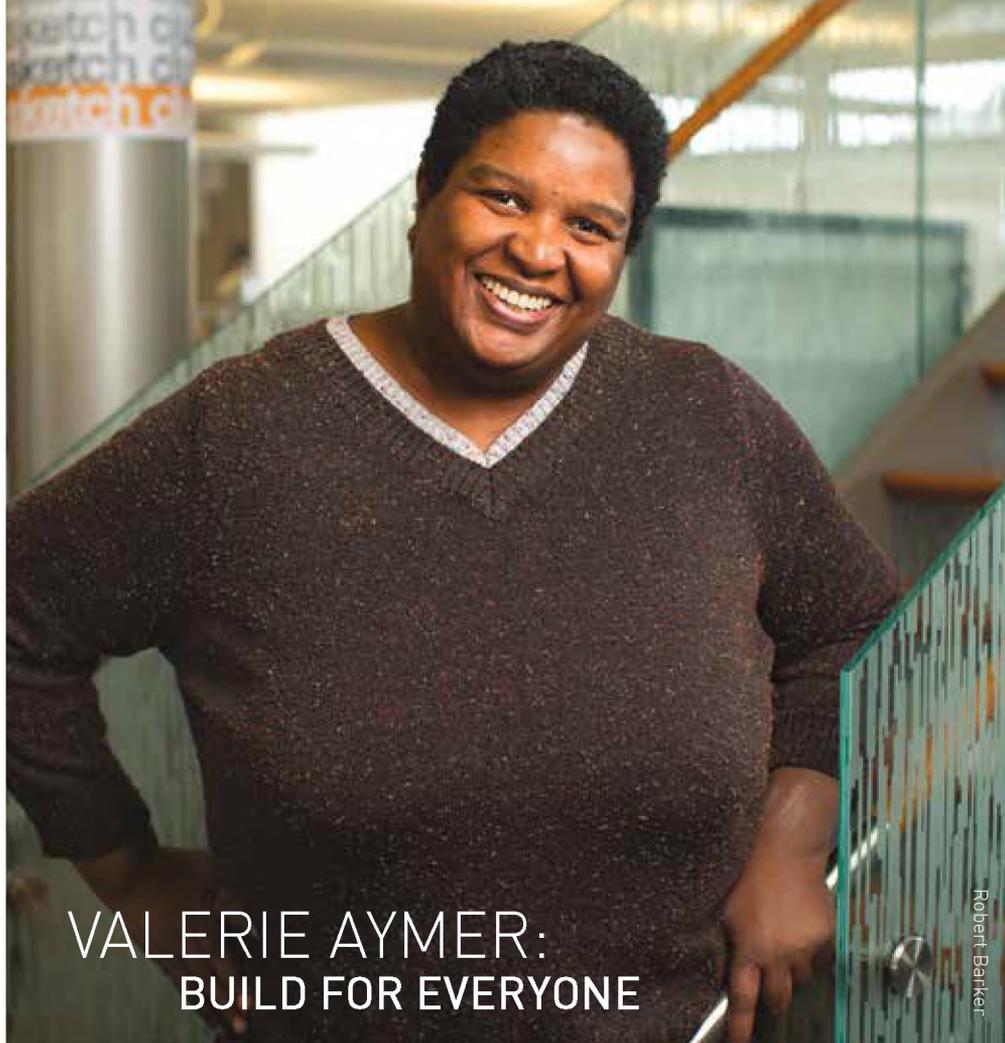
VALERIE AYMER: BUILD FOR EVERYONE

Valerie Aymer, MLA'02, assistant professor of landscape architecture, has spent a lot of time thinking about how a rooftop could help mend the hearts and minds of a city after a terrorist attack. She collaborated on the design for the World Trade Center's Liberty Park, a rooftop park overlooking the September 11 Memorial Plaza. The one-acre green refuge sits 25 feet above street level and opened to the public on July 29, 2016. It's also the future home of the St. Nicholas Greek Orthodox Church, which was destroyed by the collapse of the south tower of the World Trade Center.

"This is one of the highlights of my career because I know that people from every walk of life will stroll through that park," Aymer says. "And the memorial provides a welcoming, safe space for visitors and New Yorkers alike to gather, not only to reflect on 9/11 but also to contemplate hope for the future. I think that landscape has the ability to really heal a community."

Aymer hopes that Liberty Park will encourage people to engage with the memorial and one another in a variety of ways. A central quiet area offers a retreat from the bustle of the city, and several park-top gardens attract visitors' attention to the changing of the seasons. Whereas spring unfurls gently with ferns and the muted whites and pinks of hellebore, summer makes a loud splash with the vibrant reds and purples of gardenias and bee balm. The park was also designed to serve the diverse local community—Wall Street hedge fund managers, university students, neighborhood families—providing a welcome getaway for any purpose, from the workday lunch break to contemplation and remembrance.

Aymer pursued landscape architecture because she wants to make places for people—all people, and she challenges herself to keep a perennial problem in



VALERIE AYMER: BUILD FOR EVERYONE

mind as she tackles each urban project: how to improve neighborhoods so that they provide the same quality and level of service that people can get in the suburbs without sparking gentrification. She would claim the rooftops for community spaces.

"There should be more use of rooftops for growing food as well as for recreation," Aymer says. "Many marginalized communities don't feel like they own the places where they live. If we can give them that sense of ownership, we have a better chance of creating stronger community spaces. Nobody wants to live in a place that is less than, and everybody should be equal. There's no question."

"There should be more use of rooftops for growing food as well as for recreation. Many marginalized communities don't feel like they own the places where they live. If we can give them that sense of ownership, we have a better chance of creating stronger community spaces."

Valerie Aymer, assistant professor of landscape architecture

MARIANNE KRASNY AND KEITH TIDBALL: POWER UP AND PREPARE

Krasny and her colleague Keith Tidball, Ph.D. '12, a natural resources senior extension associate, look to vacant lots and rooftops as fertile ground for cities facing climate change.

The pair coined the term "civic ecology" to describe spontaneous, community-driven efforts to renew blighted spaces.

"Civic ecology practices emerge in cities when people are living near a derelict space, like an abandoned lot or shoreline with a lot of litter or dumping," Krasny says, "and they take initiative to restore the site by creating a community garden or holding a litter cleanup or removing invasive species and planting native ones."

Often these projects tend to focus on greening efforts, notes Krasny. And from the standpoint of climate change, this makes her optimistic that these small-scale practices—if enough of them are occurring at many locations—can add up to a big difference for communities, with a caveat.

"I think it's important that researchers in the university not just look at climate adaptation—coping with the changes in



Chris Kitchen

Jason Koski

MARIANNE KRASNY AND KEITH TIDBALL: POWER UP AND PREPARE

sea level and temperature—but look at it in a way that’s consistent with enhancing environmental quality, so that we can mitigate our carbon footprint at the same time that we’re adapting,” she explains.

Many urban stewards who engage in civic ecology practices strive to achieve the same balance between adaptation and mitigation. Nearly 20 years ago, the very first community garden Krasny visited in New York City—the Open Road Community Garden in Manhattan’s Lower East Side—was powering a small stream that youths had built on their site with a single solar panel.

“Ultimately, I wish climate change would go away. But I don’t think anyone knows how to do that,” Krasny admits. “Nevertheless, if cities like New York could be more self-sufficient in terms of energy—that would have a huge impact on slowing climate change. For example, there are so many flat roof surfaces in New York that could be used for solar panels.”

Based on Tidball’s research in New Orleans after Hurricane Katrina, Krasny’s idea is not too far from reality. After the hurricane, technologies designed to collect rainwater, harness solar energy, and create more energy-efficient heating and cooling systems were built

into the roofs of demonstration houses in the Lower Ninth Ward. And their success sparked their implementation in residences throughout the city and well beyond, reducing the region’s carbon footprint and bolstering its resilience to weather-related disasters.

“Some of these developments ease rescue operations or provide people with almost a week’s worth of power while they wait for floodwater to subside, avoiding life-or-death situations such as those during Hurricane Katrina,” Tidball explains.

One could argue, he notes, that a chain of activity sparked by civic ecology

activists opened the door for new ways of thinking about old cities. Throughout all of New Orleans, and even beyond Louisiana and Mississippi, a “rebirth movement” awoke as nonprofits sprang up to develop technologies based on lessons learned from the storm.

“Restoration does not always mean putting everything back as it was,” Tidball says. “It can also represent an opportunity to make things better. These rooftop technologies were designed for residential homes in flood-prone areas everywhere, and now they are there for the taking, with great potential to save lives.”

“I think it’s important that researchers in the university not just look at climate adaptation—coping with the changes in sea level and temperature—but look at it in a way that’s consistent with enhancing environmental quality, so that we can mitigate our carbon footprint at the same time that we’re adapting.”

Marianne Krasny, professor of natural resources

“We tend to think about Wi-Fi as something that every individual citizen gets for their homes, but as a result, there’s a lot of unused Wi-Fi availability. Efforts to create community-based, shared Wi-Fi are already in motion, and that can better leverage access for all.”

Lee Humphreys, associate professor of communication



LEE HUMPHREYS: GET CONNECTED

Chris Kitchen

LEE HUMPHREYS: GET CONNECTED

Associate professor of communication Lee Humphreys ’99 studies how people integrate communication technology in their everyday lives, connecting to their peers and managing their own identities. This research has led her to see access to the information superhighway—ubiquitous community Wi-Fi on rooftops—as technological infrastructure for promoting equality.

Mobile access is power, Humphreys explains, and the world is increasingly divided into the digital haves—people with unlimited access to the Internet via

Wi-Fi at home and at work—and the have-nots—those who can only access the Internet on their mobile phones and purchase data by the bit in data plans. When someone is paying per bit, they are operating with a “metered mindset.”

People with a metered mindset depend more heavily on access to Wi-Fi in public places. For example, students increasingly need the Internet for school assignments, and a metered mindset will produce a very different way of thinking about homework. Humphreys also cites the rise in “smarter” mobile technologies, which has enabled everyday users in and around cities to affect the condition of the urban infrastructure. If someone sees

a pothole, they can document it through a mobile app, increasing the city’s responsibility to fix it. Yet this puts more of the power in the hands of those who can afford to be connected 24/7.

“We tend to think about Wi-Fi as something that every individual citizen gets for their homes, but as a result, there’s a lot of unused Wi-Fi availability,” Humphreys says. “Efforts to create community-based, shared Wi-Fi are already in motion, and that can better leverage access for all.”

NEIL MATTSON: GROW FOOD, KNOW FOOD

Food production is taking root in cities, from commercial rooftop greenhouses to indoor “vertical farms” in warehouses that maximize space efficiency by growing plants in layers from floor to ceiling. For Neil Mattson, associate professor in the School of Integrative Plant Science, the viability of these projects comes down to their carbon footprint. Mattson directs the college’s Controlled Environment Agriculture group, which aims to reduce New York state’s dependence on imported food.

“One of our research topics is looking at the carbon footprint of producing food in different ways,” he says. “Looking specifically at lettuce, strawberries, and

“Restoration does not always mean putting everything back as it was. It can also represent an opportunity to make things better. These rooftop technologies were designed for residential homes in flood-prone areas everywhere, and now they are there for the taking, with great potential to save lives.”

Keith Tidball, natural resources senior extension associate



Chris Kitchen

NEIL MATTSON: GROW FOOD, KNOW FOOD

spinach, we found that there's a much smaller carbon footprint if they are field-grown in California and shipped to New York than if they are grown locally in greenhouses. We have more cloud cover and need to provide more supplemental light, which increases energy use."

However, Mattson has been researching advances in lighting and greenhouse technologies that can reduce the carbon footprint of local greenhouse-grown produce. Efficient LEDs use less energy and can turn on and off in milliseconds in response to the temporary shade of a passing cloud—unlike the more commonly used high-pressure sodium lights that take 15 minutes just to warm up. LEDs also allow growers to adjust the light spectrum to make photosynthesis more efficient and improve crop quality.

New York is already second in the nation in controlled-environment agriculture, netting \$27 million a year in wholesale income in the 2012 Census of Agriculture, and Mattson's research has led him to conclude that of the options for growing food in the city, greenhouses are the best choice for environmental sustainability. Growing food in warehouses (or "plant factories") requires artificial light—and HVAC

systems to manage the heat produced by such light—creating a much higher carbon footprint.

While Mattson remains skeptical about the ability of urban agricultural practices to feed entire cities, he has seen firsthand the ripple effect community gardens can have on a neighborhood's nutrition, particularly in food deserts where schoolchildren have only been exposed to a handful of common fruits and vegetables.

He cites the example of Harlem Grown, a community garden located in the middle of a Harlem food desert, which has shown him that the impact of exposing children to gardening goes far beyond diet. In addition to operating local urban farms, Harlem Grown provides garden-based development programs to Harlem youths. In turn, kids have been bringing home vegetables their parents can't find in the grocery store, from mustard greens and dwarf kale to koji—and their parents have begun to request local bodegas carry them.

"Even if urban agriculture can only provide a small portion of our daily nutritional needs, the psychological and educational benefits are huge," Mattson says.

"Even if urban agriculture can only provide a small portion of our daily nutritional needs, the psychological and educational benefits are huge."

Neil Mattson, associate professor in the School of Integrative Plant Science

CAN NEW YORK STATE FEED THE BIG APPLE?

INTENSIVE GREENHOUSE AGRICULTURE IN AND NEAR THE CITY COULD LOWER THE CARBON FOOTPRINT OF FOOD

THE NEW YORK CITY
FOOD SYSTEM
CONSISTS OF OVER **8 MILLION** CONSUMERS **AND** **\$30 BILLION** IN FOOD SPENDING

LETTUCE CONSUMED IN NY HAS TRAVELED AN AVERAGE OF **2,953 MILES** | **NEARLY 30%** OF THE TRUCK TRAFFIC OVER THE GEORGE WASHINGTON BRIDGE ON ANY GIVEN DAY IS CARRYING FOOD

BASED ON
**BEST
LAND
USE**

ABOUT 2/3
OF NEW YORK STATE
CONSUMPTION OF VEGETABLES,
FRUITS, DAIRY, AND EGGS CAN BE
SATISFIED WITH REGIONAL
AND LOCAL PRODUCTION

A 2012 STUDY IDENTIFIED **1,200 ACRES**
OF POTENTIAL ROOFTOP FARMING SPACE IN NEW YORK

ADVANCED GREENHOUSE LIGHTING, COOLING, AND HYDROPONICS TECHNOLOGY BEING RESEARCHED BY CALS' CONTROLLED ENVIRONMENT AGRICULTURE PROGRAM CAN MAKE LOCALLY-GROWN PRODUCE MORE SUSTAINABLE THAN IMPORTED PRODUCE:

1 LB OF LETTUCE CONSUMED IN NYC

IMPORTED FROM
CALIFORNIA

LOCALLY-GROWN IN
AN INDOOR PLANT
FACTORY USING ONLY
ARTIFICIAL LIGHT

GROWN IN AN
ADVANCED,
HYDROPONIC
GREENHOUSE
IN CENTRAL
OR WESTERN
NEW YORK

GROWN IN AN
ADVANCED,
HYDROPONIC
GREENHOUSE
ON LONG
ISLAND

0.7 LBS
CO₂

5.5 LBS
CO₂

0.6 LBS
CO₂

0.4 LBS
CO₂

FOR MORE ON CONTROLLED ENVIRONMENT AGRICULTURE, VISIT CORNELLCEA.COM

Sources: Cornellcea.com; Chittenden, Jessica. "Survey Says Wholesale Market Good for Farmers, Consumers." Department of Agriculture & Markets News. Feb. 9. 2005; Eng-Wong, Taub & Associates. "2000 Truck Survey Summary and Analysis: Prepared for The Port Authority of New York and New Jersey." Final Report. March 2002; urbandesignlab.columbia.edu; indoor.ag



Robyn Wishna

THOMAS WHITLOW: PLAY WHERE THE AIR IS CLEAR

THOMAS WHITLOW: PLAY WHERE THE AIR IS CLEAR

Associate professor Thomas Whitlow in the School of Integrative Plant Science is no stranger to the bounty that can be reaped from rooftop farming, due in large part to his work on enhancing nutrient retention and reducing irrigation demand for Brooklyn Grange. Operating the world's largest rooftop soil farms, located on two roofs in New York City, Brooklyn Grange grows over 50,000 pounds of organic produce per year. However, Whitlow's research on street trees and air quality brings to mind a different use for rooftops: playgrounds.

For decades, Whitlow has been studying street trees—their levels of stress, survival in tough environments, and how to best transplant them. But his recent study of air quality on the summer streets of New York City led to some disappointing results. The trees were actually doing very little to reduce air pollution at street level.

Whitlow suspects the problem is that trees simply can't handle the amount of pollution

coming from sources near and far.

"In the face of the current pollution rates, the chances that natural processes are going to restore us to an equilibrium—an acceptably low level of equilibrium, which we had prior to the industrial revolution—that's probably pretty slim," he says.

Children are among the most vulnerable to pollution. Living near busy roads increases children's risk of developing asthma, and asthmatic children exposed to higher levels of air pollution are more likely to develop symptoms of bronchitis, leading to measurable lung damage. And while street trees may not provide adequate protection, Whitlow discovered in a recent study at Brooklyn Grange that

particulates could be up to 33 percent lower on the rooftop. Pondering a short-term way to protect children, Whitlow imagines building rooftop playgrounds so that children play where the air is cleaner.

When it comes to meeting all of the challenges posed by increased urban dwelling, Whitlow believes that the best solutions will require the most creative thinking.

"I don't have any instant solutions aside from helping the current generation of students learn how to think," he says. "But I'd like to see us be more involved in New York City because it's a great test case. What did Frank Sinatra say? 'If you can make it there, you can make it anywhere.'" ■

"We need to get beyond the rhetoric about what it takes to have a sustainable city. Cities require a much larger area of land to supply the resources necessary to support the city. So where is the tipping point? To maintain human health and well-being now requires a different kind of mindset."

Thomas Whitlow, associate professor in the School of Integrative Plant Science

THE SCIENCE OF SHADE

Three decades of re-imagining urban horticulture

By Amanda Garris, Ph.D. '04

Robyn Wishna

Nina Bassuk

Pedestrians enjoying the shade of the honey locust trees in New York City's Zuccotti Park may not know that the leafy canopy is rooted—literally—in a bit of Cornell ingenuity. The CU-Structural Soil underfoot, a patented mix of large gravel and soil, brokers a truce between the pavement and the trees. A rigid lattice of rock holds the weight of the sidewalks, with room for soil in between for roots to scout for nutrients and water, resulting in larger, healthier trees.

The product, developed in the 1990s by then graduate student Jason Grabosky, M.S. '96, Ph.D. '99, and professor Nina Bassuk, has been used in more than 2,500 projects in 46 states and abroad from Ireland to Israel and is credited with changing how people think about trees and cities. It grew out of one of the central challenges in Bassuk's career: how to make trees grow in cities when they're surrounded by pavement. The impulse emerged when she was a child in Brooklyn with a postage-stamp yard

and windowsills for experimentation.

"It was sort of visceral," she says. "I always wanted to try to figure out why things would or wouldn't grow."

In three decades as the program leader of the Urban Horticulture Institute and a professor of horticulture, she has taken that question into arguably one of the most difficult environments for plants.

"Disturbed landscapes are found anywhere there's been a road, building, excavation or grading and, as a result, the soil has been really compacted. The soil structure that allows plants to grow has been destroyed," she says. "We have to come up with a way to bring that back once the dust has settled. They say, 'Make a landscape here.' But it looks like the face of the moon."

But green infrastructure—a complement to the 'grey infrastructure' of pipes and sewers—is becoming more and more important in urban planning. It not only contributes to well-being and aesthetics, but it also solves several other problems associated with city landscapes at once, including handling storm water, reducing the urban heat island and reducing pollution in waterways. Bassuk's landscape installations

can guide water from a parking lot through bowl-shaped plantings, where it infiltrates the ground and can be cleansed, rather than running directly into nearby waterways. It's an elegant ecological solution that doesn't require upgrading municipal pipes and sewers.

"When plants thrive in a site—not just survive but really do well—then we get all these ecosystem benefits in terms of energy conservation and storm water abatement," Bassuk notes. "Dealing with stormwater is a big deal in every city around the world. It's not just a Northeast issue; it's international. The climate or plant selection may differ, but the problems of urban soil compaction are pretty universal."

The first lesson you learn from Bassuk is that although plants and trees may seem to define a landscape, soil always has the upper hand. That reality drove the development of CU-Structural Soil, as well as other strategies she has tested over the years. Another example is the 'scoop and dump' method students in her Creating the Urban Eden course have used in restoration projects around campus. Heavy equipment is used to 'scoop' the soil down about 18 inches and

incorporate a vein of compost, followed by planting and then mulching it every year. Research conducted by graduate student Miles Schwartz-Sax 12 years after the initial 'scoop and dump' revealed surprising progress in soil improvement.

"It was interesting to see soil that had been compacted was recovering not just in its organic matter content and biological activity, but we also started to get granulation of the soil—clumps that allow for root movement, water movement and water holding—what we call soil structure," she says. "It's really fascinating because over 12 years there were big effects. People think it takes a thousand years to make soil, but we can actually get a fix in a few years. So it's worth doing."

Solving the problem of compacted soil is just the start. What to plant? Bassuk is eager to dispel the notion of the 'perfect' street tree. The reliance on a small number of tree species puts the urban forest at risk for devastating epidemics like Dutch elm disease, which killed an estimated 75 percent of elm trees—more than 77 million in North America alone. As the leader of Ithaca's shade tree committee for three decades, she has used the city as a testing ground for her

ideas, resulting in quite a unique urban forest.

"Typically in cities, maybe 10 trees make up most urban plantings. And maples are basically 40 percent," she notes. "People sometimes want to retain uniformity, but that's not the way to do things because there will always be some insect or disease coming down the road that's going to get you. So the idea is to be diverse. In Ithaca, we have 200 different species on our streets."

Aware that the lure of uniformity is very powerful—perhaps hardwired by images of European allées and majestic tree-lined avenues—she has also been developing designs that meld diversity with visual harmony, using trees that look similar but are genetically diverse. In a few years, she hopes to see her new hybrid oaks commercialized, the culmination of decades of breeding and selection for tolerance of difficult

soils, drought and disease. They are trees equipped to thrive in urban areas in the century to come. But is climate change a game-changer for future urban forests? Bassuk suspects that is unlikely.

"Urban environments always had

"When plants thrive in a site—not just survive but really do well—then we get all these ecosystem benefits in terms of energy conservation and storm water abatement."

-Nina Bassuk, professor in the School of Integrative Plant Science

a different climate because of all the reflected heat from the asphalt and buildings," she says. "Some people talk about the urban heat island in cities being 2 to 4 degrees (Fahrenheit) warmer than the surrounding countryside, but at the street level, it already could be 10 degrees warmer. The real challenge isn't likely to change: giving trees the greatest soil volume you can and using drought tolerant trees."

THE EARLY YEARS:

The national average for tree cover in major U.S. cities is

27.1%

When trees are harvested at the nursery, approximately

90%

of their fine nutrient and water absorbing roots may be damaged

Trees often need

2-3 YEARS

to recover and resume normal growth

Newly planted trees need between

15-20

gallons of water per week

STREET TREE SAVVY



PLANTING THIS SPRING?

Find the right shrub or tree plant for your site: woodyplants.cals.cornell.edu

THE PAYBACK:

A large, healthy tree removes almost

70 TIMES

more air pollution each year than a small or newly planted tree

Estimated avg. life expectancy of a street tree is

19-28 YEARS

NYC'S URBAN FOREST

New York City has

5.2 MILLION

trees representing

168 SPECIES

Spaced 25 feet apart, New York City street trees would stretch more than

2,800 MILES

—all the way to Las Vegas

Each year, they remove **2,202** tons of pollution, store **1.35 MILLION** tons of carbon, & capture **890 MILLION** gal. of stormwater

Sources: New York City Department of Parks & Recreation; United States Forest Service; MillionTreesNYC; www.deeproot.com; Roman and Scattina (2011) Street tree survival rates: Meta-analysis of previous studies and application to a field survey in Philadelphia, PA, USA. *Urban Forestry & Urban Greening* 10: 269-274; Trowbridge and Bassuk (2004) *Trees in the Urban Landscape, Site Assessment, Design and Installation*. John Wiley & Sons, Inc., Hoboken, NJ; Whitlow and Bassuk (1988) Ecophysiology of urban trees and their management -The North American experience. *HortScience* 23: 542-546.

CITIES AND THE POWER OF PLACE

By Amanda Garris, Ph.D. '04



Robyn Vishna

Shortly before finishing his Ph.D. in rural sociology, Rich Stedman, M.S. '93, received some sobering advice over beers with one of his professors: "If you love the countryside, live in the city and walk to work. That's the best thing you can do for the country."

Today, Stedman, a professor of natural resources, does live in Ithaca and—for the record—he does walk to work. And that sage insight on the interconnectedness of cities and rural areas is never far from his mind, especially given the pattern and pace of urbanization in the United States and the expanding footprint of cities.

"For some people, from an ecological standpoint, urban areas are our sacrifice zones—that urban areas are by default 'trashed,'" he says. "But it doesn't have to be that way. One of the antidotes is to do what we can to make our cities better places to live."

The starting point—for him—is a sense of place. It's a concept he has made a career of redefining, taking the traditionally sentimental notion in a decidedly quantitative and scientific direction. In a nutshell, a sense of place encompasses the meanings and attachments to a special setting, which grows through experience. All of these elements are measurable and comparable—across groups, across places, or even within the same place over time.

For city dwellers, meanings can easily be dominated by the cultural and the social aspects of urban environments, but

Stedman's work shows how education can restore the ecological perspectives that are often overlooked in cities. For example, urban environmental education programs in the Bronx, in which students might observe fish in the Bronx River or hawks in Central Park for the first time, help develop students' ecological identity. In parallel, the places take on new meanings through the stories people tell about them.

"Why go to this trouble?" he asks. "The reason we care about attachment is that it's a really good predictor of behavior. We tend to get involved in places that we care about. But there's a caveat: We are more likely to get involved if we feel like our important meanings are threatened."

If people have very strong attachments to places but imbue them with very different meanings, it leads to conflicts. Do you value a lake house for solitude or for the social relationships with neighbors? Stedman suggests a "dark side" of having a sense of place. It's a change-averse concept. We like to keep our favorite places "like they ought to be," which can impede needed change. In response, Stedman is drawn to diverse areas that are experiencing rapid transition.

"The more interesting places to study are not necessarily the places where everybody agrees. You see it with communities and immigration today," he notes. "When you are faced with a rapid influx of people who don't share your cultural rules, there's fear that some of what you value about those landscapes will be lost."

The large amount of migration into European cities offers a unique opportunity to examine a sense of place during a time of transition. Stedman and colleagues will host a workshop this summer in Zurich, funded by the Swiss National Science Foundation, to bring together sense of place researchers from North America and Europe and set a research agenda for their field in light of the megatrends of migration, global mobility, and urbanization. Key questions include how mobility and urbanization affect place attachment, as well as how immigrants, including refugees, form bonds with their new places. Because bonds between people and places can also create bonds among people, time and again, he has seen how ecological place meanings can give momentum to transformative change in communities.

"With volunteer oyster gardeners in New York City, for example, their work not only increased awareness, but it also created new place meanings—like hope—borne of the astonishment of seeing the oysters growing," Stedman recalls. "I've seen a number of instances where a group has completed a project, and then instead of disbanding they say, 'What's next?' Because they have built that capacity and trust to work well."

"I'm crossing my fingers that we see something like that in Europe with the refugees," Stedman says. "That it's not simply a matter of 'can we adapt and deal with this,' but 'can we leverage this in such a way that the place is actually better off?'"



Anna Minsky

HEALTHY HARVEST

RESEARCH AND OUTREACH PROTECT URBAN GARDENERS FROM COMPROMISED SOILS

By Amanda Garris, Ph.D. '04

Healthy Soils, Healthy Communities project collaborator Sara Perl Egendorf prepares clean soil for experimental beds in a Brooklyn community garden.

An empty lot converted into a lush community garden is the epitome of urban renewal. But the soil below may still hold traces of a site's less palatable history, in the form of contaminants from lead fuels and paints or residues from nearby building fires or industrial manufacturing. Community gardens yield more than fruits and vegetables; they are a boon to air quality, biodiversity, and neighborhood spirit among New York City's more than 22,000 volunteer gardeners. But the potential risks from contaminated soil were a worrisome unknown until the 2008 launch of the Healthy Soils, Healthy Communities project.

"Gardens have so many demonstrated benefits, and the consumption of locally available, fresh food is really important to consider," says Hannah Shayler, M.S. '08, an extension associate in the School of Integrative Plant Science (SIPS) and the project's coordinator. "But we didn't know the scope of contamination in urban community gardens. Ultimately, the goal was to provide solid information to urban gardeners, focusing on what people can actually do—and what they can afford to do—to protect their health as they garden."

Funding from the National Institute for Environmental Health Sciences at the National Institutes of Health brought together a statewide team of collaborators led by SIPS professor Murray McBride. In addition to Cornell scientists from the Soil and Crop Sciences Section, the Healthy Soils, Healthy Communities project tapped experts from the New York State Department of Health, Cornell Cooperative Extension, and the New York City Department of Parks and Recreation GreenThumb program, which boasts 551 community gardens across the city.

After analysis of hundreds of samples of garden soils and vegetables from more than 60 community gardens, the specific

contamination risks became clear. Lead emerged as the metal of concern, both because of the levels present in samples and its well-established negative effects on human health, especially for children. About 70 percent of the gardens sampled had soil lead levels below recommended thresholds in vegetable-growing areas; however, 10 percent of gardeners and 40 percent of visiting children were estimated to exceed the recommendations for lead exposure. Controlling pH is a powerful intervention.

"The plants themselves were not taking up lead—they are really good at keeping lead out of their tissues," Shayler says. "The exception to that is if the pH gets low.

That makes the lead in the soil more available for plants to take up. So keeping your pH near neutral is a crucial gardening practice."

Also key is preventing contaminated dirt from landing on the plants. The first line of defense is to use raised beds with clean soil and compost. Shayler also recommends barriers in two places: mulch at the soil surface on growing areas and walking paths and a fabric barrier between lead-contaminated soil and the new clean soil in the

raised beds, a visual way to make sure you're not digging down further than you think you are. The project also yielded an unexpected lesson: Urban soil quality can vary greatly over short distances.

"It's dangerous to assume that a sample from one part of a site will be representative of what's going on across the garden," Shayler says. "We did some testing on a new urban farm that was starting up, and where they originally wanted to put a chicken coop turned out to have high levels of lead. With information from the soil tests, they were able to build the coop in a different spot with acceptably lower lead levels—the data really came to the rescue."

"We did some testing on a new urban farm that was starting up, and where they originally wanted to put a chicken coop turned out to have high levels of lead. With information from the soil tests, they were able to build the coop in a different spot with acceptably lower lead levels—the data really came to the rescue."

—Hannah Shayler

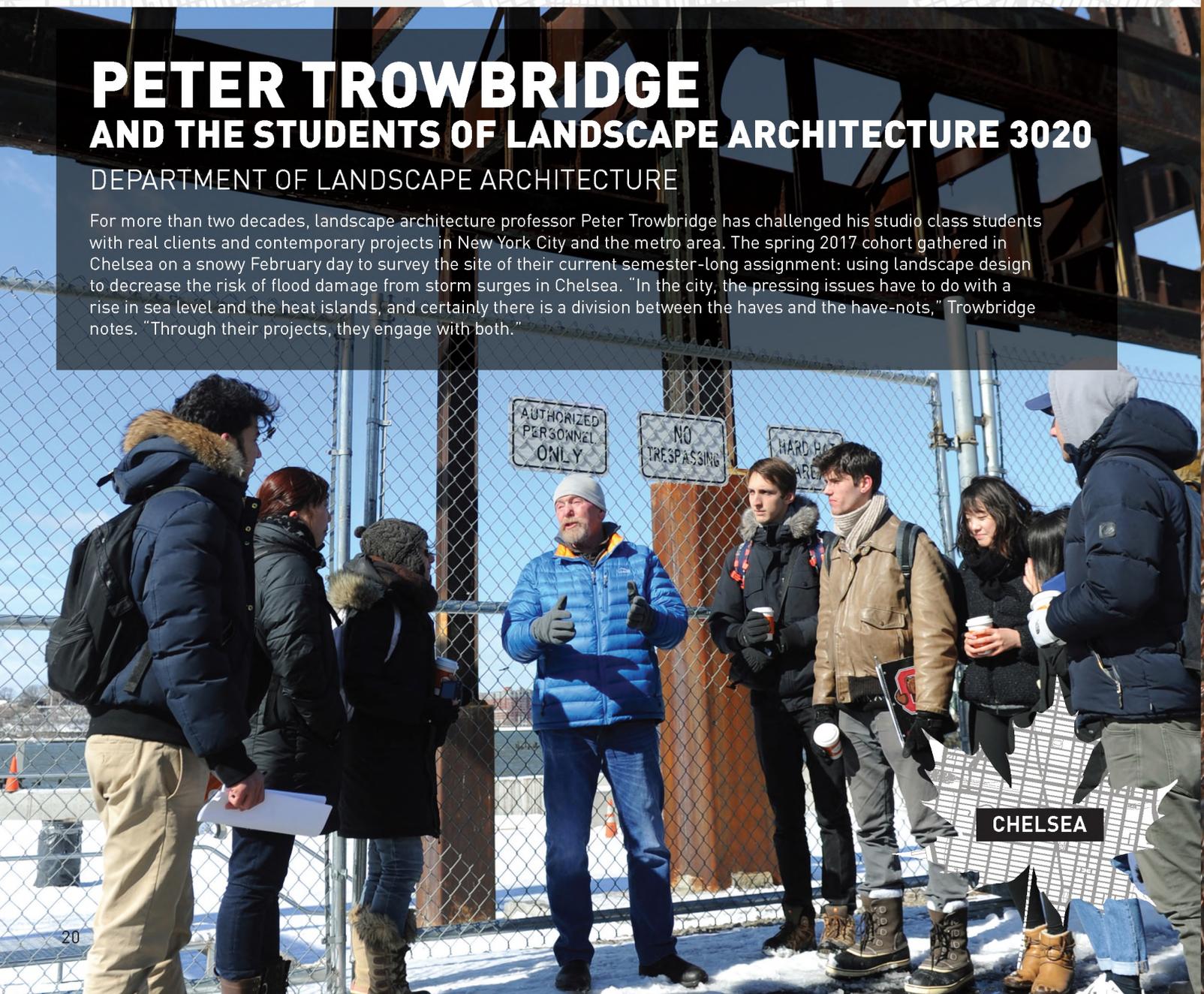
ON THE MAP: CAL S AND THE CITY

CALS research and outreach have deep roots in New York City, from the rat burrows of city parks to the furrows of a rooftop farm in Brooklyn. Meet some of the people and programs working with issues including urban pests, coastal resilience, flood prevention, urban agriculture, and water quality.

PETER TROWBRIDGE AND THE STUDENTS OF LANDSCAPE ARCHITECTURE 3020

DEPARTMENT OF LANDSCAPE ARCHITECTURE

For more than two decades, landscape architecture professor Peter Trowbridge has challenged his studio class students with real clients and contemporary projects in New York City and the metro area. The spring 2017 cohort gathered in Chelsea on a snowy February day to survey the site of their current semester-long assignment: using landscape design to decrease the risk of flood damage from storm surges in Chelsea. "In the city, the pressing issues have to do with a rise in sea level and the heat islands, and certainly there is a division between the haves and the have-nots," Trowbridge notes. "Through their projects, they engage with both."



CHELSEA



HELEN CHENG

JAMAICA BAY COASTAL RESILIENCE SPECIALIST

Cornell Cooperative Extension, New York Sea Grant, and the Science and Resilience Institute at Jamaica Bay

Bounded by southern Brooklyn and Queens and the Rockaway Peninsula, Jamaica Bay is a place where migrating birds stop over and kayakers paddle, while planes overhead depart from and land at JFK airport. To Helen Cheng, Jamaica Bay offers a unique opportunity to define resilience in the face of a changing climate. Cheng is helping communities grapple with the risks of coastal living highlighted by Hurricane Sandy, offering climate forums that provide a dialogue between residents, scientists, and decision-makers, as well as collaborating on restoration programs which aim to improve water quality and decrease erosion with oyster reefs. For more information, visit srijb.org and seagrant.sunysb.edu/jamaicabay.

Photo: Diane Bondareff





MATT FRYE

COMMUNITY IPM
EXTENSION AREA
EDUCATOR

**New York State Integrated
Pest Management**

Matt Frye knows his way around rodent real estate in the city: Storm drains, soil for burrowing, and convenient access to the all-night deli of street trash are key features. In his work as an extension educator with the Community Integrated Pest Management Program, Frye helps people manage urban pests in ways that minimize environmental, health, and economic risks, leveraging information about their basic biology to prevent and exclude rather than exterminate. In addition to helping communities manage rodents and conducting research on pathogens carried by rats in New York City, Frye's expertise extends to bedbugs and ticks as well.

Photo: Diane Bondareff



YOSHIKI HARADA

Ph.D. CANDIDATE

School of Integrative Plant Science

The Brooklyn Grange, a commercial farm which spans more than two acres of rooftops, is a flagship for urban agriculture, and Yoshiki Harada is a scientific pioneer in this new agricultural environment. Working with horticulture professors Tom Whitlow and Nina Bassuk, Harada focuses on optimizing water retention and minimizing nutrient loss in the soil, a lightweight mix of compost and porous stones that allows the Grange to produce 50,000 pounds of produce annually yet is light enough for rooftop use. He's driven by questions about the chemical, biological, and hydrologic processes in highly urbanized environments, such as green roofs, rooftop farms, and other engineered ecosystems. Photo: Diane Bondareff





DALE DEWING

EXTENSION WATERSHED TEAM LEADER

Cornell Cooperative Extension of Delaware County

Walton, N.Y., may be 150 miles from the Big Apple, but the water that flows off the county's farms eventually spills from New York City faucets without passing through a water filtration plant. The pristine water quality is due in part to the work of Dale Dewing—pictured with dairy farmer Dave Holley (right)— and colleagues in the Watershed Agricultural Program, which reduces runoff from the farms in the New York City watershed. Farmers in the watershed have been able to bolster their environmental and economic sustainability using the latest Cornell research in animal nutrition, crop production, and hydrology and funding from the city to implement new conservation practices. Program partners include the Delaware County Soil and Water Conservation District, the Watershed Agricultural Council, and the USDA Natural Resources Conservation Service, with funding from New York City Department of Environmental Conservation. Photo: Chris Kitchen

AFRICA'S GREAT GENERATION

By Amanda Garris, Ph.D. '04

RAPID URBANIZATION AND A YOUNG POPULATION IS THE CHALLENGE OF A CENTURY

This century, African families will raise the largest generation of children in the continent's history. When Parfait Eloundou-Enyegue describes their experiences, he can deftly move from the big picture demographics—the projected increases in the number of births through the year 2100—to the personal challenges facing the members of this generation as they age. Among these are employment and inequality.

"If you are not employed, you can't really take care of your family's needs, and you're not socially recognized as an adult in the full sense of the term," explains Eloundou-Enyegue, who is professor and chair of development sociology. "Without a job and being out of school, you may lack a clear social identity, and you absorb and blame yourself for something that is actually a structural problem."

Many in this generation are trapped in social adolescence until their 30s or longer.

"It's not for lack of wanting to work or not having done the right thing for many years, but they are not finding jobs, and that's not their fault," he says.

The dilemma of youth unemployment across Africa is complex. Officially, youth unemployment in sub-Saharan Africa is estimated to average 14 percent. But this figure masks vast under-employment, and the potent combination of urbanization and a youth population expansion is just warming up. Nearly 70 percent of the African population is under 30, and by 2020 Africa is predicted to be home to 24 of the world's 30 fastest growing cities. The current generation of youth is already expected to be great in a demographic sense. The question is whether it can also achieve historical greatness.

"It's going to be a rough half-century, I think, for many countries in the region," Eloundou-Enyegue cautions. "Not in the sense that you're not going to have economic growth. But that you're going to have very uneven growth and a perfect storm of inequality."

Eloundou-Enyegue points out that unemployment, inequality, and disillusionment become a source of frustration that can be tapped by groups including gangs and rebel militias, but that personal frustration and despair can also lead to drinking, drug use, and petty crime. As a sociologist, he suggests that a root of the problem is the lack of social infrastructure when youths aren't part of one of the three core institutions of family, school, or work.

"The institution of family itself is a safeguard against all sorts of deviant behavior and offers a level of social protection," Eloundou-Enyegue says. "Or if you are in school, by virtue of being really busy, it really limits the options for disruptive behavior. The third node is work. So what is happening in African countries is that you have a lot of kids outside these three institutions and falling through the cracks."

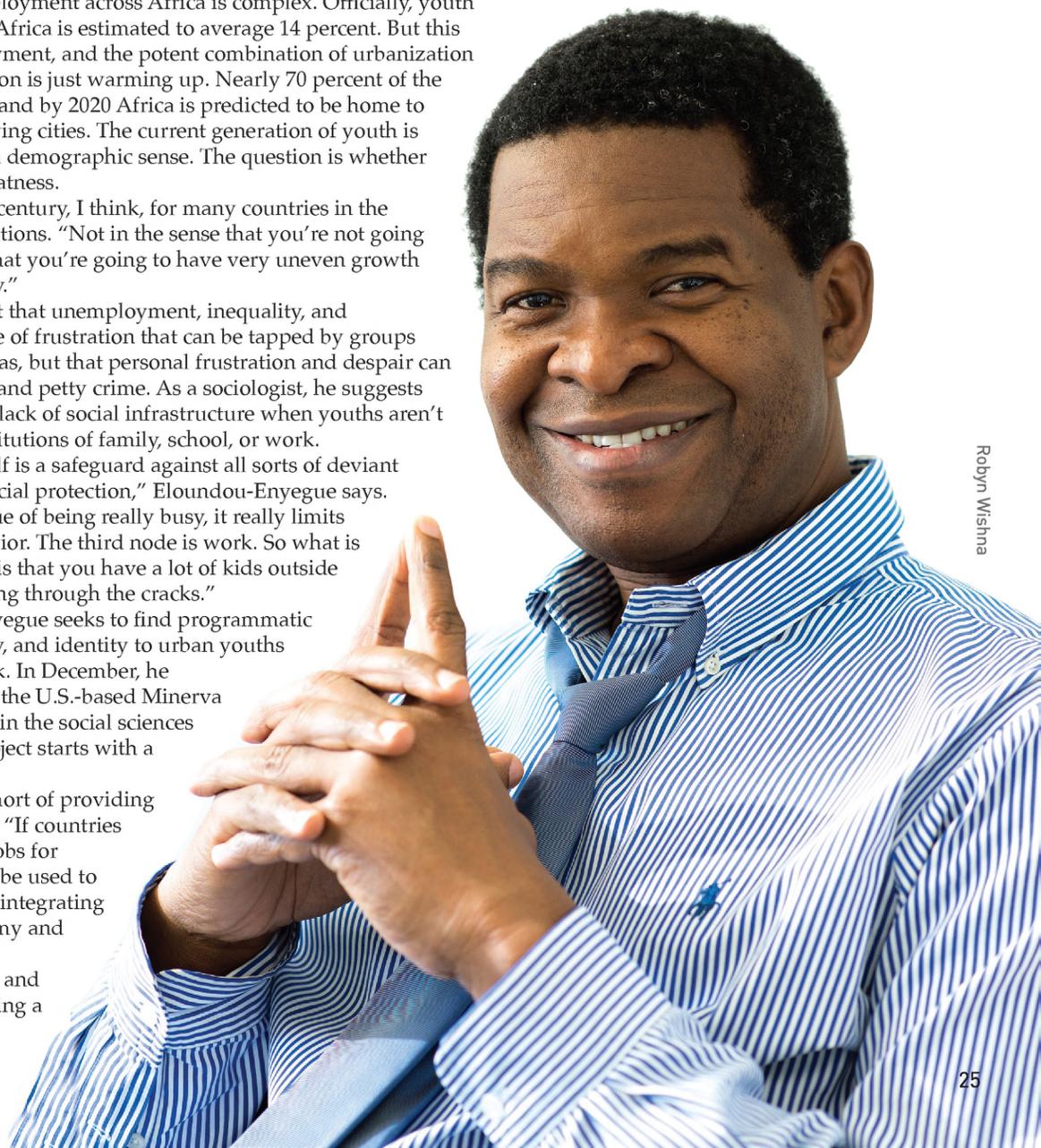
In his research, Eloundou-Enyegue seeks to find programmatic answers that offer hope, security, and identity to urban youths during their transition into work. In December, he received a grant to do that from the U.S.-based Minerva Initiative, which funds research in the social sciences to foster global security. The project starts with a fundamental question.

"What do you do with kids short of providing for their employment?" he says. "If countries cannot immediately find good jobs for everybody, what palliatives can be used to maintain hope, while gradually integrating recent graduates into the economy and society?"

To answer these questions, he and several collaborators are launching a

study in Cameroon to follow a cohort of adolescents as they leave school, for an initial period of three years. They will be randomly enrolled in a variety of social programs, and tracking their progress will allow the team to identify programs that can be most successful in helping these youths make the jump from school and adolescence to work and adulthood.

"In a broader sense, such programs, if successful and applied on a large scale," Eloundou-Enyegue reflects, "could help this generation make the jump from demographic to historical greatness."



Robyn Wishna

STAYING IN SYNC

From preventing chronic sleep disruption to supporting people with bipolar disorder, researchers are leveraging smartphone technology for health and well-being.

By Amanda Garris, Ph.D. '04

Cell phones have put communication, entertainment, navigation, and restaurant reviews in the palm of our hands. But researchers in the field of information science are making good on the promise to put a psychiatrist and health coach there, too.

"There's a really good fit between new technologies and designing interventions for mental illness, in general, because these technologies are with us all the time," says Geri Gay, the Kenneth J. Bissett Professor of Communication and a founding member of the Department of Information Science. "For bipolar disorder in particular, where it's very important to stay on a schedule of getting up, eating breakfast and making social contact, mobile technologies can actually help track when someone begins to skew into a manic phase—shopping in the middle of the night, checking their phones all night, basically not sleeping—leading to self-destructive behavior."

The new MoodRhythm app being commercialized by HealthRhythms will provide patients and their doctors a novel way to monitor their well-being. Funded by the European Union and the College of Human Ecology's Bronfenbrenner Center for Translational Research, the project to develop the app brought together a team of researchers and clinicians led by information science faculty Gay and Tanzeem Choudhury, postdoctoral associates Mark Matthews and Elizabeth Murnane, Ph.D. '17, and Ellen Frank, distinguished professor emeritus of psychiatry and distinguished professor of psychology at the University of Pittsburgh.

The app combines patients' self-assessments with passive monitoring of behavior to provide feedback on how well they are meeting their targets for physical activity, social interaction and sleep—the guardrails that mark the road to health. Physical activity is tracked using the phone's accelerometer, the number and duration of social interactions are estimated through privacy-sensitive monitoring of conversations detected by the built-in microphone, and sleep duration is logged by the light sensor. Users get a weekly report that provides feedback on how well they maintained their target rhythms, but in a format that looks more like a game than a medical tracker, with animated visualizations of rhythm and awards and badges for adhering to the schedule.

"It's essential to design for delight. If an app is pleasurable,

people tend to spend more time with it," Gay says. "We've found in general that simple elements that make things fun or quick games to play give a little spike in people's happiness levels."

Patients provided crucial design insights to strike a balance between vigilance and flexibility. Some changes to the app based on patient input included a "cheat day" and a reset of tracking every seven days to buffer against discouragement. Perhaps the most crucial feedback was the high degree of satisfaction that patients expressed with the app and, in particular, the passive sensing of behaviors.

"People have told us the idea of intelligent tracking is extremely appealing. The patients really see a need for it," Murnane says. "It could help them preempt a manic episode before they'd normally even notice they are starting down the behavioral path that leads to symptoms."

Other mobile health technologies developed in the Interaction Design Lab directed by Gay have addressed a range of conditions, from a mobile phone game to encourage mindful eating in adolescents to Nutriphone, a smartphone-based micronutrient testing system currently under commercialization and approval by the FDA. But Gay sees a great potential for mobile technologies to improve the treatment of other disorders where self-assessments are tough, including depression and chronic pain. The latter is the subject of a project funded by the National Science Foundation to evaluate if behaviors logged by cell phone sensors can serve as biomarkers of chronic pain.

"Chronic pain is quite an issue in the country, and we've been looking at alternatives to pain-controlling drugs, which have created another rampant problem," says Gay, who collaborates on the grant with Choudhury and Deborah Estrin, professor of computer science at Cornell Tech and Weill Cornell Medical Center. "It's complex to even measure pain because it is so different for each person."

That's why the first challenge of the project was to discover how people prefer to answer the question, "How much does it hurt?" Is a person's pain a seven on a scale of one to ten, a sta-



pler to the spine, or a grimacing facial expression? They tested nine different ways to report pain and learned that no one-size-fits-all solution for pain assessment exists. Some people preferred a numerical scale, while others responded better to more abstract representations of faces and landscapes. It's one reason why the team focuses not only on refining self-reporting but also on automated data collection to give doctors and patients accurate information at a granular level, for example, using the accelerometer to record how fast a patient rises from a chair each morning.

"Our intention is that these technologies become empowering, allowing people to take control over their own health and well-being," Gay says. "Through these devices, we are being tracked all the time. Giving individuals control over their own

cess—our digestion, concentration, mood, athletic performance and even sensitivity to pain—exhibits some sort of 24-hour, circadian rhythm with a genetic basis."

The problem arises when your circadian clock is not in sync with your alarm clock, and it's an epidemic. If you wake up earlier in the morning on weekdays and sleep in on weekends—an estimated 80 percent of people do—you are likely suffering from a form of jet lag. Unlike the temporary jet lag from travel across time zones, the resulting "social jet lag" can have serious consequences for health and performance. Alertness, Murnane notes, is the "lynchpin of cognitive performance," and your cell phone can detect its ups and downs.

"The tech-mediated markers—behaviors you can capture passively through the phone—can be quite revealing," Mur-

nane says. "We found strong correlations with social jet lag as well as other indicators of circadian disruption like sleep inertia. Similarly, when we looked at relationships between technology use and daily performance patterns, we saw individuals using their phones in very different ways, in accordance with their natural alertness rhythms. The types of apps you use, when, and how provide an informative signal about your latent biology."

Murnane's work has shown that there is natural variation in biological clocks, and late rising—traditionally stigmatized as evidence of laziness—is completely natural for some. Based on insights from circadian computing, she advocates for a more rational approach for scheduling our lives to take into account variation in biological clocks.

"I'm particularly excited about the opportunity for novel circadian-aware technologies that better align with our own biology to stabilize or even preempt disruptions," Murnane says. "Such tools could help you embrace your own rhythms to the best you can."

For example, teenagers' biological clocks are shifted later than adults—lateness peaks around age 20—which suggests that delaying high school start times would better prime

students for learning. If a better match can't be made, Murnane notes that interventions like light therapy, well-timed naps, or small shifts in sleep schedule can mitigate the effects of disruption. Future apps could help us work in harmony with our circadian clocks.

"I like to imagine technology as our partner," Murnane says. "It is evolving into a kind of companion-coach, especially in the context of health. Technology just needs to become a little savvier to support us in a way that augments what we could do on our own."



Robbyn Wishna
Geri Gay and Elizabeth Murnane

data is important to me."

Although the most recent applications developed in the Interaction Design Lab are for chronic, difficult medical conditions, cell phone data is giving information scientists unprecedented insight into our natural biological clocks and what happens when we disrupt them.

"Everybody probably has a sense of their chronotype: You know if you prefer to wake up early or stay out late. You might notice a regular crash after lunch when you can't get any work done," Murnane says. "Pretty much every single biological pro-

student life



In Vietnam's Ben Tre province in January, Marc Alessi '18 learned the basics of weaving a bamboo carpet in a community of rice farmers coping with climate change. Climate change in the Mekong Delta—home to more than 17 million people yet just 5 feet above sea level—is the subject of a new, interdisciplinary service learning course. "Travelling through Ben Tre was a very alarming experience," Alessi recalled. "One commune in the area lost 100 percent of its rice crop last year due to an unprecedented drought. Other areas are seeing saltwater intrusion from rising sea levels." Photo: Gail Fletcher, A&S '17



▲ Vegetable production without soil and open skies? Increasingly, hydroponics are being used to grow high-value vegetables and herbs, such as leafy greens, tomatoes, and basil. Students can now learn the fundamentals of controlled-environment agriculture in a new class offered by Neil Mattson, associate professor in the School of Integrative Plant Science. Photo: Matt Hayes

◀ Whooooo was excited about Wizarding Weekend festivities? Elizabeth Wahid '18, with the Cornell Raptor Program, exhibited this burrowing owl to delighted crowds in downtown Ithaca in October. Photo: Matt Hayes



A farmer on Inle Lake in Myanmar explains hydroponic tomato farming methods to Cornell and Burmese students during the January International Agriculture in Developing Nations field study tour of Myanmar. The class visited a range of production environments from the central dry zone to the Ayeyarwady Delta to understand the challenges and opportunities farmers face. "It's one thing to be sitting in a classroom discussing shifting rain patterns and projected yield losses in a place like Myanmar, but an entirely different thing to be sitting in front of 20 farmers and realize that their livelihoods depend on consistent rainfall," said Jesse Puka-Beals '18, an agricultural sciences major. Photo: Emma Quilligan

A modern university hallway with a cow head sculpture in the foreground. The hallway is brightly lit with large windows and modern furniture. The cow head is black and white with horns. The text is overlaid on the image.

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CALS SWEETHEARTS FUND GRADUATE STUDENTS IN PLANT SCIENCE

By *Melanie Cordova*

Mark Sellew '78 and Lisa Preger Sellew '79, MBA '82, saw more than seeds blossom in a plant genetics course as undergraduates in the 1970s. The CALS alumni would soon have that class to thank for their romantic—and professional—beginnings.

"She was a junior, a very good student—and she was my TA," Mark said.

"We started dating the following summer," Lisa added.

Mark credits CALS with fostering his love of plants. After graduating, he worked as a research associate before joining his father's fledgling plant nursery, Prides Corner Farms, in Lebanon, Conn., in 1980. Lisa returned to Ithaca, earned her MBA at the Cornell Graduate School of Management, and launched a career in banking. They married in 1984, and Lisa joined the family business over a decade ago, as Prides Corner flourished from its modest beginnings.

"We started very small," Mark said, "just a couple of greenhouses."

Now, after 37 years in business, they grow seven million plants a year, employ 500 people, and farm 600 acres. Lined up single file, their greenhouses would stretch 50 miles. They are the largest grower in the Northeast region, boasting an on-site arboretum and a diverse product portfolio that includes native plants, fruits and vegetables, perennials, and even green roofs.

Their connection to Cornell is a family affair. Mark's two brothers and Lisa's father, grandmother, aunt, and cousin are all Cornellians. The next generation, their sons Benjamin Sellew '13 and Jack Sellew '15, studied plant science and agricultural science, respectively.

"It was fun to reconnect as a parent," Lisa said. "I loved the university when we were students, but I saw Cornell get even better. The spirit of the school felt very similar, but technology really changed the way in which our kids were educated."

Recognizing that graduate students are

often key mentors for undergraduates in their critical research experiences, they decided to give a gift specifically for graduate students in the School of Integrative Plant Science (SIPS). The Sellew Family Excellence-in-Mentoring Graduate Fellowship will provide one year of support to five graduate students who embody the values of mentorship, teaching, and research. Their gift will be instrumental in drawing even more qualified students to study at SIPS. The Sellews' goal was twofold. First, to pay it forward.

"After all," Mark noted, "I wasn't a real plant nut until I got to Cornell."

"It will only help our industry if we can offer grad students the opportunity to be there and do their research without the financial pressures," Lisa added.

Second, they wanted to make sure that fostering relationships could be a priority.

"I want to be able to connect to these graduate students," Mark said. "It's quite impactful to see their desire to feed the world, to make a difference."



Shari Margulies



Shari Margulies

Christopher Pike

TRAILBLAZER GIVES BACK THROUGH FOOD SCIENCE SCHOLARSHIP *By Krisy Gashler*

An early turning point for food science alumna Liz Westring, Ph.D. '82, was a study on grasshopper diets she conducted as an undergraduate biology major at Stony Brook University.

"The main thing I learned is that grasshoppers are disgusting. I had to weigh them every week, and when you try to handle them, they spit at you," she said. "So needless to say, I thought, 'I need to go up the evolutionary scale.'"

She switched to human nutrition for graduate study and then on to food science, completing a Ph.D. at Cornell. Westring initially planned to pursue a career in academia, but Professor Emeritus Norman Potter '50 encouraged her to first spend a few years in the industry. She took a job at General Mills and never left. Now, 34 years later, she is the company's vice president for global quality and regulatory operations, accountable for all of General Mills' products and brands throughout the world, ensuring that they meet all standards for food safety and regulatory compliance.

"When somebody opens up their pocketbook and buys one of our products, they're saying they trust us to deliver," Westring said. "This is a really inspiring area to work in."

When Westring was hired in 1982, she was only the fourth female Ph.D. hired in research and development since General Mills was founded in 1856.

"One time, I had to go out on a plant visit with a new engineer who, truly, looked 15. We went to a contract plant in Chicago and everyone assumed I was his technician," Westring said. "But I had it better than some. I had one woman in my

group who did quality assurance in Buffalo. Her first day at work, she asked the plant manager where the ladies' room was, and there wasn't one."

Since then, General Mills has undergone "not just an evolution, but really a revolution," toward inclusive hiring, she said. Now, roughly 50 percent of the company's new hires are women, and many hold graduate degrees.

The mentoring Westring received from colleagues at the start of her career helped inspire a lifelong commitment to mentorship. Westring participates in General Mills' diversity mentoring program, is a past chair of the Institute of Food Technologists Education Committee and Task Force on Mentoring, and is a member of the Cornell Food Science Advisory Council.

She and her husband, Christopher Pike, are also extending their help to undergraduate food science majors at Cornell with demonstrated financial need, through the new Westring/Pike scholarship. The \$100,000 scholarship endowment is funded half from Westring and Pike and half from the General Mills Foundation.

"I came from very modest means and never would have been able to go to Cornell graduate school if it were not for the teaching and research assistantships that I received," Westring said. "I'm so thrilled to be able to give back, especially to food science. As a student, it was truly one of the most welcoming environments you could ever imagine; the commitment of the faculty and the community of the students, all within this umbrella of Cornell. It's just magic."

In Memoriam

The CALS community remembers with gratitude faculty members who passed away in 2016.

James Boodley (b. 1927)

Professor emeritus of floriculture and ornamental horticulture

A greenhouse horticulture pioneer, Boodley was a developer of Cornell Mix, an artificial potting soil that transformed the greenhouse industry in the 1960s and remains the basis of modern potting mixes.

Malcolm Bourne (b. 1926)

Professor emeritus of food science

One of the first scientists to apply the rigor of physics to analyze food texture, Bourne introduced new methods for measuring texture and wrote the definitive textbook on food texture still used today.

Harlan Brumsted, M.S. '49,

Ph.D. '54 (b. 1924)

Professor emeritus of natural resources

Twice named Conservationist of the Year by the New York State Conservation Council, Brumsted taught students about wildlife conservation and natural resources for over four decades.

Harold Capener, Ph.D. '51 (b. 1919)

Professor emeritus of development sociology

A rural sociologist who helped bring the Green Revolution to India, Capener extensively pursued international rural development projects in Brazil, Yemen, Pakistan, Guatemala, Egypt and Liberia.

Paul Eberts (b. 1932)

Professor emeritus of development sociology

An astute analyst of socioeconomic trends and well-being indicators, Eberts was one of the founders of CaRDI, the Community and Regional Development Institute.

Rick Harrison, Ph.D. '77 (b. 1945)

Professor of ecology and evolutionary biology

One of the most influential evolutionary geneticists of the past 50 years, Harrison made fundamental contributions to the understanding of how new species are formed.

Harold Franklin Hintz, M.S. '61

Ph.D. '64 (b. 1937)

Professor emeritus of animal science

A member of the Equine Research Hall of Fame, Hintz was an expert in horse nutrition, particularly mineral and energy metabolism and their relationship to performance and health, as well as a highly regarded teacher and adviser.

Lynne Howard Irwin (b. 1941)

Professor emeritus of biological and environmental engineering

Known to many as the "Pothole Potentate," Irwin was an expert in highway and pavement design recognized throughout New York state and the world and served as the director of the Cornell Local Roads Program for more than 40 years.

Richard Korf '46, Ph.D. '50 (b. 1925)

Professor emeritus of mycology

A renowned expert in fungal biodiversity, Korf described or reclassified many hundreds of fungal species and fought for rule changes that today make assigning names to species more logical and practical.

Arthur Lieberman '52 (b. 1931)

Professor emeritus of landscape architecture

Coauthor of a seminal book on landscape ecology, Lieberman's work supported ecology-based land and resource planning, protection of open space, and international development and conservation planning.

Edwin Oyer (b. 1927)

International professor emeritus in vegetable crops

An international leader and valued adviser in vegetable crop production, Oyer was instrumental in the administration of agricultural research programs in the Philippines, Taiwan, and Indonesia, and increased Cornell's impact around the globe as director of International Programs.

Bill Pardee, Ph.D. '60 (b. 1929)

Professor emeritus of plant breeding and genetics

A scholar of agricultural science and a leader in seed development for New York farmers, Pardee served five decades as a professor, becoming the consummate Cornell Cooperative Extension specialist, known for his sharp intellect and amazing recall of facts.

Daniel Sisler, Ph.D. '62 (b. 1929)

Liberty Hyde Bailey Professor Emeritus of Agricultural Economics

Committed to addressing global issues of food insecurity and malnutrition, Sisler conducted foundational economic research into international food security and development over three decades of work at Cornell and throughout the developing world.

Gil Stoewsand, Ph.D. '64 (b. 1932)

Professor emeritus of toxicology in food science

An expert in toxicology, Stoewsand rescued New York's fledgling wine industry in the early 1970s with research that debunked the shoddy science and malicious rumors that attributed health risks to drinking wine made from hybrid grapes.

J. Mayone Stycos (b. 1927)

Professor emeritus of development sociology

An early pioneer in the field of population demographics, development and the environment, Stycos' most widely known work explored fertility, family planning and the socio-psychological dimensions of marriage.

J. Paul Yarbrough (b. 1937)

Professor emeritus of communication

Committed to understanding communication processes in directed social change programs, Yarbrough conducted seminal research examining the adoption of new communication technologies, especially in agricultural communities.

Stanley Zahler (b. 1926)

Professor emeritus of molecular biology and genetics

A dedicated scholar and teacher of microbial genetics, Zahler explored the mechanisms and effects of gene exchange in bacteria, with findings that had implications for understanding the spread of antibiotic resistance among bacteria.

Milton Zaitlin (b. 1927)

Professor emeritus of plant pathology and plant-microbe biology

One of the world's leading experts in virus replication, Zaitlin made important contributions to the detection and analysis of viral pathogens as well as the understanding of how viruses move through plants.

Robert R. Zall, Ph.D. '68 (b. 1925)

Professor emeritus of food science

An expert in the management of waste from the food industry, Zall's approach and innovations led to new uses for the by-products of food processing.



COMMUNICATION ALUMNA BROADCASTS 'SIRIUS' EXCELLENCE *By Krisy Gashler*

Although Jessica Ettinger Gottesman '87 grew up close to Ithaca in Lansing, N.Y., her family's only connection to Cornell was its dedication to Big Red hockey.

In the 1970s, hockey players didn't live in the dorms; they were housed with host families in the community—including the Ettingers—so they could get their rest and focus.

"For two years, there were three hockey players living at our house. I was 12 years old, and I couldn't have been happier to have three 18-year-old hockey players staying with us," Gottesman said.

It was her next Cornell venture that set her on a media path. As a 16-year-old, she got a job at WHCU with Barbara Mink, then the station's news director, now a senior lecturer in the Samuel Curtis Johnson Graduate School of Management.

"She taught me the basics of journalism and news writing, and the skills she taught me, I still use today," Gottesman said.

They were clearly valuable lessons—Gottesman's 30-year career in broadcasting in New York City has included everything from live reporting of the September 11th terrorist attacks to award-winning coverage of the Yankees and the Rangers to DJ'ing as Jessica Wade on Sirius XM's country channel The Highway. She's also launched multiple broadcast products, including Bloomberg

Radio, Bloomberg Television, Howard 100 News for Howard Stern, and most recently, TODAY Show Radio for NBC on SiriusXM.

As host of TODAY Show radio, Gottesman is in 30 million vehicles each weekday in North America on Channel 108. SiriusXM subscribers hear the TV show, and Gottesman anchors the local cutaways with behind-the-scenes interviews from Studio 1A with Matt Lauer, Savannah Guthrie, Al Roker and all the hosts, as well as the celebrities in the green room waiting to go on. The multi-platform strategy won her a Journalism Award from The New York Press Club and may be helping to grow the TODAY show's traditional TV ratings as well by keeping people connected to the brand.

As a communication student at Cornell, Gottesman's home base on campus was WVBR. While working there as a news director, DJ, music director, and eventually program director, she made connections with peers in the media that persist to this day.

"WVBR was a four-year love affair," she said. "Many of my contemporaries at Cornell and WVBR are still in the business: a president at iHeartMedia, the president of Coleman Research firm, a senior vice president at SiriusXM, a morning anchor at CBS, an anchor at MSNBC. There are so many of them. It's always nice in the hallways at NBC to say 'Hi' to

my Cornell brothers and sisters."

Just two years after graduating from Cornell, Gottesman became the youngest-ever acting program and music director at WPLJ-FM in New York. There, an early claim to fame was helping relaunch the career of former child star Donny Osmond in the late 1980s. Convinced that his song "Soldier of Love" would be a hit—if only listeners would give it a chance—she created a "mystery artist" promotion, playing the song for several weeks without telling listeners who was singing. After the reveal, Osmond was swiftly signed to Capitol Records, and the song reached #2 on the Billboard Hot 100.

In addition to her many accolades, including regional Murrow Awards, a Gracie, and AP and UPI broadcast sports awards, Gottesman has yet another claim to fame. She has been the voice of the automated announcements of stops along New York City's Lexington Avenue trains for 17 years. Recorded pro bono for the MTA while she was working at Bloomberg News, it's a gift to the city she's come to love.

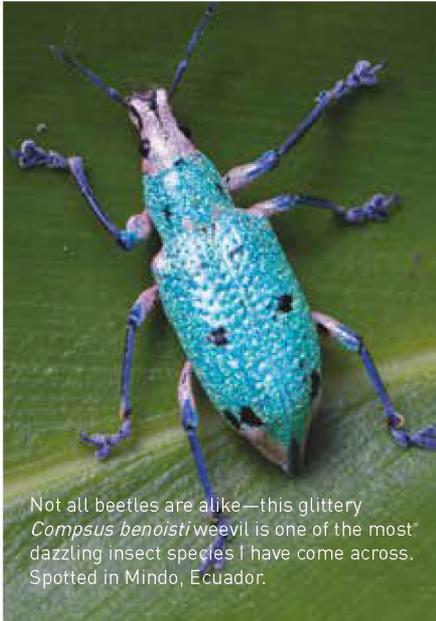
"It's a quick commute to the greatest job in the world," she said.

Know any exceptional alumni?

Send your story ideas to
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Exploration for Conservation with Phil Torres '07

With a passion for entomology and the grit for muddy, tropical adventures, Phil Torres '07 puts the focus on wildlife conservation as a TV host, science reporter, educator, and photographer. He has appeared on Animal Planet, the Discovery Channel, the BBC, and Al Jazeera America, and he chronicles his latest finds on Instagram (@phil_torres) and his YouTube channel, "The Jungle Diaries." On expeditions to remote areas around the world, he's witnessed rare sights, including salt-seeking butterflies sipping the tears of turtles and spiders that sculpt larger decoy spiders of silk, leaves, and dead insects. Below he shares his notes on species that have recently caught his eye.



Not all beetles are alike—this glittery *Compsus benoisti* weevil is one of the most dazzling insect species I have come across. Spotted in Mindo, Ecuador.



A baby sea turtle soon to be released as part of a conservation project led by Paso Pacifico, a Nicaraguan conservation organization that focuses on preserving the country's southwest coast.



Never underestimate the beauty of urban wildlife. Despite having worked in the field all over the world, the closest I've ever been to a bird of prey was this red-tailed hawk hunting in the middle of New York City's Central Park.



Nature is full of bizarre forms, especially in one of most biodiverse places on earth—Yasuni National Park in Ecuador. This is a wasp parasitizing a praying mantis egg case.

Q&A on Environmental Justice with Rosa Méndez '05

In December 2016, Rosa Méndez '05 was appointed director of the Office of Environmental Justice with the New York State Department of Environmental Conservation (DEC), a position responsible for promoting and providing cleaner water, flood protection, cleaner air, habitat, and recreation spaces in communities across the state. Méndez, a New York City native who holds a degree in natural resources from Cornell and a Juris Doctor from Vermont Law School, shared her perspective on the job that lies ahead for her and why environmental justice should matter to everyone.

What are the biggest challenges in giving New Yorkers a voice in environmental and climate decisions?

Addressing environmental and climate concerns is critical for all of New York's communities for future planning and decision-making. One of the biggest challenges is recognizing and mobilizing all of a community's assets. There is much untapped leadership and local knowledge in our communities that should inform those plans and decisions. Another challenge is recognizing that environmental and climate concerns are not just about and will not be solved by environmental decision-making. Education, transportation, food security, and health are challenges and part of the solution. We need an interdisciplinary approach to ensuring that all communities are equipped to address environmental and climate risks.

Minority and low-income communities often experience a disproportionate share of the adverse impacts of pollution and other environmental hazards. How will you ensure fair treatment in environmental policies and permitting decisions?

Agency-wide efforts to promote environmental justice include ensuring meaningful involvement in decision-making through enhanced public participation. The Office of Environmental Justice assists the DEC divisions with outreach and education initiatives, providing guidance in the development of enhanced public participation plans for permitting decisions. Also, our Indian Nations Affairs coordinator aids DEC in consulting and cooperating with Indian Nations on environmental and cultural concerns. We will also focus on directly improving the environment in communities and increasing access to green and recreation space. Our Community Impact Grants provide funding for projects addressing environmental and public health concerns in low-income and minority communities that are experiencing historic burdens of environmental problems. Our office also includes a green infrastructure coordinator who collects and provides information on green infrastructure resources, projects, and funding sources to share with our network of stakeholders.



What prepared you to succeed as an advocate?

Both of my parents are community advocates, and I learned a lot from their examples. My coursework at CALS provided a background in resource management and policy and equipped me to better advocate for the environment. However, it was the students I met from all over the world that really prepared me to be an advocate. The most meaningful education came from listening to my classmates' personal histories and discussing policy from their perspective.

What can individuals do to promote environmental justice?

One of the principles of environmental justice is meaningful involvement. But what does that mean or look like? I have experienced many instances where well-meaning advocates pushed an agenda, but residents living in the affected community actually wanted a different result. Listening is one thing individuals can do. Another is to take stock of all the benefits in your community. If a community has food, electricity, and sanitation that means it also has landfills, power generators, and trucks in someone's backyard. We all need to bear burdens equally for the benefits we expect and must work together to achieve more efficient and sustainable means to receive those benefits.

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"I work to develop new vegetable varieties that address the needs of organic growers here in the Northeast so that they can deliver high-quality, sustainably-grown produce to consumers."

Rachel Hultengren
Master's Candidate
Plant Breeding & Genetics
School of Integrative Plant Science



"Combining food chemistry and nanoscience, I create novel methods to protect, integrate, and deliver vital food molecules to our bodies. This helps us to stay healthy and boosts our longevity."

Alireza Abbaspourrad
Yongkeun Joh
Assistant Professor of
Food Chemistry and Ingredient
Technology
Department of Food Science



"Virtual reality is poised to alter our daily experiences in profound ways. My work explores how immersive media interactions impact our health and perceptions here in the physical world."

Andrea Stevenson Won
Assistant Professor
Department of Communication



"Optimizing biofuels demands understanding plant disease. As a plant pathologist, I make a real impact in sustainability and economic development."

Chase Crowell
Ph.D. Candidate
Plant Pathology and
Plant-Microbe Biology
School of Integrative Plant Science



Cornell University
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endnote

MY CORNELL STORY

Deepak Amin '88

Savoring
Success at
Deep Foods



Right after I graduated from Cornell with a degree in food science, I joined Deep Foods, the Indian foods company that my parents established in 1977. Fortunately for me, food is really easy to connect to, and, in fact, anyone walking into our facility at Deep Foods knows within seconds exactly what we're up to and immediately gets a craving to eat. You don't even have to say or see anything—just breathe it in. If it tastes as good as it smells, then have we succeeded?

Not quite—food manufacturing is itself getting more complicated by the day, and meeting quality control challenges is an achievement we celebrate at Deep Foods. I first studied HACCP food safety regulations at Cornell two decades ago, before inspectors themselves knew what the acronym meant—hazard analysis and critical control points, for the uninitiated—and today there are another hundred layers of compliance. We at Deep Foods have adopted a culture in which the strength of our quality assurance is as much a sign of success as a strong bottom line.

Despite our resolve and passion for quality assurance, making great tasting food is the core of our business,

and the spirit of innovation runs deeply throughout our organization. The better we get at developing recipes, the more we end up innovating and investing. If we develop a product whose taste surpasses everything out there, we push ourselves to scale up the process and market it. Today, from a business that started with a modest 650-square-foot factory, we now have plants dedicated to bakery, frozen meals, snack foods, individually quick-frozen vegetables, savory snacks, and quick-serve restaurants, and we are currently starting fresh meals and a bottling line—none of which were acquired.

This level of innovation is the result of an underlying principle that I have learned to appreciate over time and now reinforce through our corporate vision. In my mind, innovation is a three-step process, and the last step is the clincher.

The first step is correction: You take a potato out of the ground and clean the dirt off, skin it and remove the eyes. For this process, you need tools and basic intelligence. The second step is value addition: You julienne the potato and perfectly fry it and voilà... you have french fries. This process step requires creativity. The final process step is presentation—or celebration—you plate it beautifully and serve it with a friendly

smile. The last step requires leadership and vision, and it perpetuates the entire process. A french fry is just a french fry, but it's the final step of how you bring it to the consumer that puts the meaning and purpose in everything you do.

At Deep Foods, we keep that meaning and purpose alive by firstly striving to offer opportunities for our staff to learn and grow. Second, there is an undying spirit of creativity and development. Finally, there is the strong focus on servant leadership throughout all our departments. This is what all successful organizations do, and it's a blessing to have this in the business' roots from so early on thanks to my parents.

In hindsight, success hasn't been a goal or place but rather a feeling of fulfillment that keeps driving you to achieve through the ups and downs. Here's the truth: The feeling didn't arise in me. In fact, it was actually in my surroundings, and I simply became a part of that. It's amazing when you're part of something that's palpable and engaging, that is enriching you with knowledge and affording you the opportunity to serve something outside of yourself. I count myself lucky: It's hard to believe the same feeling I felt as a youth studying at Cornell is with me now as I lead my family-run food business. For me, that is success!

Deepak Amin '88 is president and CEO of Deep Foods, the largest U.S.-based manufacturer of Indian foods, which produces several lines of Indian foods including Tandoor Chef, Babu's pocket sandwiches, Healthy Tiffin, Recipes of Udupi, and many others. They opened the first Indikitch, a Chipotle-style Indian food chain based in New York City, in 2014. A food science major at Cornell, Amin was born in Gujarat, India, and resides in New Jersey with his wife, Dipali, and sons, Kishan and Nisheel.

Facts in Five

FOR THE BIRDS

Pigeons, crows, sparrows, starlings and killdeer: These city-dwelling species rank low in the pecking order for many birders. Although their successful adaptation to urban and suburban landscapes has rendered them ordinary and easily overlooked, they have hidden talents and creature culture worthy of a second glance.

Rock pigeons' cliff-dwelling prowess makes them adept at nesting in the eaves and window ledges of skyscrapers. Pigeons, along with only doves, flamingos, and some penguins, make 'milk' to feed their newly hatched offspring. Both male and female rock pigeons produce a liquid enriched with proteins, fats, antioxidants and antibodies to nourish chicks during their first week of life.

Pigeon

House Sparrow

Preferring nests under eaves, atop street lights, or in warehouses, house sparrows shun the dense forest for cities, towns, suburbs, and farms. They are adept at extremes. House sparrows have been observed breeding 2,100 feet underground in an English coal mine and feeding outside the 80th floor of the Empire State Building.

Equally at home in a forest or a garbage dump, American crows are highly social birds, and offspring may remain with their parents for up to six years before setting up a nest of their own. Researchers have found that crows retain a long-term memory of the faces of people who threaten them and teach others in their flock to scold and heckle on sight.

Crow

Starling

First brought to New York's Central Park by Shakespeare enthusiasts in the 19th century, European starlings are now among the continent's most numerous songbirds. Not only can they imitate other birds' songs and animal sounds, they can also mimic phrases of human speech and snippets of music, leading some people, including Mozart, to keep them as pets.

The killdeer's shorebird relatives nest on rocky shores and sandy beaches, but killdeer stake out the gravel of parking lots and city rooftops. Although they are known for their adaptation to hot, dry habitats—they even open their mouths to cool off, similar to how dogs pant—killdeer adults and chicks can swim well, even in moving water.

Killdeer

To learn more about urban bird species and bird habitat in cities or apply for a mini-grant for your community, join Celebrate Urban Birds, a program of the Cornell Lab of Ornithology.

celebrateurbanbirds.org

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