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HOPE FOR HAIR

I was utterly riveted by the journey of geneticist Angela Christiano and her personal quest to find a painless, effective treatment for alopecia ("The Rapunzel Effect," Spring 2019). Her determination and success in her field and her empathy for the emotional suffering of individuals and families afflicted with alopecia was striking. I shared the article with a friend of mine who is struggling with alopecia, and she was overjoyed to hear about the progress in finding a better treatment. Jacqueline Harounian '91CC

Great Neck, NY

Your cover photo of Angela Christiano brought back a flood of memories for my wife and me: memories of two young, motivated classmates at Nutley High School — Angela and our daughter Jeanette — having luncheon-study dates at our house, with Angela bringing pastries for dessert, and so many others. The two of them participated in a workstudy program (mentioned in the article) at the labs of the pharmaceutical company Hoffman–La Roche. Now both are making their contributions for a better world, Angela through research and Jeanette through compassionate medical care for ailing patients.

> Louis M. Paterno '54CC Hackettstown, NJ

LOST IN THE MAIL

I was saddened to read in your magazine that only half the published issues will now be delivered to alumni overseas. The notice suggested that international alumni can continue to read the magazine in its digital forms.

I understand that international postage costs significantly more and that this change is likely intended to save money. But magazines hold a unique position in our lives. We read them while we're sitting in the car waiting for the children to get out of school, when we have a few moments of downtime in between meetings or, in my case, between surgical cases in the operating room. I frequently leave this magazine around for coworkers to peruse and tear out articles to share. People ask me where it came from, and I'm proud to say it came from the minds of people at Columbia.

I know that theoretically this can all be done in digital form, but in reality, it just doesn't happen. I cannot hand a digital article to someone in the hallway. I cannot leave one on my bedside table until it's ready to read. In fact, I know of no one who sets aside digital magazines to read later. Lives are just too busy for that, and physical magazines are more present and gently remind us to read them.

I would kindly ask that you reconsider the opportunities lost in choosing to eliminate these hard copies. I look forward to reading many more issues in the future.

Branden Emmerson '96CC O'Sullivan Beach, Australia

We hear you — we love print magazines too! But with Columbia's international alumni population growing,



CHEERS

FEEDBACK

Been glancing at Columbia Magazine for years, but only in the last couple of issues has the attraction grown strong enough to draw me in to read the whole of it. Congratulations on the increased quality.

Howard Lieberman '55CC Princeton, NJ

The magazine is wonderful.

Euriah Bennett '93BUS Smyrna, GA

As the mother of a Columbia grad-school alum, I happened to see a copy of the Spring 2019 issue. Bravo! I read and loved almost every blurb and box and article.

> Betsy Amin-Arsala Washington, DC

FEEDBACK



In 1920, the 125th Street Streetcar set off a cascade of Manhattanville street-name changes that the *Times* panned under the headline "Aldermen Like French Names."

we've had to manage our resources. Today we reach more than forty thousand international alumni in 188 countries and territories, and the cost of sending out four publications a year is prohibitive. We're hoping our global audience will understand and continue to read our spring and fall issues online. — Ed.

CROSSTOWN TRAFFIC

I was interested in your feature "Welcome to Manhattanville" (Spring 2019), and I thought your readers might enjoy a related tidbit from my book *Manhattan's Little Secrets: Uncovering Mysteries in Brick and Mortar, Glass and Stone.*

On the southern flank of the Manhattanville campus, West 125th Street cuts diagonally across the Cartesian regularity of the street grid to intersect with a rectilinear West 129th Street. Why this odd arrangement? It's because today's 125th Street west of Morningside Avenue is yesterday's Manhattan Street, declared redundant by the 1811 master street plan but allowed to remain when the streets were actually cut through.

The name change came about in 1920. A streetcar that operated from the East Side along 125th Street, angling right on Manhattan Street before reaching a Hudson River pier, was known to passengers as the 125th Street Streetcar. The Board of Aldermen, at the urging of the Harlem Board of Commerce, determined that the street name should reflect the usage.

But having two different 125th Streets west of Morningside Avenue was deemed foolish, so the older one became La Salle Street (a "high-sounding French name," complained the *New York Times*), honoring Jean-Baptiste de La Salle, whose Christian Brothers had founded Manhattan College nearby. Having a West 127th Street south of West 125th likewise made no sense, so we have Tiemann Place, named for Daniel Tiemann, a former Manhattanville resident, paint manufacturer, and mayor. And the rump end of West 129th became St. Clair Place, named for St. Clair Pollock, whose famous burial monument (engraved "Erected to the Memory of an Amiable Child") is up the hill in Riverside Park.

John Tauranac '63GS New York, NY

ANTI-ANTITRUST

Your interview with law professor Tim Wu about antitrust laws misses the mark: the answer to the problem of monopolies is to prevent them from forming in the first place ("Losing at Monopoly," Spring 2019).

In a free-market economy, that means removing barriers to competition, not enforcing a specific group's view of what fairness means. Small businesses have to spend enormous amounts of money and time negotiating regulations to get off the ground and compete. That is the reason there is only modest competition for big business, not because there is a dearth of ingenuity or capital for the creation of new businesses.

KEY TO ABBREVIATIONS			
CODE	SCHOOL	CODE	SCHOOL
BC BUS CC DM GS GSAPP	Barnard College Graduate School of Business Columbia College College of Dental Medicine School of General Studies Graduate School of Architecture, Planning, and Preservation	NRS OPT PH PHRM PS SEAS	School of Nursing School of Optometry Mailman School of Public Health School of Pharmaceutical Sciences Vagelos College of Physicians and Surgeons Fu Foundation School of Engineering and Applied Science
GSAS HON JRN JTS KC LAW LS	Graduate School of Arts and Sciences (Honorary degree) Graduate School of Journalism Jewish Theological Seminary King's College School of Law School of Library Service	SIPA SOA SPS SW TC UTS	School of International and Public Affairs School of the Arts School of Professional Studies School of Social Work Teachers College Union Theological Seminary

The solution is to break down barriers so that small or moderate loans will suffice. Complicating the business landscape with additional regulations — even well-meaning ones such as net-neutrality rules — only serves to limit competition and enrich the legal profession.

> Edison Wong '91PS Silver Spring, MD

I cannot agree more with Tim Wu that "extreme corporate concentration" creates monopolies that threaten the economy and the founding ideas of the American republic. But I cannot disagree with him more about how those monopolies came into existence. And I disagree fundamentally with the philosophy that antitrust law somehow protects consumers.

The arguments advanced in favor of antitrust law erroneously assume that an unregulated market will lead to the establishment of coercive monopolies. The blame for them is almost always placed on "sociopathic" corporations, greedy businessmen, and unrestricted capitalism. This skewed perception is based in great measure on an American ailment that Gore Vidal referred to as "the United States of Amnesia."

If you examine history before the last few decades, you learn that every coercive monopoly in the nineteenth and twentieth centuries was created by the government's intervention in the economy in the form of special privileges conferred on select private companies to the exclusion of others. This effectively closed the indus-

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FEEDBACK

tries to competition and set the scene for the rapid and exponential increase in coercive monopolies that were responsible for price gouging and income inequality.

Antitrust laws have only served to exacerbate the problem. There is no historical evidence that the Founders intended for our government to buttress or subsidize by legislative edicts any commercial venture. The only logical solution is to operate government as it was intended, so that, as Tim Wu says, "no person or institution can enjoy unaccountable influence."

Emmanuel Perez '82GS Coral Gables, FL

A BRIGHTER BULB

While reading the College Walk article "How Many Columbians Does It Take to Change a Light Bulb?" (Spring 2019), about the "relamping" of Butler Library reading rooms, I realized it would take fewer Columbians to change those light bulbs over a number of replacement cycles if fifteen-watt LED (lightemitting diode) bulbs were used instead of the twentysix-watt CFLs (compact fluorescent lamps).

LEDs have approximately double the life of CFLs, and they use 34 percent less energy and run cooler, which reduces the air-conditioning load. In fact, replacing every bulb on the Columbia University campus would instantly increase energy efficiency and reduce costs for lighting and air conditioning.

Tom Milbury '83SEAS New City, NY

David Banker, assistant facilities coordinator,

responds: Columbia Facilities is beginning to convert light fixtures over to LED, starting in buildings that have the oldest electrical systems. Oftentimes the ballast — the component that regulates the electrical current flowing to the bulbs - also needs to be replaced to work properly with LEDs. For us in Butler, that means that we have so far converted the three chandeliers in the third-floor lobby to LEDs, and reading room 301 comes next. In the last two years, relamping here has dropped from twice a year to less than once a year.

What's next for Butler? As the first floor is renovated to better accommodate staff and our growing digital resources, now is the time to convert these fixtures. I'm currently working with Facilities and LED specialist Pearl Street Systems to upgrade the lighting in this part of the building.

EPIC FAIL

Thank you for another enjoyable issue of *Columbia Magazine*. I was especially drawn to the coverage of the newly opened Troy Museum in Turkey ("Curating the Legend of Troy," Network, Spring 2019). But I noticed an error at the end of the piece in the following line: "There is - so far - no material evidence of the wooden 'Trojan horse' from *The Iliad*."

There is much to admire in Homer's first epic, but, alas, the Trojan horse is not there, despite Hollywood's fanciful memories. It does not make an entrance until the sequel, *The Odyssey*, when the Spartan king Menelaus reminds his errant wife, Helen, about the old days.

As students of Humanities A (or Lit Hum) will attest, the original *Iliad* ends with the death and funeral of Hector, not the fall of Troy.

Should we, or the archaeologists, continue our search for the actual historical horse? Better to interpret it, as one historian did, as a metaphor for an earthquake, which contemporaries would have attributed to the god Poseidon, sometimes represented as a horse. Yes, there is seismic evidence of Troy being in an earthquake zone!

But which, to the poet, makes for the better story?

Allen Koenigsberg '64CC, '68GSAS Brooklyn, NY

QUESTIONS? COMMENTS? WE WELCOME THEM ALL!

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Letters may be edited for brevity and clarity.



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COLLEGE WALK

NOTES FROM 116TH STREET AND BEYOND



Made in the Shade Columbia's oldest tree gets some TLC

Sometime before 1897, the year the University moved from Madison Avenue to Morningside Heights, a tender sapling dug its roots in the soil on what is now the west side of Low Library. Having witnessed the transformation of the gardens and pastures of the old Bloomingdale Asylum into the landscaped quadrangles of Columbia, the hundred-foot-tall tree stands today in wide-armed serenity in front of Mathematics Hall. With its stout, mottled trunk and gnarled branches tufted with broad, serrated leaves, this American sycamore (*Platanus occidentalis*) bears the dignity

of arboreal maturity: no passerby would be surprised to learn that, of the 438 trees on the Morningside campus, it is the oldest.

How old, exactly? "That's hard to know unless you want to spend a lot of money or cut it down and look at the rings," says Bradley Larson, grounds manager with Columbia Facilities. "We won't do that, obviously." When pressed, Larson puts the tree at 125, give or take — not even halfway through the average lifespan of a sycamore, which can live as long as five hundred years. "It's a hardy tree, native to this area," Larson says. It is not related to the sycamore fig tree of the Bible, but it is cousin to the London plane trees around Low Library. "You can find sycamores in swamp-type conditions or at higher elevations, so they can withstand more stress than a lot of other species, like the red oaks in front of Lewisohn."

That hardiness was recently put to the test. Last year, the University replaced the stairs connecting Mathematics to Havemeyer with a wheelchair-accessible ramp. The plan was to refurbish the nearby walkways as well, but the sycamore's roots had made incursions into the adjacent footpath, forcing Facilities to find a creative way to fix the path while preserving a tree that had watched Mathematics rise brick by brick when John Howard Van Amringe 1860CC, the first official dean of Columbia College, led the math department. A tree that had seen generations of students and faculty pass through

Rather than cutting into them to make way for a path, Facilities employed a groundskeeping sleight of hand: it raised, imperceptibly, the elevation of the entire lawn, averting contact with the tree altogether. "We did have to expose some roots in order to know where they were, so we could avoid damaging them," says Larson. Workers used compressed air to blow the soil away from the unearthed roots, which they wrapped in burlap during construction.

Two new footpaths, built above root level, go *around* the tree, which is now bordered, moat-like, by an eight-foot radius of mulch fringed by boxwood shrubs. The tree has become an unofficial campus monument. In winter it stands bare and forked; in



Portrait of the sycamore as a young tree, 1920.

the building's doors and, for a few days in 1968, dangle from its windows; that had given shade to great mathematicians like Fields medalist Jesse Douglas 1920GSAS, Nobel laureate Herbert Hauptman '39GSAS, '90HON, computer scientist John Backus '49GS, '50GSAS, and number theorist Shou-Wu Zhang '91GSAS.

"The scope of the walkway project was expanded to protect the tree's roots," Larson says. summer its shaggy greenery casts deep shadows on the red-brick walkway and façade of Mathematics. And fall will bring, as Larson can attest, a shower of leaves and a "pretty good cleanup."

If the sycamore stays healthy, this cycle could hold for at least another century. "This tree has been on campus longer than anyone," he says, "and I hope it will be around when we're all gone." - Paul Hond

THE SHORT LIST

PEDAL Bike for a good cause at Velocity: Columbia's Ride to End Cancer, an event to raise money for Columbia's Herbert Irving Comprehensive Cancer Center. Whether you're a cycling novice or a Tour de France veteran, register now for a ride of 10, 25, 45, or 62.5 miles. October 6. velocityride.org

READ Columbia Global Reports has two new books. In Speech Police: The Global Struggle to Govern the Internet, David Kaye looks at the rise of hate speech and fake news online, and in We Want to Negotiate: The Secret World of Kidnapping, Hostages, and Ransom, Joel Simon unpacks the consequences of paying ransom money to terrorists. Buy copies or subscribe online. globalreports.columbia.edu

VISIT After the End: Timing Socialism in Contemporary African Art, an exhibit at the Wallach Gallery, showcases artwork that responds to postcolonial socialist movements in Angola, Ethiopia, Guinea-Bissau, Mozambique, and other African nations. Curated by Álvaro Luís Lima '19GSAS. June 15–October 13. wallach.columbia.edu/exhibitions

LOG ON Alumni can network, update their contact information, and share news with fellow Columbians through the newly redesigned online Alumni Community. alumni.columbia.edu/content/alumni-community

SEE Celebrate cutting-edge young artists at the 2019 Whitney Biennial, which features work by Korakrit Arunanondchai '12SOA, Alexandra Bell '13JRN, Ilana Harris-Babou '16SOA, Iman Issa '07SOA, Steffani Jemison '03CC, Ragen Moss '00CC, and Kyle Thurman '09CC. Co-curated by Rujeko Hockley '05CC. Through September 22. whitney.org/exhibitions/2019-Biennial

COLLEGE WALK



Donald Keene at poet Basho's tomb in Zeze, Japan, 1955.

Found in Translation

America's foremost Japanologist lived for his adopted country — and his students

hen Fred Katavama '82CC. 83JRN returned to New York in 1994 after working for five years as a reporter in Japan, he called his old professor Donald Keene '42CC, '49GSAS, '97HON and asked him to dinner for Keene's birthday. Katayama had taken Keene's undergraduate course in Japanese literature and had never forgotten it. The two went to birthday dinner and repeated the ritual for the next twenty-five years.

Keene, a University Professor who died in February at ninety-six, was the premier scholar of Japanese culture in the West. He taught at Columbia for fifty-six years and produced dozens of books. Moving fluidly between literature and history, he wrote major works on Noh (classical Japanese theater) and Emperor Meiji and translated many Japanese poets and writers, including his friends Yukio Mishima and Kōbō Abe. His Anthology of Japanese

Literature, published in 1955 and still in print, and his monumental four-volume *A History of Japanese Literature* first brought the subject to Western audiences.

For Katayama, however, Keene's scholarship had more personal meaning. Growing up in Los Angeles in the sixties, Katayama was ashamed of his Japanese heritage. At Columbia, he took Keene's class and read his book *Landscapes and Portraits: Appreciations of Japanese Culture*, which explored Japanese aesthetic principles like impermanence. "He opened my eyes to Japan," Katayama says.

"Donald knew more about Japan than any Westerner," says Carol Gluck '77GSAS, the George Sansom Professor of History at Columbia. "For him, Japanese literature was part of world literature, and you didn't have to read it in Japanese. He taught us how to *love* literature — not just to be interested in it, not just to criticize it, but to love it."

"Professor Keene was small-statured, soft-spoken, and gentle," says Yoshiko Niiya '93BC, the assistant director of Columbia's Donald Keene Center of Japanese Culture, established in 1986. "But when he lectured, there was an aura about him. You could just feel his love and passion."

Keene grew up in Flatbush, Brooklyn, and entered Columbia at sixteen, where he studied Greek and French literature. "Donald was precocious, but Columbia shaped him intellectually," says Gluck. "He's the perfect example of what happens when an impressionable teenager encounters the Core."

As Keene liked to recount, his first brush with Japan was in 1940, when, as an undergraduate, he passed a bookstore window in Times Square and saw a forty-ninecent copy of The Tale of Genji, the sprawling eleventhcentury work generally considered the world's first novel. Attracted by the bargain, he bought it; and as Europe sank into barbarism, Keene lost himself in the romantic intrigues of Prince Genji and the exquisite manners of the imperial court of the Heian period. Then, on December 7, 1941, Japan bombed Pearl Harbor. The US was at war.

A pacifist, Keene entered the US Navy Japanese Language School in February 1942. There he befriended Wm. Theodore "Ted" de Bary '41CC, '53GSAS, '94HON. The two were sent to Hawaii as interpreters. Keene interrogated prisoners of war and read the diaries of dead Japanese soldiers, which moved him greatly. After the war, he returned to Columbia for graduate studies under Ryūsaku Tsunoda '62HON, the mainstay of Japanese studies at Columbia. He began teaching full-time in 1955.

As a teacher, Keene punctual, attired in jacket and tie, alight with joy in his subject — lectured without notes, imparting his insights directly to students. "We all called him 'Sensei,'' says Amy Heinrich '80GSAS, the former director of the C. V. Starr East Asian Library at Columbia. "'Sensei' means teacher, but it is also a term of respect. He was, for his whole life, our Sensei."

Keene taught his last class at Columbia in the spring of 2011. The following year he became a Japanese citizen, living full-time in Tokyo. "Japanese, which at first had no connection with my ancestors, my literary tastes, or my awareness of myself as a person, has become the central element of my life," Keene wrote in his memoir *Chronicles of My Life: An American in the Heart of Japan*.

Last August, Katayama visited his "beloved Sensei" at his home. They went to a nearby restaurant. The restaurant was closed, but the owner opened it for Keene and made his favorite meal. "Donald talked about the emperor and empress — he knew them and loved them both. Then he said that he was finishing up his book on the late Ted de Bary, his best friend, and that he wasn't doing any more research. That saddened me."

In those last months, Keene received a stream of friends. "He was frail," says Gluck, "but anybody who came to Japan went to visit him. At the end, it was his students he most wanted to see."

Keene died of heart failure on February 24. His death made headlines around the world. The emperor and empress sent a wreath to the funeral home. In April, a public memorial in Tokyo drew 1,500 people, including Heinrich. And in New York, Fred Katayama made a donation to the Donald Keene Center, in honor of the Sensei who had helped him discover the beauty of impermanence. — Paul Hond

ARTISTS IN RESIDENCY



The Mystery of the Shirley Temple Sphinx, by Francesca Oberbeck.

This year marks the tenth annual CUIMC Fine Art Exhibition, an event that showcases work by the medical center's students, faculty, staff, and family members. The eclectic sampling of some two hundred sculptures, paintings, and photographs is on display in the Hammer Health Sciences Center until the end of the year.



Bridecycle, by Pan Su "Peter" Kim.



Distance, by Carmen Neal.

COLLEGE WALK

STRAIGHT TALK ON STEM

Ursula Burns '82SEAS, CEO of the telecommunications company Veon and former head of Xerox, recently joined Columbia engineering dean Mary C. Boyce at the launch of New York City Women in Tech, an organization that cultivates the talent of women engineers. During a panel discussion at the Forum, Burns explained her choice of career and talked about the need for more diversity in STEM fields.

I remember going to the library and saying, 'OK, I need to figure out a way to get my mother out of poverty - myself as well. What's the degree that actually gets me the most money after four years of college?' And it was chemical engineering. So basically I said, 'I'll do that.'

In NYC the deans of three top engineering schools are women it's a big deal. Leaders set tones; they often can also set rules, in addition to being an example.

If you think about the role that we're playing — men designed it. They selected the players; they selected the rules and selected what winning looks like.

We can't try to fit in, because we're fitting into a world not designed for us.



Would You Survive Parole?

A simulation captures the frustration of reclaiming a life after prison

n a recent Tuesday night, an unusual crowd of alumni, employers, and formerly incarcerated men and women – many still on parole – gathers at Low Library for what will turn out to be a twohour exercise in frustration and humility.

At the coat check, visitors are handed a name tag with a string of numbers and letters. On each of their seats is a unique profile of a fictional felon just released from prison.

"Do I look like an ex-con to you?" says a white, redheaded woman with a Southern twang standing at the front of the room. It is more icebreaker than question. Sue Ellen Allen served time for securities fraud. Now the speaker, author, and activist leads simulations of what life is like for a formerly incarcerated person (FIP) trying to reenter society.

"Tonight you're a former prisoner like me. You'll get a taste, just a taste, of what it's like to come home ... That profile on your chair is you. That sticker on your shirt is your New York State correctional services ID." Participants dutifully read the profiles, which detail a four-week schedule of tasks that FIPs must complete to meet the conditions of parole. The simulation demands that people visit tables around the room to get each task done. Along with making rent and showing up to counseling, FIPs need a state ID, urine tests, bus tickets, a job, food all the essentials.

A bell rings. Week one starts.

The tables are staffed by volunteers, almost all of whom are parolees. They have been told to treat people as officials treat them, which is to say rudely. Most people will need a state ID to get a job, but the ID line is twenty people deep. "Time's up," says Allen after fortyfive minutes. "Back to your seats."

Week two starts. Tasks pile up. Participants who cannot pay rent are homeless. One gets her state ID and makes it to the counseling table only to be told to pick a card at random. The card says she's disruptive, so she's kicked out of therapy. The bell rings again. It's week three. She's out of food.

SARA WONG



By now, there's a black market for bus tickets. The lines, already long, are made longer when a parolee working one table has to leave early to make curfew. When the bell rings and week three ends, Allen stops the exercise. Mercifully, there is no week four.

"How do you feel?" Allen asks.

Participants share their exasperation, anger, and sense of powerlessness. "The rules don't work," one man observes. "The playing field isn't level."

Each year, more than 650,000 people are released from US prisons. Two-thirds of those will be rearrested within three years. "With little social support, few job options, and an inefficient, often dehumanizing legal system, formerly incarcerated people face an uphill battle," says Damon Phillips, codirector of Columbia **Business School's Tamer** Center for Social Enterprise, which along with the Osborne Association and Reinventing Reentry, two nonprofits working on criminal-justice issues, helped organize the simulation.

He explains that one of the ways Columbia Business School is trying to help prisoners with that transition is through the ReEntry Acceleration Program (REAP). Created by the Tamer Center in partnership with the Center for Justice at Columbia, REAP takes a two-pronged approach: "It teaches incarcerated and formerly incarcerated individuals business skills, and it also gives employers tools and guides for hiring people with a criminal record," says Phillips.

The simulation exercise is important, says Phillips, because it fosters empathy. A two-hour event will never capture the true pain of life after prison, but it can be a powerful way to bridge worlds that rarely connect.

– Rebecca Kelliher '13BC

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THE COLUMBIA COMMITMENT



wenty third graders jostle for a close-up view of the tiny aquatic crustacean *Daphnia*. Adjusting microscopes, peering at monitors, and identifying body parts, they chirp about the "water fleas":

They're so cute!

Is it pregnant?

She gave birth! I saw it! One, two, three, four, five ... she just had another one!

This encounter took place not in a conventional laboratory but aboard a thirty-four-foot-long Airstream trailer parked outside PS 208 on West 111th Street in Harlem. Welcome to BioBus, a community-focused mobile science lab and not-for-profit educational program founded and directed by Ben Dubin-Thaler '00CC, '08GSAS. In BioBus's two vehicles — the Airstream and a converted city bus painted orange, yellow, and blue — Dubin-Thaler's staff of scientists cruises the metropolitan area, bringing mind-expanding glimpses of the natural world to schoolchildren.

"I can see kids' minds changing in a forty-five-minute stay on the bus," says the lean, bearded, forty-year-old Dubin-Thaler ("You look like a skateboarder!" cried one of his PS 208 charges). "But it's equally important that, beyond doing science, the kids meet scientists from Columbia and other institutions. That's how barriers fall." BioBus's grassroots approach stems from Dubin-Thaler's activist bent. "I'm trying to redefine the scientific community," he says. "Science is for everyone. There's no us and them. Climate change, for instance: we've all got to solve it."

Dubin-Thaler was raised in Philadelphia and comes from a long line of Columbians, starting with his great-grandfather Meyer Jacobstein 1904CC, a congressman from western New York in the 1920s, and extending to his father, Jon Thaler '67CC, '72GSAS; his uncle Toby Thaler '72CC; and his brother, Alex Thaler '04CC. But Dubin-Thaler says it was Columbia's activist culture, not family tradition, that drew him to Morningside. For him, activism meant breaking down boundaries. As a grad student in biology, he would open his lab to visitors, from University staff to "kids I'd met playing roller hockey in the park," in an attempt to share his fascination with the widest possible audience.

Ever since high school, when he interned at a mobile-science program called the Physics Van at the University of Illinois, Dubin-Thaler had longed for a way to meld a teaching career with community service. His eureka moment came as he was completing his doctorate. "One of the things that kept me sane in graduate school was performing with an anti-consumerist politicaltheater group called Reverend Billy and the Church of Stop Shopping," he recalls. In 2004, while Dubin-Thaler was briefly touring California with the group in a refurbished San Francisco city bus, one of his compatriots remarked, "Hey, this bus would make an amazing bookmobile!" Dubin-Thaler agreed, but he had a slightly different plan.

With a chunk of his savings and some help from family and friends, he bought a used bus and had it converted into a lab. In 2007, BioBus was born. Today, through a partnership with the Zuckerman Institute, it is headquartered at the Jerome L. Greene Science Center, home of the Education Lab, where motivated BioBus students can work on long-term projects with Columbia scientists. With two vehicles and nearly thirty staff members, the BioBus program reaches thirty thousand kids each year.

These days, whenever Dubin-Thaler feels overwhelmed by the day-to-day work of keeping BioBus rolling, he'll join a trip out to a school to "see what's up" and connect with the kids, whose access to science education, in his view, is essential to solving problems, locally and globally. "The message is clear," he says. "We're all in this together."

> — Thomas Vinciguerra '85CC, '86JRN, '90GSAS

BIOBUS

"I volunteer in the South Bronx, bringing the Poetry Out Loud program to classrooms and mentoring young athletes. My goal is to create platforms that allocate more resources to marginalized communities like the one I grew up in."



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The planet is drowning in the most useful material ever invented. So what are we going to do about it?

By Paul Hond

he first night on the boat everyone got sick. Agustina Besada '15SPS, her husband, and two friends had left the Mill Basin boatyard on Brooklyn's southeast shore heading toward Bermuda, and now, somewhere in the chop off New Jersey, Besada was having second thoughts.

For the past year, the thirty-five-yearold entrepreneur had been getting ready to launch Unplastify, a business startup aimed at helping schools, companies, and governments assess their relationship to plastic and reduce their dependence on it. To emphasize the toll of single-use plastics - bags, straws, cups, packaging, utensils - on the environment, Besada decided to embark on a sailing trip. She would cross the Atlantic to Europe - sail past the Azores and through the Strait of Gibraltar, collecting water samples along the way. In Europe she would meet with sustainability experts and then voyage, using the trade winds, to Brazil. There

were easier ways to make a statement, but the problem called for a sweeping gesture.

The world produces four hundred million tons of plastic annually, nearly half of which is considered single-use. Each year, more than eight million tons of plastic waste ends up in the ocean. That's a rate of almost fifteen tons every minute. Some of this non-biodegradable flotsam washes up on beaches. It fouls habitats and mars scenery. It becomes accidental food for seabirds and sea turtles. In the water, it agglomerates into giant fields of debris, the largest of which, swirling between California and Hawaii, is twice the size of Texas.

"Plastic is an amazing material," Besada says. "My boat is made of plastic. We need plastic. But there are so many products we use for a few seconds or minutes or hours — a coffee pod, a shopping bag — and then it lasts for five hundred years."

Besada, who grew up in Argentina, became fascinated with waste manage-

ment in high school, when she volunteered in rural recycling programs, but the scope of the plastics glut didn't really hit her until many years later. It happened at a recycling center in Brooklyn. She had joined the center's board while getting her master's in sustainability management at Columbia's Earth Institute through the School of Professional Studies, and one day in 2017, standing amid "mountains of plastic" — mostly bottles — she was struck afresh with amazement and horror. The situation, she would later say, seemed "completely out of control." She knew that 91 percent of plastics never got recycled and that plastic production was only increasing.

Besada knew she had to act. It was time to unplastify. She and her husband, Ignacio Zapiola '11LAW, love sailing, so Besada, who'd never been on a boat for more than twenty-four hours, hatched the idea of a transatlantic expedition. She and Zapiola bought a twenty-year-old, thirty-seven-foot sailboat in Connecticut and named it *Fanky*, after a song by the Argentinian musician Charly García. Besada figured if she was going to advocate for oceans, she would have to go into the belly of the beast.

The planning took months. Besada learned how to fix a diesel engine and do electrical work. She obsessed over crucial purchases: which life raft, which emergency beacon? Every detail mattered. Finally, in March 2018, Besada and Zapiola sold their belongings and moved out of their Brooklyn apartment and onto the boat in Mill Basin. That May, at the start of a weather window that would get them to South America before hurricane season, they welcomed aboard two friends with more extensive sailing experience, and the four of them set out. Now, in the pitch and heave off New Jersey, with everyone seasick and ten thousand nautical miles ahead of them, Besada kept reminding herself what was at stake.



Agustina Besada's campaign to reduce single-use plastic stems from her love for the ocean.

arlier this year, a beached whale in the Philippines was found to have eighty-eight pounds of ■ plastic, mostly bags and nets, in its digestive system. A few weeks later, a pregnant sperm whale washed ashore in Italy, its stomach filled with forty-eight pounds of plastic. The list of casualties goes on. Millions of animals die with bags and nets and buckets in their guts, but symbols emerge: the dead albatrosses on Midway Atoll, their insides stuffed with colorful, undigested bites of plastic; an endangered sea turtle in Costa Rica with a plastic straw lodged in its nostril and throat; a Missouri turtle whose shell grew around the plastic six-pack ring that had ensnared it as a hatchling.

But the trouble goes beyond the plastic we can see. Plastic doesn't break down but rather breaks up into smaller and smaller particles. Granules less than five millimeters across — the length of a pencil tip are known as microplastics. Many of the microplastics in the oceans are invisible to the naked eye, the hidden ingredients of a slow-cooking plastic broth.

"Smaller plastics are our biggest problem," says Joaquim Goes, a marine biologist at Columbia's Lamont-Doherty Earth Observatory (LDEO). Goes, along with geochemist Beizhan Yan, students in LDEO's high-school intern program, and high-school science teacher Debra Magadini, has been studying microplastics in the waterways of New York City and in the digestive tracts of local marine life. Usually these particles are fragments from larger objects, but some, like microfibers and microbeads, are made to be small. Microbeads, often used as abrasives, are added to cleansers, detergents, paint strippers, and cosmetics, and are so tiny that they escape from wastewater-treatment centers. In 2015, President Barack Obama '83CC signed the Microbead-Free Waters Act, making the US the first country to ban microbeads, though loopholes and lack of disclosure have made the law difficult to enforce.

"Microplastics are in the guts of every animal we've studied," Goes says.

In their surveys of eight waterways around New York, including the Hudson, Harlem, and East Rivers, the LDEO team has found high concentrations of microplastics – mostly acrylic polymers, used in paints, clothes, and medical devices. Under ultraviolet light, microplastics will glow, making them easy to spot in the guts of marine organisms like phytoplankton, which are consumed by mussels and oysters. The team has also looked at the plastic-flecked innards of speck-sized crustaceans and the small fish that eat them - in particular, mummichogs and banded killifish from Piermont Marsh, twelve miles upriver from Manhattan. Casting a wider net, the researchers detected microplastics in canned clams from China and farmed shrimp from South America. (Goes notes that on many shrimp farms, microbeads are added to feed pellets to keep them afloat.)

Another major concern is that microplastics tend to attract compounds from substances like pesticides and pharmaceuticals. "Those chemicals don't like water," says Yan. "They do like plastic. So they naturally attach to it." When these grains of plastic collect on the surface of the water, they come into contact with bacteria and algae, which can absorb them. Those organisms, which are eaten by other marine animals, become "vectors of chemicals," says Yan.

Goes is now focusing on a dominant source of microplastics: clothing. Many synthetic materials and cotton-synthetic blends shed fibers when they are laundered. "Fleece jackets and flannel shirts are big culprits," Goes says. "These fibers — thinner than the width of a hair aren't trapped by waste-treatment plants. And so they, too, end up in the waterways and in the guts of whatever animals are in the water, especially bivalves and zooplankton."

Last year, Goes went to a fashion conference and spoke about the problem. Afterward, designers and retailers approached him with offers to help. Goes asked them to send fabric samples, which he keeps in bags on his desk: blends of cotton, polystyrene, and nylon. "We want to get an index on shedding — find out which fibers are involved and inform



Seabirds, like this albatross on Midway Atoll in the North Pacific, often mistake plastic for food.

the companies," says Goes, who in the absence of funding has assigned the survey to the high-school interns. "If companies know which fibers are shedding most, they can improve the manufacturing of those fabrics."

Though the plastic fibers are minuscule — check out the fuzz on your gym clothes — they add up quickly, traveling by the trillions from washing machines to the sewers and eventually into the sea. "There is a bioaccumulation factor," says Magadini. "We've done preliminary studies looking at the uptick of marker plastics in these smaller organisms, which end up inside larger organisms that are prey for striped bass and lots of other game fish. What we're really talking about here is the base of the food chain."

n 1907, in a lab in Yonkers, a Belgian chemist named Leo Baekeland, who would later become a professor of chemical engineering at Columbia, mixed phenol (carbolic acid) with formaldehyde. The result was Bakelite, the first synthetic polymer, or plastic. Polymers are large, dense molecules made up of repeating chains of smaller identical subunits called monomers. There are useful polymers in nature, like cellulose (plant fiber), silk, and wool, but Bakelite could be shaped and hardened into all sorts of things: telephones, jewelry, radios, lamps, poker chips.

"Early plastics transformed consumer culture," says Susan Freinkel '84JRN, author of *Plastic: A Toxic Love Story*. "Imitation luxury objects were suddenly widely available." In her book, Freinkel tells the story of the "humble comb," which went from expensive tortoiseshell or ivory to cheap plastic overnight. "You no longer had to be wealthy to have a pretty comb in your hair," Freinkel says. "A trip to Woolworth's would do."

This change heralded the plastic revolution of the coming decades, which saw such miracles of versatility and durability as plastic wrap, vinyl, nylon (introduced by DuPont at the 1939 New York World's Fair), polyester, and polypropylene (used in textiles and food containers). In the 1930s, chemists began experimenting with ethylene, a hydrocarbon made from petroleum or natural gas. They found that the ethylene molecule could, with chemical stimulus, be polymerized. The result, polyethylene, fueled an explosion of consumer plastics. In the 1940s and '50s, three giant polymer-based products appeared: Saran Wrap (polyvinylidene chloride), Tupperware (low-density polyethylene), and Lycra (polyurethane).

"Plastic is everywhere," says Freinkel. "Most food packaging is made from plastic. It allows food to travel around the globe and affords conveniences like bagged salad or squeezable mayonnaise. Plastics enable modern medicine and electronics. Cars are made with a high percentage of plastic. My glasses, my computer — it's endless. Plastics are integral to every facet of our lives today, for better and worse."

Moreover, asserts Freinkel, the fracking boom has weakened markets for alternative plastics in the US. "You can make plastics out of plenty of materials - corn, sugar cane, agricultural waste - but fracking has made it ever cheaper for petrochemical companies to produce plastic from natural gas." (A moleculealtering process called "cracking" turns the gas ethane into ethylene.) "New facilities are being built in the US to bump up production of synthetic plastics, even as awareness of the problem spreads. Polyethylene is so cheap to produce that there's no incentive for big companies to find more sustainable methods."

nce Fanky crossed the Gulf Stream, the passage became much smoother, and Besada, feeling better, began to gather water samples. A non-scientist with a bachelor's degree in industrial design as well as a certificate, earned in 2017, from Columbia Business School's Entrepreneurship and Competitiveness in Latin America (ECLA) program, Besada had wanted to make whatever measurements she could during the voyage. She had brought along a filtering device called a manta trawl that could be towed behind the sailboat. The trawl, with its wide mouth and flat wings, gulps surface water, which is then sieved through a tapered net. Within hours, the net collected hundreds of tiny pieces of plastic.

The crew stopped for a day in Bermuda to fix a broken autopilot, then resumed the journey. Three days later, in the middle of the Atlantic, the steel-blue sea, furrowed and lacquered, rolled out to a serene flatness, "like a mirror," as Besada wrote in her log. It was exceedingly pleasant.

Besada, standing on the deck, then noticed something floating. It was not, as a sea turtle might suppose, a tasty jellyfish. It was a plastic bag. Besada saw another object — a beach ball. Nearby she saw pieces of netting. She saw water bottles and plastic containers and things that had broken off from larger objects, parts she did not recognize, bobbing and lolling in the sun.

verall, plastics are among the most useful materials invented by humankind," says Nickolas Themelis, founder of Columbia's Earth Engineering Center and a leading expert on waste management. "But they've gotten a bad name, because we have not yet found a way for them to be used well at the end of their life."

Municipal recycling handles consumer plastics that can be melted down and



LDEO's Joaquim Goes (left) and visiting scholar Ye Li filter water in New York Harbor.

made into other objects (water bottles often become carpet fibers or grocery bags). In the US, where less than 10 percent of plastic is recycled (compared to 30 percent in Europe), tight budgets, inefficiencies, and China's 2017 decision to stop buying used paper and plastic from the US (officials said the recyclables were too mixed up with garbage to make recovering them worthwhile), have wiped out recycling programs across the country.

"Recycling has reached its limit," says Themelis. "If you assess the environmental impacts of recycling a plastic container, for instance — the collection, processing, and eventual end of life — it doesn't pay off ecologically. But we do it because it seems sensible and it makes us feel good."

Part of the reason recycling plastic is so complicated, he explains, is that plastic comes in many thousands of different types (change one molecule in a polymer and it becomes potentially patentable), and many plastics, such as those used for aircraft parts, insulation, and waterproofing, have chemical bonds that prevent them from being melted and reshaped. "Unlike metals, most plastics cannot easily return to their original, basic forms," Themelis says. "When there is a limit to recycling, what can we do?"

Themelis, who coauthored a 2014 report for the American Chemistry Council on the energy and economic value of non-recycled plastics, believes we already possess effective alternatives to overflowing landfills and plasticchoked oceans. One is a plastics-to-fuel process called pyrolysis, in which plastic is subjected to high heat in the absence of oxygen and converted into oil, which can be used to run energy plants and vehicles. "In India and China, existing pyrolysis plants can handle up to ten tons of plastic a day – a small amount. For plastics pyrolysis to be economically viable in the US, where labor is more expensive, a plant's capacity would have to be much larger."

Another, more feasible solution is waste-to-energy plants. Cheaper than pyrolysis, which requires the separation of plastics from the waste stream, waste-to-energy uses combustion to turn

Our Plastic Problem by the Numbers



Source: UN Environment Programme, "Single-Use Plastics: A Roadmap for Sustainability" (2018)



Plastic refuse litters the Turneffe Atoll in the Caribbean Sea, off the coast of Belize.

mixed waste, composed mainly of paper, food, yard trimmings, and plastics, into energy. "Instead of using coal, gas, or oil to generate electricity and heat, you use mixed waste," Themelis says.

Many environmental groups oppose the burning of waste, not just for the unavoidable emissions of carbon dioxide and other gases but because reliance on the method could promote the continued production of cheap plastic.

Themelis figures the math differently. "If you put one ton of municipal solid waste through a waste-to-energy plant instead of in a landfill, you save up to one ton of carbon dioxide," he says. "In the landfill you have methane emissions" — one of the most potent greenhouse gases, released by rotting organic matter, like food and yard waste — "and you use up land. So there's no question that waste-to-energy plants are cleaner and more efficient."

He sees waste-to-energy as a complement to recycling and reduction, not a replacement, and he applauds China for raising its capacity from fifty waste-toenergy plants to some three hundred in the past decade. There are about seventy such plants in the US, mostly in what Themelis calls the "more advanced" Northeast. He wants to see more. He points to the EU and Japan, where landfills are giving way to waste-to-energy *and* recycling.

"So now we have a practical way to turn unrecyclable plastic into energy, but we still have outdated notions about burning our waste," Themelis says. "A hundred years ago people started using furnaces to burn waste. In New York City there were furnaces in thousands of apartment buildings. There was a chute, and you'd throw the stuff down. That, of course, was no good: you could not afford to have environmental controls with twenty thousand furnaces. But pressures from environmental groups and citizens led to cleaner, gas-controlled systems. That's what these plants have. It's like trains: they ran on coal, there was terrible pollution, but that doesn't mean the trains of today are the same."

Pyrolysis and waste-to-energy may be viable options in some places, but according to Ranjith Annepu '11SEAS, there is no one-size-fits-all answer. A former student of Themelis's, Annepu directs global waste operations for Kimberly-Clark, makers of Kleenex tissues, Scott paper towels, and Huggies disposable diapers.

"Asking what's the best way to address plastic waste is like asking a chef what's

the best way to cook," Annepu says. "The chef's response would be, "That depends on what you want to cook, the available ingredients, and the tools you have access to.' In other words, to understand the issue you must consider the enormous diversity in our world. There's no single plan, no one type of mindset or culture. The solutions depend on the resources available, the infrastructure, the waste stream, and the local governance."

While at Columbia, Annepu worked with the nonprofit advocacy group Ocean Conservancy, analyzing different technologies to keep plastics from ending up in the oceans. His oft-cited master's thesis was on sustainable solid-waste management in India.

In his job, he is responsible for diverting waste from eighty-five mills on six continents. "You can imagine the variety in all these different places, from landfilling to recycling," Annepu says. "The goal is to divert 100 percent of our waste from landfills to a mix of recycling, composting, and anaerobic digestion. We're at 96 percent. It's a diverse world, and we need diverse solutions."

hen it comes to remedying the polymer predicament, Kartik Chandran, a professor of earth and environmental engineering at Columbia, has got one word for us: bioplastics.

Chandran, a 2015 MacArthur Fellow known for using living bacteria to convert food waste, sewage sludge, and fecal sludge into fuel and fertilizer, is applying the same principles to make biodegradable polymers out of organic waste.

In a laboratory in the Mudd Building, two kitchen-blender-sized cylinders hold the promise of a new generation of plastics. These are reactors, or fermenters, which provide specific conditions for specialized microbes to thrive on a particular medium — in this case, food scraps from John Jay Hall.

"We have to run these reactors under very specific conditions that allow these organisms to proliferate," Chandran says. The bacteria in the first reactor are capable of secreting enzymes that break down, or depolymerize, the rotting food's proteins, fats, and starches into smaller molecules and release them outside their cells. "We are going from high molecular weight to very simple organic carbon monomers," says Chandran.

The team then harvests the carbon monomers and places them in the second reactor, which is populated with totally different organisms. These microbes consume the monomers and turn them into usable polymers, which can then be made into things like bags, utensils, and straws. Though far outgunned by the trillion-dollar synthetic-plastic market, the \$20 billion bioplastics industry is expected to grow rapidly in coming years as increasing awareness swells demand.

For Chandran, the goal is efficiency: he wants to engineer the microbes to be versatile, able to depolymerize the from Spain to Norway, talking to sustainability experts, regulators, and educators. In London she met with the NGOs behind the #OneLess campaign (motto: "Because everything we do touches the ocean"), a local movement to reduce plastic bottles and other single-use plastic in that city.

Besada wasn't looking for one answer. But the big takeaway from her fact-finding mission was the consistent response she received to her key question: *How do we change our relationship to plastic?* Almost everyone gave the same reply.

"They all said education," Besada says. "It was so clear. I was looking for sophisticated solutions, but even scientists said 'education' — teaching people about the severity of our plastic problem. This is the starting point to change behavior."

As soon as Besada returned, on stormy seas, to South America, she began developing educational programs and

"This generation has much more access to information than any before it. The challenge is to get them excited and inspire them to take action."

material whether it's cafeteria leftovers or municipal sludge. "The engineering process should be agnostic to the feedstock," Chandran says. "We want to produce the most attractive biopolymer on earth."

ailing from Bermuda to the Azores took two weeks. One night, out in the devouring darkness, while Besada was sleeping — "you sleep with one eye open" — she heard something. Everyone heard it. There were always noises, and you came to recognize them: flapping sails, glugging waves. But this time there was an impact, "like hitting the ground in the middle of the ocean." There was a halfmoon out, and someone on deck spied the cause of the collision. It was awake now and retreating: a whale. It had been sleeping on the ocean's surface.

The crew began inspecting the boat. No water was coming in, and *Fanky*, none the worse for wear, reached Europe. For the next six weeks, Besada traveled by air, talking to school administrators. She is now working with high schools in Uruguay, Chile, and Argentina. "We go to the school, give a talk, and moderate a workshop in which students design strategies to reduce plastic in their schools," Besada says. "Some teams are working on implementing new regulations, others on awareness campaigns, and others on finding ways to reduce plastic use in the cafeteria. The response of teenagers has been amazing."

Though it's a pilot project, Besada designed the curriculum so that it could be applied to a hundred schools in different countries. "If it works," she says, "we'll scale it: it must be done on a large scale. This isn't just about recycling at home. This is about asking kids questions: How would you change your school? How would you have an impact?

"Once we see people becoming more aware, we can provide solutions: rethinking how we use plastic in our day-to-day lives and developing products that can replace disposable plastics. It's not about simply providing information. This generation has much more access to information than any before it. The challenge is to get them excited and inspire them to take action."

t's time we made some changes here " at home," says Joaquim Goes at LDEO. "Columbia is full of plastic: forks and knives and containers. Even in places like Mumbai, which I just visited, they've switched over to other materials: forks and knives made of wood, plates made of cornhusks, paper straws. The high-school interns in our lab tell us that their school cafeterias go through thirty or forty boxes of plastic forks and spoons every day. Switching to wooden spoons and forks and paper straws in schools would make a huge difference. I'd like to see high schools and colleges ban this sort of plastic. Alternatives exist. In fact, the use of cornhusks could give rise to a huge industry in the Corn Belt of the Midwest, because the plates are beautiful."

That all sounds good to Agustina Besada. She can get behind a commonsense ban.

"A strong ban sends a message," she says. This spring, New York became the second state, after California, to pass a ban on most single-use plastic bags. (The law goes into effect next year.)

With the ocean voyage over, the next phases of Unplastify — education and action — are picking up steam. In addition to working with schools, Unplastify was hired this spring to advise a large South American restaurant chain seeking to unplastify its operations.

Meanwhile, at a marina in Montevideo, Uruguay, 125 miles east of Buenos Aires across the Río de la Plata, a sailboat rocks gently in its berth. Besada and Zapiola, who divide their time between Argentina and New York, get over to Uruguay once in a while to take *Fanky* out. They want to sell the boat, but they're still attached to it.

"The boat was our home for so long our amazing house on the ocean," Besada says. "But the work to be done now is on land." ₪





COLUMBIA SUMMER 2019 25

A MEDITATION ON THE MARGINALIZED

For Kiyan Williams '19SOA, performance art has always been about more than aesthetics. It's a way to explore identity and "reclaim power in a society that devalues Black, queer bodies."

Williams — who uses the pronoun "they" — says that growing up in Newark, they would dance to gain acceptance. "Being in front of a crowd — whether it was at a family barbecue or a queer nightclub — I felt freer than I did in other spaces," they say.

As an undergraduate at Stanford University, where they pursued an independent course of study on art and identity, and as an MFA student at Columbia, Williams started using performance as a form of activism. In one piece, for example, they traveled through the gentrifying New York neighborhoods of Bushwick and Harlem wearing trash bags and cardboard boxes. In another, they emerged from a trash bag on a street corner and recited the story of two Black lesbians who were murdered and left in a dumpster. "These kinds of pieces are meant to be uncomfortable and transgressive," they say. "I want people to have to confront truths about how members of society are marginalized and discarded."

Much of Williams's work has involved dirt, and particularly the act of geophagy — consuming dirt — which was a common practice among slaves in the Caribbean and the American South. For their piece *Dirt Eater*, Williams sculpted the torture masks that were given to slaves as punishment for geophagy, using soil sourced from St. Croix, where the artist's ancestors were slaves.

Williams will again incorporate dirt into their performance at the Shed. For that piece, Williams says, they will use their body and long braids to throw and smear soil onto a blank canvas, creating an outline of the map of America. After the performance, the canvas will be displayed in a group show at the Shed.

"Black people were brought to this country to work the soil. And when slavery ended, we were supposed to disappear," they say. "This piece is a physical monument to the fact that we're still here."

BEYOND THE BLUEPRINT

Architect Farzin Lotfi-Jam '14GSAPP and architectural historian Caitlin Blanchfield '12GSAPP see the X-ray machine as much more than a piece of medical equipment. To them, it's a means to photograph the structure of a building and chronicle the hidden details of its construction and preservation.

"We're particularly interested in looking at how modernist buildings have been conserved," says Blanchfield. "Often nothing has changed about the façade, so the updates are basically hidden to the naked eye."

While architects occasionally use X-rays for small conservation projects, Lotfi-Jam and Blanchfield are the first to use architectural X-rays in a creative context. After photographing a building, they use the X-ray images to create an architectural history, which they present both in galleries and academic journals. They see their work as similar to an archaeological dig — gathering evidence to understand a building's historical and cultural significance, as well as the measures taken to maintain it.

For the first iteration of their project, called Modern Management Methods, Lotfi-Jam and Blanchfield photographed two UNESCO World Heritage–designated houses by Le Corbusier in Stuttgart, Germany, that had recently undergone a renovation. Now, for their commissioned work at the Shed, they're tackling a much bigger, more iconic structure — the United Nations headquarters on Manhattan's East Side.

The pair recently spent a weekend imaging everything from the General Assembly Hall to the bathrooms, largely focusing on changes made during a multibillion-dollar renovation that took place in 2014. "From the day that it opened in 1950, the UN headquarters has been symbolic, a physical representation of the idea of world peace," says Lotfi-Jam. "We're in a very different time, politically and culturally, and we wanted to understand what it meant to transition this particular building into a new era."

Lotfi-Jam and Blanchfield's images of the UN will be on display at the Shed as part of a group show this summer, and they will simultaneously publish a book of their findings. And though they haven't picked their next building yet, they say they plan to continue their project for the foreseeable future. "The exhibit at the Shed is really just one component of what we hope will be a much larger project," says Lotfi-Jam.

REVISITING THE RAW POWER OF NATURE

When Hugh Hayden '18SOA graduated from Columbia last May with an MFA in sculpture, most of his classmates were focused on finding a job. But Hayden was going in the opposite direction. After working for more than a decade as an architect — including the entire time he was in the MFA program — Hayden was finally ready to give up his day job and focus on his art full-time.

"It always surprises people that I juggled both careers for so long. But working a full-time job made me disciplined about my time in the studio and also helped me develop more creative problemsolving skills," he says. "When I run into a roadblock with a sculpture, I almost always go back to thinking like an architect." Hayden studied architecture at Cornell, where he focused on the hospitality industry. He spent several years at New York firms before landing at Starbucks, as a store designer. In his spare time, he started building furniture. "I've always been interested in the spaces where people eat," he says. "So it felt natural for me to create the other elements of those spaces — the tables and chairs." Eventually, creating furniture morphed into more experimental sculpture.

Hayden, who grew up on the edge of a protected forest near Dallas, was drawn to working with wood. Sourcing natural, uncut wood in New York City presented a challenge, but after a big storm in the fall of 2016, Hayden saw an opportunity.

"There were fallen trees all over my neighborhood, and I just took a hacksaw to one and started carving," he says. "After that, I'd walk through Riverside Park on my way to my studio in Prentis Hall and scavenge for branches."

Hayden built on the idea of inner-city foraging while developing his piece for the Shed. He plans to use discarded Christmas trees from Park Avenue to construct a miniature Cape Cod-style house. "It's intended as commentary on class in American society," he says. "Park Avenue is the pinnacle of wealth and status. And I think of the Cape Cod home as the archetype of the everyday, suburban American home. So I'm

taking the trash from the upper crust to build the dreams of the middle class."

The sculpture will be displayed in a mirrored gallery in the Shed, which will create the illusion of a room full of identical houses — a reference to the American suburban landscape. And as with much of Hayden's work, the wood will not be cut smoothly - rather, branches will protrude from the walls in their natural form.

"Leaving branches whole allows the piece to blend back into the natural landscape," he says. "I like the idea of camouflage, and of remembering that we're all a part of a bigger natural organism."

THE SHADOWY IMPLICATIONS OF TECHNOLOGY

Asif Mian '18SOA refuses to limit his art to one medium. He paints, he sculpts, and he draws in pen and ink. He's also a filmmaker, a performance artist, and a stop-motion animator. Often his work incorporates several media in one piece.

"To me they feel completely intertwined," he says. "It's hard for me to imagine any part of my work existing without the others.

Mian started making short films and music videos in his twenties while he was working as a graphic designer. He integrated his paintings and drawings into his sets and became interested in sculpture as a way to make props. While Mian says there's no singular theme to his work, he is interested in the concepts of violence and technology and how they relate to each other in modern society.

"I've been interested in surveillance imagery since I was a teenager, in the technology that the military and the police use to target groups of people," he says. In his recent work, Mian has focused on images and video captured by a thermal camera — one that detects heat rather than light. For his installation at the Shed, he plans to build several sculptures made out of thin aluminum and polypropylene bags — two materials that conduct heat particularly efficiently. Thermal cameras will film visitors walking through the artwork and project those images onto screens on the walls of the gallery.

"It creates a very high-contrast, almost ghost-like image," Mian says. "I'm exploring the ways that the camera erases human features and identity. It almost turns people into characters in a video game."

In addition to his commission from the Shed, Mian will be showing similar work in a solo show at the artist-run Crush Curatorial gallery in New York this summer, and he will also be a part of a young curators' exhibition at the Whitney Museum of American Art.

ANCIENT SOUNDS ON NEW INSTRUMENTS

Vicente Hansen Atria '15CC, a drummer and composer, has worked in a variety of musical genres — classical, jazz, experimental, and rock (or, as he puts it, "rock-adjacent"). But recently, Hansen has expanded his repertoire significantly, to include both the traditional sounds of ancient instruments and the newly conceived music of instruments of his own invention.

For Hansen's recent work, including his upcoming project at the Shed, he and his collaborator Mat Muntz used a 3D printer to fabricate original instruments and then composed for them. Modeled on historic musical instruments — such as the aulos, a wind instrument played in ancient Greece, and the mih, a type of bagpipe from Croatia — Hansen's new creations both explore and expand their forbears' unique sounds.

"The mih is a very special instrument: it has two chanters, or pipes, so that you can play two melodies simultaneously," he says. "One of the instruments that we're making riffs on that. It's a modular instrument with ten separate pipes, and the player uses any combination of two of those pipes at a time."

Hansen says that he was particularly interested in the tonality, or tuning system, of the aulos and the mih. Like those instruments, his new ones will be microtonal: they will use some notes that fall between the keys of a piano. "The system of notes that we commonly use in Western music is actually very recent; it didn't exist until the late eighteenth century," he says. "Before that, different kinds of music used distinct tunings, and there was quite a bit of experimentation."

Hansen, who studied philosophy at Columbia College before moving on to a PhD program in music at Columbia, says that he had no prior experience with the technical demands of 3D printing. "I really had to plunge blindly into this world," he says. "It's taken a lot longer than I expected."

For their project at the Shed, Hansen and Muntz are composing a piece that will incorporate their new instruments as well as existing double-reed instruments like the Scottish bagpipes and the Korean taepyeongso, a wind instrument akin to the oboe. They will perform it later this summer, with several professional musicians playing the new instruments and Hansen and Muntz accompanying them on drums and double bass.

"I've always been interested in exploring different approaches to sound — both ancient and modern, both inside and outside the Western canon," he says. "And with the help of some cuttingedge technology, we've been able to bring them all together." \clubsuit

For a full schedule of Columbia artists at the Shed, visit *theshed.org/program/series/15-open-call*.

BLUE MOON

Fifty years ago, when astronauts first landed on the moon, they carried not only humanity's highest hopes but an important experiment from Columbia By Paul Hond

n the afternoon of July 20, 1969, Gary Latham '65GSAS, a thirty-three-year-old geophysicist at Columbia's Lamont-Doherty Geological Observatory, arrived at NASA's Manned Spaceflight Center (now the Johnson Space Center) in Houston to witness the fulfillment of thousands of years of curiosity and wonder: humanity's first attempt to land men on the moon.

Four days earlier, Latham, along with millions of others around the world, had stared rapt at a TV screen as a 363-foot-tall Saturn V rocket lifted off in a Zeusian thundercloud from Cape Canaveral. Atop the rocket was the Apollo 11 spacecraft, carrying astronauts Neil Armstrong, Edwin "Buzz" Aldrin, and Michael Collins. Also onboard, but attracting a lot less attention, was the Passive Seismic Experiment Package (PSEP), a system of four solar-powered seismometers that Latham had developed for the mission.

At training sessions in Clear Lake, Texas, Latham had shown the astronauts exactly how to rig PSEP, which would measure the seismic waves caused by disturbances of the lunar surface, whether from meteorites or — if such things existed — moonquakes. The readings would provide the first scientific glimpse into the interior properties of the moon and help tackle questions as old as time: what was the moon's structure, its composition, its origin, its history?

But first the spacecraft had to land. As the Apollo 11 crew, 240,000 miles away, prepared their next precision maneuver, Latham registered the intense focus and bottled-up emotion at Mission Control. Cigarette smoke hung thick over the beige consoles, with their red and yellow buttons and cathode-ray-tube monitors. On the front wall, a screen marked the progress of the flight on a plotted graph.

Latham was one of an army of Columbians gathered at the complex in Houston that day. Astrophysicist Robert Jastrow '44CC, '48GSAS was the first chairman of NASA's Lunar Exploration

Committee and, with Nobel-winning chemist Harold Urey '46HON, had pushed lunar science to the fore at NASA in the 1950s. Wilmot "Bill" Hess '46SEAS was director of science and applications for Project Apollo and spent much of the time in a side room monitoring the sun for flares, which could harm the astronauts. Geologist Donald Beattie '51CC was program manager for the Apollo lunar-surface experiments (including Latham's). And Robert Kovach '59GSAS was the principal investigator on the seismic experiments that would go up on later Apollo missions - provided, of course, that all went well with this one.

Aldrin carries PSEP to its deployment site.

t the time of the experiments we didn't know anything about the near-surface properties of the moon," says Kovach, eighty-five, who is professor emeritus at Stanford. "The biggest argument among the scientists in the early days was whether the craters seen on the moon were impact craters or volcanic craters. The reason NASA brought geologists into Project Apollo was to resolve that basic question."

NASA's effort to put seismometers on rockets and land them on the lunar surface had been in the works since 1959. It started with the Ranger program, which sent unmanned spacecraft to take the first close-up photographic images of the moon. Geophysicist Frank Press '49GSAS, '90HON, who left Lamont in 1957 to run the seismology lab at Caltech, created seismometers for Ranger 3, 4, and 5 that were to be dropped on the lunar surface. Each instrument was encased in a balsa-wood ball and designed to separate from the rocket once the moon's gravity was strong enough to reel it in. But mechanical glitches sent Ranger 3 and 5 off-course, missing the moon entirely, and the failure of an onboard computer caused Ranger 4 to crash on the far side of the moon.

The follow-up program to Ranger was Surveyor, which began in 1966. Surveyor would launch space probes to test the practicality of soft landings on the moon. Again, NASA wanted to send up a seismometer. This time, it enlisted help from Lamont, and specifically Maurice "Doc" Ewing, Lamont's founding director. Ewing had virtually invented modern marine geoscience, and in the 1940s, with his then student Press, he developed the first mass-produced seismograph, called the Press-Ewing. A Texas farmer's son and a self-described "big, rough-looking character," Ewing embodied the fieldwork-driven, data-amassing, non-theoretical scientific explorer. He

Gary Latham (left) monitors the signal from his experiment.

was the first person to study the ocean floor using seismic waves, and in 1953 he procured a research vessel, *Vema*, on which he made dozens of expeditions, setting off dynamite, collecting core samples, and revealing to the world the physical properties of the ocean floor.

Latham's role at NASA began one day in 1965. "I was walking down the hall in the geoscience building at Lamont, and Doc Ewing pulled me aside," says Latham, who is eighty-three and lives in St. Augustine, Florida. "He said, 'How would you like to put an instrument on the moon?' At first I thought he was joking. The moon? But he was serious. I said, 'Sounds exciting.' And we got to work."

No sooner had they started than NASA raised the ante. Latham had assumed that any lunar seismometer would go up on an unmanned rocket. But in 1966, NASA decided that the Surveyor seismometers would fly with the Apollo program, whose stated goal — echoing President John F. Kennedy's 1962 speech — was for the US to land humans on the moon and bring them back safely, and to accomplish this before the decade was out. NASA now wanted the Lamont team to design an instrument that astronauts could actually carry and set up. Such an instrument would have to make minimal demands on the astronauts' limited time; be adjustable by remote control from Earth; withstand extreme temperatures; and send data by radio telemetry back to Houston, where a seismograph would translate the signals into lines on paper.

Latham was happy just to be part of it. As a kid growing up in Bucks County, Pennsylvania, he had wanted to be a physicist until an undergraduate course in geology at

Penn State inspired him to combine the two disciplines. Geophysics entailed more fieldwork than physics, and that suited Latham. Now he was thriving in Ewing's lab, and Ewing persuaded NASA that Latham, the junior member of the team, should be the principal investigator, or PI. "I was at the right place at the right time," Latham says, "and Ewing really lent his weight to having one of his students be a major part of the project."

What made the choice even more remarkable was that the PI post was coveted. As Donald Beattie wrote in his book *Taking Science to the Moon: Lunar Experiments and the Apollo Program*, PIs, in addition to being the lead scientists, "also got the publicity and all the other notoriety that went with this highprofile position ... How many scientists could look forward to saying they had designed an experiment that was placed on the Moon by the astronauts? Everyone knew only a lucky handful would have this claim to fame."

The seismometer system that Latham devised weighed 106 pounds on Earth

but would weigh one-sixth of that, about eighteen pounds, on the moon. To protect the instrument from temperatures ranging from 260°F during the lunar day (which lasts 13.5 Earth days) to -280°F during the lunar night, the team shrouded it in layers of aluminized Mylar and provided radioisotope heaters. Seismometers were sensitive devices, and the lunar environment would enhance this sensitivity to unimagined levels.

"The moon has no noise — no wind, no ocean, no human activity," Latham explains. "That means we could pick up vibrations on the moon much smaller than anything we could possibly detect on Earth. It's a kind of magnification: the data that we see recorded on chart paper show vibrations that are ten million times larger than those that actually occurred at the lunar surface. This turned out to be a very favorable factor for seismic experiments on the moon."

ust after 4 p.m. EDT, a problem occurred, and the doors to Mission Control were ordered locked. The lunar module, *Eagle*, carrying astronauts Armstrong and Aldrin, had overshot the landing area and was now skimming above a football-field-sized crater full of rocks the size of Volkswagens. With fuel running out, Armstrong took manual control of the bug-like craft and guided it to a patch of flat terrain. At 4:18 p.m. EDT, *Eagle*'s struts touched the lunar grit. Inside Mission Control, Armstrong's voice crackled from the speakers: "Houston, Tranquility Base here. The Eagle has landed."

The force of the exhalations released in Houston was itself seismic. In the Mission Control viewing room, cheers broke out.

For Robert Kovach, the scientific journey was about to begin. His own experiments for future Apollo missions 14, 16, and 17 were in many ways contingent upon the feasibility of Latham's work. Like the Latham experiment, Kovach's would measure the velocities, frequencies, and amplitudes of seismic waves moving through rock. Only instead of impacts from meteorites, the source of the waves would be controlled explosions. "It took many years to get these experiments developed and built and certified," says Kovach. "There were all kinds of safety problems with using explosives on the moon with the astronauts walking around — you can imagine. People were balking at the time."

Kovach's path to the moon began when he was a kid in Los Angeles. At fifteen, he saw a movie called *Lust for Gold*, about a legendary hidden gold mine. He became obsessed with mines. In those days, a Greyhound bus could take you out to the boonies in no time, and on weekends Kovach would ride out to the abandoned gold mines in the high desert above LA to scout around. That was how he got interested in geology.

He enrolled in the Colorado School of Mines, and after he graduated he went to Columbia for his master's. In the summer of 1955, he went to sea on *Vema* with Doc Ewing. His studies in seismology were disrupted in 1956 when the Suez Crisis broke out and he was called to serve in the Army Corps of Engineers. Two years later he returned to Lamont, graduating in 1959. Then he went to Caltech to work with Frank Press.

Now, as a PI for Project Apollo, Kovach found that his most important resources were patience and perseverance. "There was a lot of pushing and shoving among all the investigators and the people in Houston," Kovach says. "We were taking time from the astronauts to do different tasks, and there was a tradeoff of pavload weight and how much weight you could have for the experiments, and how much time the astronauts would devote to doing the experiments rather than just taking pictures. There were arguments over whose experiment was most important, that sort of thing. All of that had to be massaged out."

On July 20, 1969, however, the wrangling had been set aside. The awesome scale of the mission, the unimaginable effort brought to bear, the ever-present dangers — these realities had a way of diminishing differences.

At 10:56 p.m. EDT, the large TV monitor in Mission Control showed the shadowed figure of Neil Armstrong, commander of Apollo 11, lowering himself from the ladder of *Eagle*. Armstrong touched his boot to the ground, which he found to be powdery. CBS anchor Walter Cronkite, speaking over the images, said, simply, "Armstrong is on the moon. Neil Armstrong, thirty-eight-year-old American, standing on the surface of the moon."

At Mission Control, while people slapped backs and wiped tears, Gary Latham slipped into a side room where the seismograph was set up. There he waited for the astronauts to deploy his experiment. Confident as he was, he knew

Robert Kovach in 1971 with a detonator.

that in a supremely ambitious endeavor such as this one in the harshness of space, the unknowns far outweighed the knowns. "With the rush to get ourselves to the moon by the end of the decade, you wondered how safe the astronauts really were, and you wondered if we could really develop the instrument in its final form and have it successfully put onto the surface. We were pushing."

Latham stared at the seismograph's pens and the straight lines they were making on the paper. Then, shortly before midnight Houston time, the pens began to twitch and scratch. Up there, on the windless, desolate moon, the instrument was picking up the vibrations of Buzz Aldrin's footsteps.

Latham felt like he was floating.

"We then knew we had a working instrument, and that astronauts could deliver it," Latham recalls. "It's really hard to describe the kind of exhilaration you feel in those circumstances, when you actually get a success."

ith six Apollo moon landings between 1969 and 1972, knowledge of Earth's lone natural satellite expanded by orders of magnitude. Latham's seismometers picked up hundreds of meteor strikes (lacking an atmosphere, the moon has no shield from cosmic debris) — impacts that clearly accounted for the moon's pocked and battered shell and the pulverized grit that covers it.

At Lamont, geophysicist Orson Anderson and geochemist Paul Gast '57GSAS analyzed samples from the hundreds of pounds of lunar rocks and soil hauled home by the astronauts. Comparing the rocks to those in "the lava fields in Hawaii," Anderson confirmed the presence of glass particles that had been generated by meteor impacts and ancient volcanoes. And though the moon was not, as it turned out, made of cheese, Anderson, stirring the pot, compared the seismic velocities - the rate at which waves travel through a medium — of lunar rocks and cheddar. He found that the moon was, seismically speaking, closer to cheese than it was to schist or slate.

Gast, for his part, felt that NASA was undervaluing the rocks. He decried the inadequate care paid to the lunar samples, arguing that the rocks were not mementos or curiosities but geological treasures worthy of serious analysis. NASA responded by naming Gast head of its division of lunar and earth sciences. Gast died in 1973 at age forty-three, but his push for state-of-the-art storage and processing of the rocks was rewarded in 1979 with the opening of the Lunar Sample Laboratory Facility at the Johnson Space Center, where most of the rocks reside today.

The seismic experiments, meanwhile, cracked open the moon's interior. They

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revealed a differentiated body, like Earth's, with a crust, mantle, and small core. Scientists had debated whether the moon had any tectonic activity, and in the moon's windless, lifeless environment, Latham's instrument picked up subtle aborted after the rupture of an onboard oxygen tank, and as the imperiled astronauts returned safely to Earth, the spent rocket booster fell to the moon, crashing eighty-four miles from the seismometers. The waves took longer to reach the seis-

Maurice Ewing examines seismographic readings from the impact of a Saturn S-IVB rocket on the moon.

vibrations that weren't from any meteors. These were moonquakes. Yes, they existed, and not a few bets were lost.

"Moonquakes aren't like earthquakes," says Latham. "Most are so small as to be imperceptible to an astronaut standing on the epicenter." Latham found that the quakes were more pronounced when the moon passed nearest to Earth in the course of its 27.3-day orbit. "The quakes are caused by the gravitational expansion and contraction of the moon as it circles Earth," Latham says. "That flexing is concentrated near the partially molten zone in the moon's core. It's like squeezing a tennis ball in and out. And if you have a partially molten zone in the interior, that's where the stress builds up. That's what causes these little moonquakes."

Latham's experiments would also benefit from one of a geophysicist's greatest luxuries: foreknowledge of a seismic event. In December 1969, after the crew of Apollo 12 left the moon and returned to the command module, the lunar module's ascent stage was jettisoned purposely into the moon's surface, creating shock waves that lasted nearly an hour. In April 1970, the Apollo 13 moon landing was mometers than expected, leading Latham to posit that the lunar crust was much thinner than supposed, averaging about forty miles from surface to mantle.

For many scientists, the Apollo program was terminated too soon. But it did go out with a bang. In December 1972, Apollo 17 astronauts Harrison Schmitt (a geologist, the first trained scientist in space) and Gene Cernan, the last moonwalkers, had to perform a particularly delicate task: planting explosives for Kovach's final seismic experiment.

"The Apollo 17 astronauts had to physically take these charges and put them on the roving vehicle and drive out to the geological sites to place them," says Kovach. "The charges had triple redundancy built into them, using pull rings and mechanical timers. The third pull ring released the firing pin that initiated a thermal battery, which could receive a signal from the central station to fire." On Apollo 14 and 16, astronauts set off some twenty small explosions while they were on the moon, but on Apollo 17 the detonations were timed to go off after the astronauts left. "It was very complex and safe," Kovach says. "We were nervous that it was so complicated that it

might not work, but all the charges went off, so it was a successful experiment."

Most strikingly, the waves from the blasts didn't die down the way they would on Earth. "The signals from the moon rang for a very long time," says Kovach. "In the earth, waves die because of the attenuation properties of rocks, due to moisture — the waves get absorbed and don't travel so far. But on the moon they just kept reverberating."

Maurice Ewing memorably described the lingering vibrations from the manmade lunar impacts: "It's as though one had struck a bell, say, in the belfry of a church a single blow, and found that the reverberation from it continued for thirty minutes."

atham's Apollo 11 seismic experiment lasted for twenty-one days. He also oversaw the more sophisticated systems that were sent up on later missions. In 1972 Doc Ewing left Lamont to found a geophysics institute at the University of Texas Medical Branch in Galveston, and Latham went with him. The seismic experiment that they'd worked on together operated continuously, feeding data back to Earth until 1977, when the budget ax fell. Latham was laid low. "Painful," he says, recalling the day he threw the switch that deactivated the equipment on the moon.

Today, interest in lunar exploration is heating up again. Technology entrepreneurs like Elon Musk and Jeff Bezos want to create permanent human bases on the moon, and scientists are going back to the Apollo data trove. The voluminous files have been digitized, allowing researchers to reinterpret the findings using new technology. The pioneering work of Columbia scientists, the plinth on which lunar geophysics stands, is being rediscovered and reexamined.

And it all began with the first steps on another world - and their reverberations.

"For people like us, who were involved in the project for many years," says Kovach, "the moon landing was a great culmination. We were tremendously excited about it at the time. And we still are." 🍲

The Age of Cyberwarfare With the Internet now a global battlefield, how serious a threat do cyberweapons pose to America's economy and infrastructure?

Jason Healey, a senior research scholar at the School of International and Public Affairs, is a leading authority on cyberattacks. *Columbia Magazine* interviewed the former intelligence officer about his work.

Can you give us an overview of your research?

I'm interested in the ways that nations are competing in cyberspace and how cyberattacks are changing the very nature of geopolitical conflict. As financial institutions, utilities, transportation systems, government agencies, and military commands all become increasingly wired, countries are putting more and more energy into identifying and exploiting vulnerabilities in their enemies' networks. Cyberattacks are now a primary means for nations to project their power. They can involve sabotage of critical infrastructure, espionage, election tampering, and all manner of intellectual-property theft, economic disruption, and political destabilization.

Which countries are most active in this realm?

Our main adversaries in cyberspace are Russia, China, North Korea, Iran, and, to a lesser degree, terrorists. The United States is also very active. Most people are surprised to learn that we possess the most powerful offensive cybercapabilities and online espionage tools in the world and that we employ them guite aggressively. In fact, the first cyberattack to cause serious material damage was perpetrated by the United States and Israel. In the early 2000s, they developed a sophisticated computer worm called Stuxnet that infiltrated the Iranian nuclear facility at Natanz and instructed its centrifuges to spin out of control, destroying perhaps a thousand of them.

Do countries have specific strategies when it comes to cyberattacks?

Absolutely they do, based on their different geopolitical and domestic priorities. Under Putin's regime, Russia has launched some major attacks to cause political turmoil in other countries. These attacks can blur the distinction between espionage and cybercrime. Between 2014 and 2016, Russia's intelligence agency, the FSB, supported criminals who hacked into some five hundred million Yahoo e-mail accounts: the hackers were allowed to keep credit-card numbers they amassed in exchange for handing over the private data of journalists and politicians. Russia's interference into the 2016 US presidential election was revolutionary, in that it combined a hacking operation - into the Democratic party's e-mails - with a very Soviet-style disinformation and propaganda campaign.

China, by contrast, has focused on stealing the intellectual property of Western companies. This has allowed it to copy advanced weapons systems, create high-tech products like wind turbines without having to spend on research and development, and even

steal the negotiating and legal strategies of businesses bidding against Chinese companies or seeking to operate in China.

Meanwhile, North Korea, in order to raise hard currency, has been breathtakingly creative and aggressive. It almost succeeded in stealing a billion dollars from the central bank of Bangladesh and has undertaken disruptive ransomware attacks, hijacking companies' data and releasing it for a fee. The worst of these attacks, the so-called WannaCry ransomware attack of 2017, shut down hundreds of thousands of computers in 150 countries. The chaos that ensued illustrates how dependent we've become on computers: hospitals had to cancel surgeries and turn away ambulances, and factories ground to a halt.

How big a problem is cybercrime and cyberwarfare?

It's been estimated that malicious cyberactivity costs the global economy some \$600 billion annually and the US economy upwards of \$175 billion a year. The US is the top victim of cyberattacks in part because we are so dependent on the Internet, which makes us more vulnerable.

For years, cybersecurity experts have been warning that America's power grid is susceptible to attack. Is that a serious concern?

I have little doubt that our enemies are capable of taking down sizable portions of our power grid. We know this, in part, because we're capable of doing it to other countries and because we've detected Russian and Chinese hackers poking around inside our systems and planting malicious code. What's less clear is how large a section of our grid could be taken down and for how long. Potentially, entire regions of the US could lose power for weeks or even longer.

It's worth noting, though, that we've been worried about such a catastrophic attack for decades. The main reason it hasn't happened yet is that other countries know it's a red line they can't cross. I mean, if China were to shut off electricity across California, we'd be at war.

Terrorist groups could be more brazen. Are they capable of doing such a thing?

Not yet. But we're lowering the bar by connecting more and more of our infrastructure to the Internet. Now that our power plants, pipelines, dams, railroads, factories, and bridges are all controlled and monitored online, we're creating a situation where relatively unsophisticated groups have a greater chance of scoring a knockout punch.

How can we defend ourselves?

Our cyberdefenses have gotten better in recent years. For example, we've dramatically improved our ability to identify the perpetrators behind cyberattacks, which has a deterrent effect. The problem is that while the defenders tasked with keeping our institutions safe are getting better, the attackers are improving at

Jason Healey

an even faster pace, and staying several steps ahead. Every year, the situation gets worse. The Internet is expanding, and our electronic devices are becoming more complex, which means they contain more lines of computer code and hence more potential vulnerabilities. We're creating unlocked digital windows into our lives, and the hackers will take advantage of that.

Is there anything the US government should be doing differently?

I think the United States has been overly focused on developing and using its offensive cybercapabilities and online espionage tools at the expense of shoring up our defenses. What's more, our aggressive use of cyberweapons has had a blowback effect, inspiring enemies to plow more money into their own cyberwarfare programs and to launch attacks against us. Just look at how Iran responded to the Stuxnet sabotage of its nuclear facility. Until that time, the Iranians were focused almost exclusively on using their cybercapabilities to monitor and oppress their own citizens. But after we threw the first punch, they began harassing US financial institutions, launching attacks that flooded companies' websites in order to crash them.

Another US cyberinitiative that's come back to haunt us is the NSA's online spying operation that was revealed by Edward Snowden's leaks in 2013. That program was massive in scale and sent a pretty loud message to the international community that the US considers routine hacking of other countries' networks acceptable behavior. We ignored other countries' complaints — saying, "It's just spying" — until those techniques were turned against us. After the Chinese stole millions of federal personnel files from the Office of Personnel Management in 2014 and 2015, we started crying about how this kind of online espionage crossed a line.

The prevailing attitude in US military and intelligence circles today is that it is imperative to dominate our enemies in cyberspace. Now, I don't think that's self-evident. In fact, one of the questions I ask in my research is: What are the unintended consequences of treating the Internet like one big battlefield?

What's the downside of doing that?

You have to consider that the Internet is the most extraordinary human invention since the printing press. It's been a force for remarkable progress, freedom, and prosperity. Shouldn't we treat it as a precious resource and try to sustain it for future generations? Yet the US government is actively involved in militarizing the Internet. Everyone is peeing in the pool, and I think that we may come to regret this. Our whole economy depends on having a free, open, and safe Internet, after all. I say aim for prosperity and defense first.

Given your background, you're certainly uniquely qualified to talk about the militarization of the Internet.

Yes, in the late 1990s I was an intelligence officer in the US Air Force, and I helped to establish the military's firstever cyberwar-fighting command. Our mission was to defend the Department of Defense against cyberattacks and, later, coordinate offensive attacks. I then served as director of cyberinfrastructure protection at the White House from 2003 to 2005, coordinating the federal government's efforts to secure US cyberspace and critical infrastructure in both the public and private sectors.

How should the US shore up its cyberdefenses?

The government should be doing more to enable and encourage big tech companies like Google, Microsoft, and Apple to come up with industry-wide solutions, because they have the expertise to fix things at scale. I recently coauthored a report on the major cybersecurity improvements made in the US private sector over the past few years, and we found that the vast majority aimed to address vulnerabilities at the level of individual computers or companies. These measures provide some protection but typically end up being bypassed by savvy attackers. What we need instead is for companies that can work at scale to secure billions of computers at a time. If necessary, we may even have to consider government regulations to require them to take such steps.

What can ordinary people do to protect themselves from cybercrime?

First, keep your computer and phone fully updated. Vendors are pretty good about sending security patches, so don't leave yourself open by putting off these updates. Also, definitely use a password manager. I use LastPass, which generates long, complex passwords for all of my online accounts and remembers them for me. You'll only have to log into one app and they're always full. My favorite class is one that I teach with professors from Columbia Law School and the Department of Computer Science. We take eight students from each area and put them together into teams so that everyone can learn from the unique perspectives of the other disciplines. Overall, our focus at SIPA is giving students the practical skills they'll need to develop policies that help government agencies, corporations, or other employers protect themselves against cyberattacks. Our graduates are well-versed in the technical aspects of the threats but also understand the international forces driving attacks. When new threats are looming, they're able to write crisp and intelligible policy recommendations that non-specialists can understand. It's a popular area for students now because it's intellectually challenging, and we help connect them to the many good iobs in the field.

strategy comes with serious risks, because whenever you engage an adversary, there's a chance that one side will misread the other's activities as being more threatening than they really are, which can escalate tension.

What do our allies think of this program?

They don't like it, because we're doing it without their permission! The whole thing raises profound questions about how we define sovereignty in cyberspace, questions that we're likely to be grappling with for the next hundred years.

Is there any momentum to limit the use of cyberweapons?

There have been some fledgling attempts by the UN, but the proposals haven't gained much traction. The US has generally hindered these efforts, because we don't want any restrictions on how we act in cyberspace.

"Our electronic devices are becoming more complex, which means they contain more lines of computer code and hence more potential vulnerabilities."

to access them all. That might not strike some people as a good idea, but it's what we pros rely on.

Also, save your data in the cloud. The big technology companies that offer cloud services are much better at security than you'll ever be. I never worry about the data on my computer because there's almost literally nothing saved there.

How are you preparing students for jobs in cybersecurity?

At SIPA, we've expanded our curriculum in recent years, creating new courses in subjects like cyberrisk in business and cyberthreat intelligence analysis. We offer a half dozen cyber-related courses,

What are you working on right now?

Currently, I'm studying a new US military strategy that calls for our spies to mirror the movements of enemy hackers, even if that entails following them into the computer networks of our allies. What results is a sort of digital cat-and-mouse game, where our spies and those of our enemies are constantly looking for signs of one another while trying to remain hidden, sort of like two gangsters hunting for each other in a dark warehouse. The Pentagon officials behind the program say that it will enable them to detect and scuttle impending cyberattacks before they occur. I'm watching to see if it works. I think it's possible that it will. But the

When it comes to cyberattacks, what frightens you the most?

It's not a major attack on our physical infrastructure. I worry more about another attack like Russia's theft of the Democratic National Committee's e-mails in 2016. Imagine this scenario: the US economy is in crisis and Federal Reserve officials are holding private discussions to figure out how to prevent a crash. Imagine if someone hacked into the Fed's servers and released the e-mails. Now there's widespread panic and we're in a recession that would not have occurred otherwise. Something like that is bound to happen sooner or later. - David J. Craig

EXPLORATIONS

FRONTIERS OF RESEARCH AND DISCOVERY

The secret research that could make you healthier

umans are secretive creatures, with brains adept at concealing information. Yet surprisingly little research has been done on the psychology of secrets — how common it is to have them and the toll they take on us.

"For a long time, secrecy was thought to be too difficult to study, in part because you'd have to get people to reveal their most closely guarded thoughts," says Michael Slepian, a social psychologist and assistant professor of management at Columbia Business School.

But since 2015 Slepian has conducted a series of groundbreaking studies on the subject using a boldly simple strategy: he just asks people to confess their deepest secrets. His project, for which thousands of people have been surveyed, has generated several insights: for example, that 97 percent of US adults are concealing at least one uncomfortable fact about themselves at any given time; that most people have at least thirteen significant secrets weighing on them; and that the most secretive among us are less satisfied with our personal relationships, less productive at work, and at a higher risk for anxiety, depression, and other health problems.

"Going into this work, I wasn't sure how forthcoming people would be," says Slepian. "But our participants have been eager to open up. They want to unburden themselves."

Many of the secrets divulged to Slepian's team involve sex. The most common secret,

they found, is having romantic thoughts about a person other than one's partner. That is followed closely by cheating and various forms of emotional infidelity, like maintaining clandestine contact with an ex. Among the secrets that weigh the most heavily on people, the surveys show, are those that concern mental health, a past traumatic experience, and body image.

"The more we think our secrets reflect poorly on who we are, the more shame we feel and the more we ruminate on them," says Slepian.

The researchers have also examined the psychological impact of keeping secrets. In the past, studies had suggested that highly secretive people are less happy because it is mentally exhausting to continually lie and censor oneself in social situations. But Slepian's work has challenged this analysis, showing that for most people the stress of concealing secrets does not significantly affect their well-being. The real emotional burden of secrecy, he has found, is social isolation. "If there is a really important thing going on in your life but you have chosen to hold it back from other people, you are building a wall between yourself and others," Slepian says. "This will make you feel alone and disconnected. which over time will take an emotional toll."

Slepian's research also suggests that this selfdestructive habit can be broken: in yet another recent study, Slepian shows that if someone confesses a secret to at least one other person, he or she can find some relief. "Even if the secret is kept from everybody else, talking to one person about it can make a world of difference," Slepian says. "With support and guidance, people can break the pattern of obsessive thinking and begin to cope with the secret." Slepian is working on sev-

eral papers that explore the experience of secrecy from many angles, including one on how Americans who kept their support for Donald Trump or Hillary Clinton a secret from friends and family in 2016 were affected by the experience. Another paper explores the emotional costs of keeping a friend's secret; yet another looks at the psychological profile of an ideal confidant.

"This is an exciting area," Slepian says, "because it's fairly uncharted territory."

A path to greener pastures

or centuries, Fulani herdsmen in Burkina Faso have lived a semi-nomadic exis-

tence, spending several months of the year traveling through arid zones, river valleys, and wetlands to keep their cattle fat and healthy. Today, however, many of those West African herders are struggling to survive, as warming temperatures and shifting weather patterns have made it difficult to anticipate where and when fresh pastures will grow.

In an effort to help the herders adapt to climate change, Elisabeth Ilboudo-Nébié, an anthropologist and postdoctoral researcher at Columbia's International Research Institute for Climate and Society, has spent the past several years mapping their migratory routes. She hopes that climate scientists, armed with her maps, will soon be able to generate seasonal forecasts tailored to the herders' needs, offering predictions about when particular grasslands will be verdant.

"Seasonal forecasts are already available for the country, but they tend to be oriented toward agriculture rather than herding," says Ilboudo-Nébié. "Farmers want to know how much rain they will get in a season, but herders want to know which areas will get rain, for how long, and how often."

Ilboudo-Nébié is also studying how Burkina Faso's herders decide when it is time to move from one place to another. "The herders use diverse sources of knowledge, including environmental cues such as the appearance of certain birds, to make decisions," she says. This information will provide a framework for delivering future climate forecasts.

NEURON DANCE

A team of Columbia engineers and neuroscientists has created liveaction 3D videos that reveal how the brain coordinates movement. Using SCAPE, a cutting-edge microscope developed by Columbia biomedical engineer and radiologist Elizabeth Hillman, they were able to observe the nervous system of a fruit-fly larva as it crawls. For video, visit magazine.columbia.edu/neurondance.

EXPLORATIONS

From left: Gerald Markowitz, Merlin Chowkwanyun, and David Rosner.

ToxicDocs exposes industry misdeeds

ver the past quarter century, thousands of lawsuits have been filed against major American companies alleging that they knowingly harmed US citizens with products containing poisonous substances such as asbestos, lead, and polychlorinated biphenyls (PCBs). The litigation has forced the release of troves of internal corporate documents - material that could be of enormous use to public-health researchers. investigative journalists, and members of the public if only it were easily accessible.

Now a powerful resource at Columbia is bringing this material within reach. After years of gathering, scanning, and indexing records from across the country, publichealth scholars have built ToxicDocs, a growing database of some twenty million industry documents.

"It is the right of the public to know which industries knowingly profited from public-health hazards," says David Rosner, the Ronald H. Lauterstein Professor of Sociomedical Sciences at Columbia's Mailman School of Public Health and a professor in the history department.

The companies represented in the database range from small brake-parts manufacturers in Ohio and Michigan

"It is the right of the public to know which industries knowingly profited from public-health hazards."

to multinational giants like DuPont, Johnson & Johnson, and Monsanto. The documents include internal memos, unpublished scientific studies, plans for public-relations campaigns, meeting minutes, and presentations — some dating back to the 1920s — all related to the introduction of new products and chemicals into workplaces and commerce.

The ToxicDocs team is led by Rosner; Merlin Chowkwanyun '05CC, the Donald H. Gemson Assistant Professor of Sociomedical Sciences; and recent \$500,000 grant from the National Science Foundation — awarded through Columbia's Data Science Institute — he is overseeing the development of software that will also help users detect subtle patterns in the data.

Gerald Markowitz, a CUNY

historian and an adjunct pro-

fessor at the Mailman School.

books about occupational and

testifying as expert witnesses

on behalf of plaintiffs exposed

course of that work, they have

accumulated boxes and boxes

environmental disease and

to industrial toxins. In the

of company records.

"We've had access to

millions of documents, but

they were impossible to sift

through," says Rosner, who

codirects the Center for the

History and Ethics of Public

Health at the Mailman

School, which maintains

department and CUNY.

ToxicDocs with the history

Chowkwanyun is spear-

heading the effort to index

searchable archive. With a

and digitize the material

and develop ToxicDocs'

Rosner and Markowitz have been collaborating since the 1980s, writing

"ToxicDocs gives consumers, journalists, scientists, researchers, lawyers, policymakers, and community activists a strong, evidence-based tool for raising questions about industrial firms' behavior," says Chowkwanyun.

- Carla Cantor '82SIPA

GEOSCIENTISTS FIND ANSWERS IN STONE-AGE PEE

ordan Abell, a graduate student at Columbia's Lamont-Doherty Earth Observatory, has used an unusual form of evidence to pinpoint when people in ancient Turkey began raising animals for food: urine residue preserved in sand. His study, written with colleagues from the Universities of Arizona and Tübingen. reveals that the numbers of humans, sheep, and goats at a settlement near the modern city of Aksaray increased dramatically some ten thousand years ago. The paper suggests that Middle Easterners may have given up hunting and gathering over a period of just three hundred years - more abruptly than previously thought.

The transition to farming, or the Neolithic Revolution, is considered a turning point in human history. But scientists are still working out the details of how and when it took place. Abell's study, in addition to illuminating the pace of the change, adds to mounting evidence that the revolution did not have a single birthplace in the Fertile Crescent, to the south of Turkey, as some scientists have argued, but rather occurred in several locations simultaneously.

Students excavate ruins near Aksaray, Turkey.

KEEP CALM AND HAND ME THE SCALPEL

hey may be known for their steely nerves and steady hands, but a recent paper suggests that surgeons are prone to making mistakes when they're stressed, just like the rest of us.

The study, published in the open-access branch of the *British Journal of Surgery*, is small and exploratory, based on the performance of a single surgeon at Stanford Medical Center over several weeks, but its results are striking. It showed that when the surgeon's heart rate climbed above a normal level — indicating anxiety — he was up to 66 percent more likely to commit errors.

To conduct the experiment, researchers led by Peter Dupont Grantcharov, a graduate student at Columbia's Data Science Institute, took a novel approach: they outfitted the surgeon with a special undershirt that contained sensors to monitor his heart's electrical activity, made laparoscopic video recordings during a variety of his abdominal operations, and then looked back to see if his performance was affected by his stress level.

"We had medical experts evaluate his work, using established frameworks for assessing surgical performance," says Grantcharov, who designed the study and oversaw its statistical analysis. "Our research revealed that when he was feeling stressed, he was more likely to make small mistakes that could result in injuries such as bleeding, torn tissue, or burns."

The study does not attempt to identify the causes of the surgeon's anxiety, but Grantcharov and his colleagues hope that future research will pinpoint triggers that might be controlled.

"Operating rooms can be surprisingly chaotic places, with lots of alarms going off, pieces of equipment malfunctioning, nurses and physicians having side conversations, and people constantly coming in and out of the room," says Grantcharov, who points out that medical errors cause hundreds of thousands of deaths in the US each year. "If researchers could demonstrate that distractions like these can make surgeons anxious, even at a subconscious level, it could prompt hospitals to institute new protocols and possibly make surgery safer for us all."

The myth of the Asian-American advantage

sian-American students outperform their classmates by almost every measure, earning better grades, scoring higher on standardized tests, and graduating college at higher rates. But do these accomplishments lead to professional success?

To find out, Columbia sociologists Van C. Tran and Jennifer Lee '90CC, '98GSAS, along with graduate student Tiffany J. Huang, analyzed employment data on thousands of second-generation Chinese, Indian, Korean, Filipino, and Vietnamese immigrants in the US. What they discovered is that Asian-Americans, despite their educational advantages, are no more likely than white

DIGITALREFLECTIONS / SHUTTERSTOCK

Americans to land professional jobs — and those who do are less frequently promoted to leadership positions.

"We were surprised by the results," says Tran, the lead author of the paper, which appears in the journal *Ethnic and Racial Studies*. "Asian-Americans are present in professional and management positions in much smaller numbers than you'd expect."

While previous studies have suggested that Asian-Americans' competitive edge may disappear in the workplace, the Columbia study is the most comprehensive yet and the first to distinguish between different groups of Asian-Americans. The study's scope led to some major insights. "For example, we found that Indian-Americans are no more likely to attain a professional job than white Americans, despite being eight times as likely to graduate from college," says Lee. "The same goes for Korean-Americans and Vietnamese-Americans, who are three times as likely to complete college."

The only group of Asian-Americans to turn their scholastic triumphs into career gold, the researchers found, are Chinese-Americans: they are one and a half times more likely than whites to be in professional or leadership positions, after controlling for age, gender, and level of education.

These robotic discs work together like an organism.

EXPLORATIONS

New robots can swarm like human cells

Biology is rich with examples of how complex phenomena can arise from simple interactions: consider how billions of neurons work together to form and store memories, or how white-blood cells organize themselves into hit squads to combat disease.

Inspired by such examples of "emergence" in nature, a group of Columbia and MIT engineers has developed a robotic propulsion system that is much more than the sum of its parts. It consists of an assemblage of six-inch-wide plastic discs that expand and contract like blooming flowers in response to light. (Each disc contains a small battery-powered motor and sensors.) When the discs are loosely attached to one another with magnets, their gentle undulations have a surprising cumulative effect: the whole cluster vibrates and, as a result of tiny variations in the timing of the discs' movements, propels itself toward the nearest light source.

Hod Lipson, a Columbia professor of engineering who led the research team alongside MIT's Daniela Rus and experimental toy designer and architect Chuck Hoberman '85SEAS, says that the system is both flexible — it can navigate around obstacles and squeeze through tight gaps — and resilient. In a series of experiments reported in the journal *Nature*, the researchers showed that a prototype keeps working even when some of its discs fail or become detached.

"Most robots are composed of lots of intricate and fragile parts whose malfunction will cause the whole apparatus to break down," he says. "The beauty of our design is that its components are all simple, sturdy, and expendable."

Lipson says that the system could be used to create new kinds of robots capable of venturing into hazardous environments.

"It could easily be adapted to gravitate toward chemicals rather than light, in which case it would be perfect for cleaning up toxic spills or even exploring distant planets," he says.

To see the video, visit magazine.columbia.edu/robot.

Trade war, what is it good for?

The Trump administration's trade policies are costing US consumers \$1.4 billion per month, dwarfing any benefits to American manufacturers

and exporters, according to research by Columbia economist David Weinstein '73BUS and colleagues from Princeton and the Federal Reserve Bank of New York.

Weight-loss warning Women with a history of "yo-yo dieting" — a pattern of losing weight and then regaining it — are at higher risk of heart disease, Columbia medical researcher Brooke Aggarwal '08TC has found.

Popularity contest By evaluating dozens of twentieth-century abstract painters' critical reviews, press exposure, and social circles, Columbia Business School professor Paul Ingram and Mitali Banerjee '17BUS have determined that, even in the pre-digital age, an artist's fame was determined less by his creativity than by the number of powerful friends he had.

Gun-law lowdown US states with weak gun laws and high levels of gun ownership have more mass shootings, according to new research by Columbia epidemiologist Charles Branas and doctoral student Paul Reeping. The study examined two decades' worth of data.

A browner shade of green While some climate scientists have hypothesized that rising levels of atmospheric CO_2 could make the earth's forests greener — since plants use CO_2 for photosynthesis — a team of climatologists led by Columbia's Pierre Gentine now predicts the opposite result. Gentine warns that warming temperatures will, on the whole, cause forests to wither.

Transgender seniors Older transgender adults benefit from surgery and drugs that align their bodies with their gender identities even more than younger people do, according to research by Xiang Cai of Columbia's Mailman School of Public Health. Cai found that people over the age of sixty who undergo gender-affirming procedures are eight times likelier to be happy with their lives afterward, whereas younger people are twice as likely to be happy following treatment.

Giving voice Columbia neuroscientists led by Nima Mesgarani have created a brain-monitoring system that can translate rudimentary thoughts into speech; they hope it will eventually enable people who have lost their ability to talk to communicate with others.

Heavy beats Columbia physicist Alberto Nicolis, together with graduate student Rafael Krichevsky '12CC and Angelo Esposito '18GSAS, has found evidence that sound waves have mass and are therefore affected by gravity — a discovery that, if confirmed by future experiments, would cause scientists to fundamentally rethink how sound behaves.

ENGAGE IN THE LEGACY OF ALUMNI FELLOWSHIP

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YOUR ALUMNI CONNECTION

Elegance Bratton, filmmaker and veteran

Home Movies

ilmmaker Elegance Bratton '14GS loves to tell stories about families — notably, the alternative families that support and nurture homeless LGBTQ youth. His work, including the documentary *Pier Kids: The Life*, which hits film festivals this year, has predominantly looked at New York City's ballroom scene, a subculture of queer people who band together in "houses" and organize drag-centric dance and catwalk competitions.

"Ballroom is a community built around the notion of family," says Bratton. "You've got house

mothers and fathers, brothers, sisters, cousins, aunties — pretty much everyone that gay kids lose when they're kicked out of their homes."

Bratton, who is gay, says his own mother forced him out of their New Jersey home back in 1996. He was just sixteen. He drifted between friends' couches and the streets and spent a lot of time hanging out on the Christopher Street Pier, by Greenwich Village, a known haven for castoff gay and transgender kids.

Bratton's life changed in 2005. He asked his mother if he could move back home, and she suggested that he join the military instead. Naturally, he was hesitant: "This was the time of the Iraq War, but I looked around and thought, 'Do I really want to keep living in a shelter?'" So he enlisted in the Marines. Bratton scored high on the placement exam and had his choice of jobs. Though he could have become an intelligence officer, he didn't like the idea of being a spy — "As a closeted gay kid, I had had enough of living in disguise." He opted for the combat photography and film division, where he learned how to tell stories with a camera.

After leaving the military in 2010, Bratton entered Columbia's School of General Studies and rented his first apartment. "But I realized that I still didn't know what 'home' was for me," he says. That loss became more glaring at the end of freshman year. "Kids going home is a big deal as an undergrad. Families show up, there's banners and pets and stuffed animals, parents, brothers, sisters ... And I kept asking myself, 'What is home? Where is home? *Why* is home?''' With no family to return to for the summer, Bratton found himself back on the pier — this time with a camera.

Pier Kids follows a group of queer, Black youths who are also estranged from their families. During production Bratton split his time between campus and shooting locations. "Half the week I'd be in class, focused on the transformation of my life, and the other half I'd be re-experiencing homelessness through filming," he says, adding that the emotional toll of capturing the documentary's four hundred hours of raw footage, paired with funding setbacks, delayed the film's completion until this year.

In the meantime, Bratton has been busy with other projects. He graduated from NYU's Tisch School of the Arts with an MFA in film in May. He's directed and produced several short films, published a photo book on ballroom called *Bound* by Night, and executiveproduced the documentary series My House, which aired to critical acclaim on the Viceland TV network last year. Now Bratton is working on The Inspection, a semiautobiographical feature film about a gay teen who joins the Marines during the Don't

A scene from the documentary Pier Kids: The Life.

Ask, Don't Tell years. "It's kind of like *Moonlight* meets *Full Metal Jacket*," he says.

Whatever the artistic endeavor, Bratton is passionate about introducing the public to new faces and perspectives. "I'm still in the process of learning how to make work that features queer people of color and gives those identities their full value in the industry," he says, adding that film backers often resist taking on scripts that deal with atypical subject matter. "It comes down to relatability. And whiteness is kind of a baseline."

Bratton says that he considers himself part of a long line of queer historians, activists, and artists who have made it their life's mission to introduce the LGBTQ community to a mass audience. He praises TV impresarios like RuPaul of *RuPaul's Drag Race* and Ryan Murphy of *Pose* for helping to bring content about drag and ballroom culture — and queer people of color — into America's living rooms.

Though Bratton's career is just getting started, he's candid about what he's seeking in the long run. Simply put, he wants fame, less for himself than for the actors and artists he casts in his work. "I feel like directors are only as good as the people they make famous, so I want to make lots of really great people famous."

– Julia Joy

STARTUP SPOTLIGHT

The Perfect Playdate

Amanda Raposo '17BUS, a rising tech entrepreneur and veteran babysitter, thinks she can offer just that. Through her digital platform, PAL by Project Playdate, which she founded with her business-school classmate Courtney Bernabei '17BUS, she has created a network of premium playdates for kids in New York City.

PAL is designed to function both as a marketplace where parents can "shop" for group activities and as an online job board for childcare professionals. Caregivers, all vetted by the company, offer events — tea parties, museum trips, yoga, or a few hours spent creating science experiments or speaking French — based on their skills and interests. Parents can sign up for those scheduled activities or create custom ones through members-only groups.

Because all playdates happen in groups of two or more, parents can split the cost of care. A session with seven kids, for example, might cost each parent ten dollars per hour. "Customers get better-quality care often at a lower price point than babysitting, and the childcare specialists get paid much more than the typical sitter," says Raposo, who won first place at the Startup Columbia festival's venture competition in 2018.

For Raposo, PAL is more than just a solution to the "nightmare" of scheduling playdates; it also promotes social and emotional development. "A facilitated playdate unlocks certain learning opportunities," she explains. "The more support you can provide for children at a young age to make meaningful connections, the happier and more successful in life they'll be."

For now, Raposo is focused on the New York market, but she eventually wants to expand to other cities. No matter how much her business grows, her goal is not to replace babysitters altogether. "There will always be a need for someone to run through daily routines with a child," she says. "What we're offering is a fun alternative that might encourage parents to take a little more time off for themselves."

— Julia Joy

NETWORK

Marie Kondo (left) and Marie Iida on Tidying Up with Marie Kondo.

The Kondo Whisperer

ach episode of the new Netflix reality show starts the same way: a family burdened with too much stuff and not enough space explains why they're desperate to start organizing their home. Just then, the doorbell rings! And in comes help, in the form of not one but two Maries – both petite, neatly dressed Japanese women in their mid-thirties. One is the global organizational guru Marie Kondo, author of three best-selling books and the star of *Tidying Up* with Marie Kondo. The other is her interpreter, Marie Iida '11GSAS, who is quickly becoming a popular personality in her own right.

A good interpreter should almost fade into the background, and on the show, Iida is accordingly respectful and unobtrusive. But the Maries also come across as a team, working together to help Kondo's clients bring order to their lives. Kondo,

who is sprightly and ethereal, skips, hops, and flutters around each room, offering gentle encouragement and sharing her KonMari method, which asks us to let go of belongings that no longer "spark joy." Iida is the straight man. Less a sidekick and more an anchor, she is the consummate professional - right down to the reporter's notebook she carries in every scene. The show hinges on Kondo's enthusiasm, warmth, and empathy, and Iida is driven to convey them flawlessly.

"Marie speaks with confidence and conviction but also brings a sense of serenity," Iida says. "Her signature style is such an important part of the show, and I want to make sure none of it gets lost in translation."

Iida, who has been interpreting for Kondo on a freelance basis for three years, seems remarkably comfortable on set, even though she has no prior experience on camera. She says that, unlike many reality shows, *Tidying Up with Marie Kondo* is entirely unscripted, which helped put her at ease. "The interactions between Marie and the families are entirely genuine," she says. "Obviously there are a lot of moving parts — cameras and lights and tons of people but it really is about building those relationships with the families, and it became easy to block everything else out."

Iida says that she is moved by the way Kondo's methods create lasting change for the families. But for her, the show is inspiring for another reason. "I'm very proud to see a fellow Japanese woman get to be at the helm of her own show," Iida says, noting that it is rare to see a non-English speaker be given such a prominent platform. "I want to honor her courage and match her ambition."

Iida was born in Tokyo but moved to Boston when she was in the first grade.

Because of her father's job, the family moved back and forth between Japan and the US every few years, so Iida found herself having to constantly switch between the two languages and cultures. "Straddling two cultures can be pretty isolating," she says. "Language is such an important part of identity, and when you speak two languages, that identity can feel very fluid. I think that's why I was eventually drawn to interpreting. It turns that gray area into a big advantage."

Iida studied journalism and film as an undergraduate at NYU and then moved back to Japan to work at a film-production company. She quickly discovered that her English fluency opened some unexpected doors. Though Iida was hired to translate screenplays, she was asked to step in and interpret at an important meeting when the regular interpreter was out. "It was for a major Hollywood actor, so it was a bit nerve-racking," Iida says. "But interpretation is sort of always trial by fire."

In 2009, Iida returned to the United States to get a master's degree at Columbia in American studies. "I've always been fascinated with American culture," she says. "I wanted to study it from a literary and historical viewpoint, to think about what philosophies and voices helped shape American society as it is today." She says her graduate work became an essential asset to her career as an interpreter.

"The best translators are equipped with a deep understanding of both cultures

NETFLIX

that they're trying to bring together, so that they can find a worthy equivalent in the other language," she says.

After graduating, Iida began working as a translator for publishers and universities and as an interpreter for several New York cultural institutions — including the Museum of Modern Art, the Film Society of Lincoln Center, and the Japan Society, where she first met Kondo in 2016. She moved to Los Angeles in 2017, and in addition to working with Kondo, she is finishing the translation of a novel for Soho Press.

Iida says that while she's always been a tidy person, interpreting for Kondo has reminded her of lessons that she learned growing up in a Japanese household. "There's a Japanese expression — *shoshin ni kaeru* - that means returning to basics, returning to your roots. Working with Marie has helped me to do that," she says. "Taking care of your belongings is a fundamental part of Japanese culture, and this job has been an important reminder of that."

Because much of her own life has been defined by the need to switch between two very different languages and cultures, Iida says she is happy to be working on a show about needs and desires that transcend those things. "As a translator, I'm always focused on what makes people different," she says. "But the show gets down to fundamental human needs. The need to live in a space that feels comfortable and secure is universal."

- Rebecca Shapiro

Connect Four

For most social-media users, Instagram is a place to share flattering selfies and proof of fun times. For those with tens of thousands of followers, it can also be a way to influence how other people shop, eat, travel, work out, and dress. Here are four Columbians who are harnessing the app's visibility to build their personal brands.

Trevor Bell '16CC @trevorbell | 160,000 followers

Bell, a former Columbia runner and football player, is a fitness model and social-media consultant. When he's not showcasing his washboard abs and perfect pecs, he likes to dress up as a superhero and inspire everyone's inner champion.

Selby Drummond '09CC @selbydrummond | 63,000 followers Drummond has made a career out of being a style influencer. A former accessories director at *Vogue*, she now heads fashion and beauty partnerships at Snapchat.

Cynthia Chen '19PH @dxxchen | 111,000 followers

Chen's passion is public health, but it's the glam selfies and luxurious dining and travel photos posted by her Instagram alter ego that have earned her a massive following.

Jamie Grimstad '19CC @jamiegrimstad | 23,000 followers Grimstad, an entrepreneur and health and beauty marketer, posts about skin-care, workout, and fitness regimes. Her Insta also documents vacations guaranteed to bring on a severe case of FOMO.

NETWORK

ASK AN ALUM: HOME-COOK HACKS

In his new cookbook, *Milk Street: Tuesday Nights*, **Christopher Kimball '73CC** — chef, television host, and bow-tie enthusiast — relies on global flavors to keep cooking simple and interesting. We asked him to share a recipe and his philosophy on weeknight meals.

What's one thing you want home chefs to know?

To look for inspiration outside of classic American or European cooking. Those cuisines use fairly bland ingredients like dairy, meat, and potatoes and then rely on a lot of time and technique to slowly build flavors. But you'll find that in most of the world, flavor is built with ingredients, not time. The actual cooking process is not as important as your raw materials.

What are some of your go-to "raw materials"?

All kinds of herbs, chiles, ginger, scallions, lemongrass, smoked meats, and fish. And instead of a sprinkling of herbs, I use handfuls!

What do you always keep in your pantry?

Certain staples bring big flavors to simple foods. I always have harissa, tahini, pomegranate molasses, salsas, fermented sauces like gochujang, and vinegars. And all kinds of spices! If you use a spice rub on a pork tenderloin, it's done in eight minutes and you don't need to bother with a fussy pan sauce.

Pistachio-Mint Beef Kofta Start to Finish: 35 minutes | Servings: 4

1 cup roasted and salted pistachio meats (shelled)

- 21/2 teaspoons dried mint
- 1½ pounds 85 percent lean ground beef
- 5 tablespoons chopped fresh dill, divided
- 4 tablespoons chopped fresh mint, divided
- 4 medium garlic cloves, minced
- 1 teaspoon ground allspice
- 3⁄4 teaspoon cayenne pepper
- Kosher salt and ground black pepper
- 1 large egg plus 2 large egg yolks, beaten
- 1 cup plain whole-milk yogurt
- 2 tablespoons grapeseed or other neutral oil

Pistachios — lots of them — give these beef kofta a rich, toasty flavor that's balanced by the sweetness of dried mint and the grassiness of fresh dill. Most supermarkets sell shelled pistachios that are already toasted and salted. If you start with raw ones, toast them in a 400°F oven for about 8 minutes, stirring once, and increase the salt in the meat mixture by ¼ teaspoon. Serve with shredded romaine lettuce, thinly sliced red onion, and warmed flatbreads.

Don't worry about overmixing the beef. Processing for a full minute yields a mixture with a spreadable consistency that, when cooked, has a texture that's pleasantly springy, yet soft and tender.

In a food processor, pulse the pistachios and dried mint until the nuts are coarsely chopped, about 3 pulses. Set aside 2 tablespoons, then process the remaining mixture until finely ground, about 20 seconds.

Add the beef, 3 tablespoons of the dill, 1 tablespoon of fresh mint, the garlic, allspice, cayenne, 1½ teaspoons salt, and ¾ teaspoon pepper. Process until well combined, 1 to 1½ minutes, frequently scraping the bowl. Add the eggs and process until the mixture has a spreadable, sticky consistency, about 1 minute.

Shape into 12 patties, each about $\frac{1}{2}$ inch thick. Place on a large plate, cover, and refrigerate for 15 minutes.

Meanwhile, in a small bowl, stir together the yogurt, the remaining 2 tablespoons dill, the remaining 3 tablespoons fresh mint, ½ teaspoon salt, and ¼ teaspoon pepper. Set aside.

In a 12-inch nonstick skillet over medium, heat 1 tablespoon of the oil until shimmering. Add half of the patties in a single layer and cook, turning once, until golden brown on both sides, about 3 minutes per side. Transfer to a platter and tent with foil. Repeat with the remaining 1 tablespoon oil and patties. Sprinkle the reserved pistachios over the patties and serve with yogurt sauce.

She's on First

arysol Castro '00JRN is used to being the only woman at the baseball diamond. Growing up in the shadow of Yankee Stadium, she remembers joining the neighborhood boys in their backyard stickball games. "I got plenty of dirty looks. But I found that if I worked hard enough, I could always compete," she says. "That sort of became the story of my life."

and helped launch a twenty-year career in television.

Castro worked in local news in New York City and then became a traffic and weather reporter for ABC's *Good Morning America* and CBS's *The Early Show*. "Traffic and weather reporting wasn't my first choice, but it taught me how to tell stories succinctly and clearly," she says. "I use that every day from the booth."

Marysol Castro

Now Castro is making history in another stadium across town as the New York Mets' publicaddress announcer. She is the organization's first female announcer and the first Latina announcer in Major League Baseball. "It feels unbelievable that I'm the first," she says. "But I'm grateful to the Mets for playing catch-up."

Though Castro grew up in a sports-loving family, she never considered athletics as a career. "I really wanted to be the first Puerto Rican senator," she says. Instead, after graduating from Wesleyan University, she taught English at a Brooklyn prep school and then pivoted to journalism. Castro intended to be a newspaper reporter, but Columbia gave her a passion for broadcasting Castro says that her role with the Mets feels particularly important because of how prominent baseball is in the Latino community. "Almost a third of all Major League Baseball players are Latino, and Latino viewing audiences are at an all-time high," Castro says. "It had become clear to the Mets that their organization didn't reflect the diversity of the players or the fans."

Castro also hopes that her presence will inspire female fans to pursue more prominent positions in the community, whether in sports or otherwise. "In every job I've had, I felt like I was the only Latina for miles," she says. "I hope being in a visible position like this will help little girls think outside the box." — *Rebecca Shapiro*

NEWSMAKERS

• Three Columbia alumni were honored with Pulitzer Prizes this year, along with one professor. Harriet Ryan '96CC was part of a *Los Angeles Times* team that won the investigative-reporting award for a series on a former University of Southern California gynecologist accused of sexually assaulting hundreds of women. Carlos Lozada '05JRN, the nonfiction book critic for the *Washington Post*, won for criticism. Composer Ellen Reid '05CC won in the music category for her opera *prism*. And School of the Arts professor Eliza Griswold took the general-nonfiction award for her book *Amity and Prosperity: One Family and the Fracturing of America*.

• The US Senate confirmed **Roy Altman '04CC** to the federal bench in South Florida. At thirtysix, Altman is one of the youngest judges ever confirmed to a lifetime post. Born in Venezuela, he has primarily worked in private practice in Miami, specializing in aviation law.

• Kristin Simmons '12CC won a Women of Change Award from the SDG5 Global Alliance, which was organized to support the United Nations' fifth sustainable-development goal: achieving gender equality. She also became the organization's first artist in residence. As a part of the yearlong appointment, Simmons will create a body of work that addresses gender equality in industry.

• Four Columbians were named to the *Time* 100, the magazine's list of the year's most influential people, including Columbia doctoral student **Arundhati Katju '17LAW**. Katju and Columbia Law School researcher **Menaka Guruswamy** were recognized for successfully challenging India's colonial-era law banning gay sex. US attorney general **William Barr '71CC, '79GSAS** and School of the Arts professor

Lynn Nottage also made the list.

• Mariana Costa Checa '13SIPA is one of more than twenty "extraordinary women role models" who have been honored with Barbie dolls made in their likenesses. She is the cofounder and CEO of Laboratoria, a startup that prepares women in Latin America for careers in tech.

BULLETIN

UNIVERSITY NEWS AND VIEWS

Nabila El-Bassel

SCHOOL OF SOCIAL WORK TO LEAD \$86 MILLION OPIOID RESPONSE IN NEW YORK STATE

The School of Social Work has received an \$86 million grant from the National Institute on Drug Abuse (NIDA) to spearhead an ambitious multi-year effort to reduce opioid overdose deaths in New York State.

The effort, part of a nationwide research study on how to address the opioid crisis, is being led by Nabila El-Bassel '89SW, a University Professor and the Willma and Albert Musher Professor of Social Work.

"We are planning a rapid public-health response to the current opioid epidemic, focusing on policy and system-wide changes by working with the criminal-justice system, health-care organizations, emergency rooms, schools, and drug-treatment programs," she says.

The federal grant, which is one of the University's largest ever, will bring together researchers from Columbia's School of Social Work, Department of Psychiatry, Mailman School of Public Health, and Data Science Institute, along with colleagues from the Albert Einstein College of Medicine, the City University of New York, the Weill Cornell Medical College, the New York University School of Medicine, the University of Miami, and the Yale School of Medicine. Working closely with state and local health officials, the researchers will implement an array of drug prevention and treatment programs in fifteen New York counties that have been hit hard by the opioid epidemic.

The aim of the project, El-Bassel says, is not to try out new interventions but rather to determine how proven strategies are best combined in different settings — strategies from opioid education to the distribution of naloxone, a drug used to revive overdose victims. "Some of the communities we're targeting are in rural areas where few drug-treatment services are available and where little or no research has ever been done," she says.

The Columbia-led effort is one of four launched as part of NIDA's Helping to End Addiction Long-term (HEAL) Initiative this spring; companion studies are being led by the University of Kentucky, Boston Medical Center, and Ohio State University in their home states.

NIDA officials have challenged the researchers to reduce opioid-overdose deaths in the communities they serve by 40 percent within three years; the ultimate goal, they say, is to identify strategies that communities across the US can use.

"There is no time to waste," says El-Bassel, who has decades of experience designing and overseeing drug-intervention programs in marginalized communities. "We have lost far too many to this epidemic already."

ONLINE COURSE HELPS VETERANS NAVIGATE COLLEGE ADMISSIONS

The University has launched an online course, Attaining Higher Education, to help military veterans make the transition to college.

The course is hosted by the nonprofit online-education company edX and is free and open to all. It was created by Columbia's Center for Veteran Transition and Integration (CVTI); the Center for Teaching and Learning, which supports the use of innovative classroom technologies across campus; and the School of General Studies.

Led by a team of instructors with decades of experience in college admissions, financial aid, and support services for veterans entering the University, the new course breaks down the collegeapplication process step by step and helps prospective students decide what kind of higher-education program is right for them. Graduates of the course can apply for follow-up peer coaching and professional advice.

follow-up peer coaching and professional advice. "This course offers reliable information and robust support so that our service members and veterans can navigate the complex transition to college successfully," says Beth Morgan, director of higher-education transition and partnerships at CVTI.

BEATRICE MORITZ / CLOONEY FOUNDATION FOR JUSTICE; CENTER: COLUMBIA UNIVERSITY IRVING MEDICAL CENTER; BOTTOM: EILEEN BARROSO

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Amal and George Clooney at Columbia Law School. LAW SCHOOL, CLOONEY FOUNDATION LAUNCH TRIALWATCH

The law school's Human Rights Institute and the Clooney Foundation for Justice have joined forces to train Columbia law students to monitor legal proceedings against journalists, dissidents, LGBTQ people, women and girls, members of religious minorities, and other vulnerable groups in countries where human rights are at risk. Participants in the new program, called TrialWatch, will issue reports about the trials they observe and, if necessary, assist defendants in pursuing remedies in human-rights courts.

"We measure corruption by governments, but not by courts. We monitor the fairness of elections, but not trials ... We need extensive monitoring, hard data, and committed advocacy if this is to change," says Amal Clooney, an international human-rights attorney and occasional Columbia visiting professor who runs the Clooney Foundation with her husband, George.

To watch related video, visit law.columbia.edu/news/2019 /04/trialwatch-conference.

Faculty from the newly named Seymour, Paul, and Gloria Milstein Division of Cardiology.

\$32M GIFT TO SUPPORT CARDIOLOGY PROGRAMS

Columbia's Vagelos College of Physicians and Surgeons has received a \$32.5 million gift from the Louis and Gloria Flanzer Philanthropic Trust for an endowment to support patient care, research, and education in cardiology.

In recognition of the gift, the school is renaming its cardiology unit the Seymour, Paul, and Gloria Milstein Division of Cardiology. (Seymour Milstein, Paul Milstein, and Gloria Milstein Flanzer were siblings who all gave generously to the University.) Columbia's cardiology division is widely regarded as among the best in the world; its faculty members have developed revolutionary approaches to replacing aortic valves and treating arrhythmias and have discovered the genetic basis of many cardiovascular conditions.

"This remarkable gift will ensure that we continue to attract the nation's most talented cardiologists and researchers to Columbia," says cardiologist and division chief Allan Schwartz '74PS.

BULLETIN

CLIMATE PANEL, REVIVED BY EARTH INSTITUTE, RELEASES FIRST REPORT

A national climate advisory panel disbanded by the Trump administration and reconvened last year with support from Columbia's Earth Institute has issued a major report outlining how US cities and businesses can prepare for climate change. Among its recommendations is that communities plan not just for catastrophic events like hurricanes and wildfires but also for increased risk of heat-related injuries, drinking-water shortages, sunny-day flooding, and infectious disease.

The fifteen-member panel, called the Independent Advisory Committee on Applied Climate Assessment, also announced the creation of a new consortium of climate-adaptation experts — the Science for Climate Action Network — that will help civic and industry leaders across the country incorporate climate data into their planning.

"We want to get started right away,"

Planting cordgrass to reduce erosion in New York's Jamaica Bay salt marsh.

says Richard Moss, a visiting senior research scientist at the Earth Institute and chairman of the advisory committee. "With climate impacts becoming more problematic and efforts to limit climate change falling further behind, we can't afford to wait."

TENNIS TEAM WINS SIXTH STRAIGHT IVY TITLE

he men's tennis team defeated Cornell on the final weekend of the season this spring to claim its sixth straight Ivy title.

In front of a roaring home crowd at the Dick Savitt Tennis Center, senior Victor Pham, junior Adam Ambrozy, and sophomore Jack Lin all scratched out gritty victories in their singles matches to lead the Lions. In doing so, they helped give retiring head coach Bid Goswami his fourteenth Ivy crown in thirty-seven years at Columbia.

"If I had to write a script, I would do it this way, but it was too much tension," said Goswami, who steps down this summer as the winningest tennis coach in Lions history. "I think Cornell is a great team, so we had to play our best ... I'm in awe of the guys."

LIBRARY ACQUIRES ARCHIVE OF FLASH-FICTION MASTER

The Rare Book and Manuscript Library has acquired the personal papers of American author Lydia Davis '70BC.

A pioneer of "flash fiction" — extremely brief stories that often blur the line between prose and poetry — Davis has pushed the form to its minimalist extreme, writing elliptical vignettes that often consist of just a sentence or two. Here's one from 2007 called "Collaboration with Fly": "I put that

word on the page, but he

added the apostrophe." Davis, who taught for many years at the State University of New

Lydia Davis York at Albany, has published six collections of fiction and is a recipient of the Man Booker International Prize. She is also celebrated for her translations of French literary classics, including Gustave Flaubert's *Madame Bovary* and Marcel Proust's *Swann's Way*.

The archive features corrected drafts of her fiction, personal correspondence dating back to her adolescence, and notes relating to her translation projects and her thirty-five years of teaching.

Davis is a "truly significant" American writer, and "literary historians will be reckoning with her influence for decades to come," says Columbia English professor Nicholas Dames. Columbia prepared me with a great education, and now I feel blessed to be able to give back."

> -CINDY GRAHAM TETHER '80BUS, 1754 SOCIETY MEMBER

> > 1754 SOCIET COLUMBIA UNIVERSIT

Children's book author Cindy Graham Tether credits Columbia with jumpstarting her decades-long career at IBM. She recently established a charitable gift annuity that will pay her income for life, with the remainder going to unrestricted support at Columbia Business School. She has also documented a gift through her will, and both gifts have earned Cindy a place in the prestigious 1754 Society.

Does your giving meet your income needs? Call the Office of Gift Planning at 800-338-3294 or email us at gift.planning@columbia.edu to discover ways to support Columbia while securing an income stream for you and/or a loved one.

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BOOKS

Doing Justice By Preet Bharara '93LAW (Alfred A. Knopf)

reet Bharara '93LAW, the celebrated former United States attorney for the Southern District of New York, could have written a juicy memoir. He certainly had plenty of material to work with. There was the 2016 meeting in Trump Tower when the president-elect slapped him on the back and encouraged him to remain in the powerful post he had held for almost a decade. There were the times during the presidential transition, after the FBI had begun its investigation of Russian meddling in the election, when Bharara dodged a series of calls from the president. And there was the day in March 2017 when Attorney General Jeff Sessions called on all Obama-appointed federal prosecutors to resign. Bharara was fired when he would not comply.

But Bharara didn't write that tell-all. Not even close.

Instead, while others went low, *Doing Justice* goes high. It is both an eloquent appeal for a return to a time when the law was backed by a system of agreed-upon norms and a sober warning about the dire consequences of descending into a lawless society.

"The rule of law and faith in the rule of law, the state of judicial and prosecutorial independence, the meaning and primacy of truth — all are in question and under fire in

numerous ways," Bharara writes in the preface. "Our adversaries are not our enemies; the law is not a political weapon; objective truths do exist; fair process is essential in civilized society."

It's hard to imagine a better leader to remind us of these nobler instincts. During his years as US attorney, Bharara was known for aggressively fighting public corruption, and he has a keen and deep appreciation for the values that define the rule of law: procedural fairness, independence from political influence, and respect for — as he writes — "truth, dignity, and justice." Born in India to a Sikh father and a Hindu mother, Bharara moved to America when he was two years old. After graduating from Harvard College and Columbia Law School, he worked in private practice for several years before serving as chief counsel to Senator Chuck Schumer. In 2009, President Obama named him to lead the most elite and independent federal prosecutor's office in the country.

Bharara focuses much of his book on his years as US attorney, giving the reader an inside look at the workings of a federal prosecutor's office. He explores the process of investigating and bringing to justice elected officials, Mafia kingpins, drug-gang leaders, and terrorist-cell members. With a stellar record of successful and high-profile prosecutions, Bharara could have easily focused on his wins. Just as often, though, he draws lessons from the cases and experiences that did not go as well: the interrogations that failed to produce the urgently needed intel; the tough decisions not to prosecute; the cases where his team learned, even years later, that someone had been wrongfully convicted.

What makes Bharara's storytelling so compelling beyond the trial lawyer's riveting war stories is how morally invested Bharara is in his profession. When he speaks about justice

DOING JUSTICE

A PROSECUTOR'S THOUGHTS ON CRIME, PUNISHMENT, AND THE RULE OF LAW

PREET BHARARA

and truth and integrity, he is not only defending the pillars of the criminal-justice system, he is expressing a personal creed.

One of the book's most moving passages is Bharara's recollection of the highschool public-speaking competition that inspired him to go to law school. The speech he chose to deliver was Clarence Darrow's 1925 summation in defense of Henry Sweet, a Black man who had fired a gun into the white mob attacking his home. He quotes Darrow's closing: "After all, every human being's life in this world is inevitably mixed with every other life and, no matter what laws we pass, no matter what precautions we take, unless the people we meet are kindly and decent and human and libertyloving, then there is no liberty. Freedom comes from human beings, rather than from laws and institutions."

Darrow's words not only propelled Bharara to enter the law, but their meaning clearly stuck with him throughout his career. In his memoir Bharara tells us that "in the end, the law doesn't do justice. People do." In such fractured times, when the law often seems devoid of morality, the zeal and passion of *Doing Justice* is an important reminder that along with being a nation of laws, we are also, for better or worse, a nation of men. - Aaron J. Freiwald '85CC

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Freiwald is a trial lawyer in Philadelphia and the host of the weekly podcast Good Law / Bad Law.

EXCERPT

We will have to come up with educational and social solutions as soon as possible to prevent short-term technological unemployment from becoming a long-term social disaster. If we don't, we will see a growing backlash against automation, and against technology in general, that will adversely affect our economies.

By Andrés Oppenheimer '78JRN

From The Robots Are Coming!: The Future of Jobs in the Age of Automation (Vintage)

Orange World

By Karen Russell 'O6SOA (Alfred A. Knopf)

istilled to their premises, Karen Russell's stories sound absurd: A grizzled farmer retires after a career spent raising tornadoes as crops. A teenage boy finds a two-thousand-yearold girl preserved in a bog and falls in love. A woman pricks her finger on a Joshua tree and becomes possessed by the plant's spirit. Yet Orange World, Russell's fifth book and her third collection of short fiction, is hardly gimmicky. Rather, the eight

fantastical stories gathered here are inventive and richly imagined, empathetic and often sly. As a collection, it is nothing short of exhilarating.

Russell '06SOA, who was a finalist for the Pulitzer Prize in 2012, is known as a master of the surreal and the macabre, and her ability to conjure frightening worlds is again on display here. Russell grounds much of her work in places we can recognize, like a terrifyingly believable postapocalyptic Florida, where children attend school in wrecked cruise liners. In "Black Corfu," a real village off the coast of Croatia is the home to an unreal situation — a doctor who operates on corpses underground. He snips their hamstrings to prevent the bodies from rising and taking on grotesque new forms.

Someone or something is always transforming in a Russell story, and characters are constantly on the move, often seeking escape from their grim circumstances. In "The Bad Graft," a young couple from Pennsylvania have decided to run away together on their first date; we meet them in the California desert. "Hadn't their trip unfolded like a fairy tale?" Russell writes, but — no spoiler here — that doesn't mean a happy ending. Russell comes from the original fairytale tradition, where magic and menace reign.

While the intersection with the otherworldly gives these stories their power, the characters' preoccupations remain totally familiar and achingly human. The doctor in "Black Corfu" is relegated to working on dead bodies because of his race and class. Blister, an orphan in "The Gondoliers," chafes under the watchful eye of her three older sisters; her only option is to plunge into toxic waters. Love transforms Cillian, the teenager who has fallen for the bog girl, and his mother can't square "her knowledge of her sweet, awkward boy with this wayward, confident person."

BOOKS

In "The Tornado Auction," a standout story about mortality and remorse, the surreal details are particularly vivid and blood-quickening, though the story also winds back to very relatable anxieties. The hero has spent his life cultivating dangerous celestial patterns for "weatherassisted demolition." Storms, not horses, fill his stables: "Baby southerlies whinnied around, shrieking their inhuman sounds ... What a catalog of weathers my peers were now breeding, dreaming up on their ranchlands." The farmer nurses a storehouse of familiar regrets - his family, the children he paid little attention to and, more crucially, could not protect.

Russell is particularly well attuned in this collection to the concerns and predicaments of parents — the raw fear that blooms in tandem with the love for one's child. In the terrific title story, "Orange World," an expectant mother named Rae makes a Faustian deal: she promises to breastfeed the Devil in exchange for keeping her baby safe. The story showcases Russell's keen comic touch ("Don't read anything online," one mother counsels. "They'll tell you your baby is going to die and sign off with an angel emoji"). Its resonance lies in its depiction of the desperation and isolation of new motherhood. As one character remonstrates: it's easier to believe in the devil than "admit that you are powerless like the rest of us."

The need for connection is the beating heart of a Russell story, and it is only through authentic relationships that characters are able to find peace. In "Orange World," Rae's fear abates when she joins forces with a group of women. The farmer in "The Tornado Auction" isn't as alone as he fears. One character tries to connect with her dog but finds that there's a problem: "There's no trouble or sorrow in your life!" Indeed, trouble and sorrow are pervasive connectors in this book. And Russell's prodigious gifts allow her to tease them out, while uniting us in the most unlikely ways.

– Ellen Umansky '00SOA

Working By Robert A. Caro '68JRN (Alfred A. Knopf)

n 1965, Robert Caro '68JRN, a bright-eyed *Newsday* reporter with an itch to uncover political corruption, was assigned to look into a controversial plan to build a six-mile-long

Robert A. Caro Working

"Here was a man, Robert Moses, who had never been elected to anything, and he had enough power to turn around a whole state government in one day." bridge between Rve, New York, in Westchester County, and Long Island's Oyster Bay. Most state-government officials, including Governor Nelson Rockefeller, thought the bridge was a terrible idea; it would make traffic jams worse, not better, and pollute

the Long Island Sound. Caro told his editors that the project was dead on arrival. But he hadn't figured on Robert Moses.

Moses 1914GSAS, '52HON, the New York City parks commissioner and head of the Triborough Bridge and Tunnel Authority, was the mastermind behind the bridge. as well as numerous other bridges, expressways, parks, public beaches, and housing developments built since the 1920s. A couple of weeks after state officials had told Caro they would never back the project, Moses visited Albany, and suddenly the officials had a change of tune. How could this happen? The reporter started to question how power in government really works.

"Here was a man, Robert Moses, who had never been elected to anything, and he had enough power to turn around a whole state government in one day," Caro writes in his new memoir, *Working*. The revelation, and Caro's desire to explain the "raw, naked realities of power," inspired *The Power Broker*, a 1,336-page book on Moses and his profound, often ruthless shaping of modern New York.

Caro, who is known for integrating painstaking historical research with novelistic prose, has spent more than five decades writing about power, including the ways that unchecked political egos can affect all our lives. He finished The Power Broker in 1974 (a Carnegie Fellowship at Columbia helped him kickstart the book) and won his first Pulitzer. Since 1976 he has been working on The Years of Lyndon Johnson, a five-volume biography of a political genius who – for better or worse — wielded extraordinary influence in public office.

Caro has yet to finish the fifth installment, but at age eighty-three, he has decided to share his experiences as a journalist and historian in *Working*. Those who have read Caro's work and are in awe of his mastery of detail and narrative will get the most out of this memoir. In it Caro takes us behind the curtain to reveal the sheer, hard slog of his craft. He talks about writing exclusively by hand and typewriter; nosing through boxes at government archives, trying to "turn every page" even when there are millions; and moving to Lyndon Johnson's hometown in rural Texas to truly — *thoroughly* - understand his subject's formative years. He writes about the 522 interviews that went into The Power *Broker* and the thousands for the Johnson biography, completed with help from his wife and research assistant. Ina Caro '62GS.

Caro shares stories about his unique reporting techniques, and how he gets people to recall decades-old details from their pasts. He recounts his visit to the Johnson boyhood home with LBJ's younger brother, Sam, and how he convinced him to reenact family fights at the dinner table. He also explains why it takes him so long to finish books: he can't stop asking himself if there is more to the story, and "if you ask the right questions, there always is."

At 207 pages, Working is a mere footnote in Caro's canon. He says he hopes to someday write a longer memoir, although he admits that he can "do the math" with regard to his time left. Until then, this pause for self-reflection should please his fans, or at least help them understand why they need to be patient as they wait for him to decide that the final story of the Johnson years is ready to be told.

– Julia Joy

READING LIST New and noteworthy releases

THE SEVEN OR EIGHT DEATHS OF STELLA

FORTUNA by Juliet Grames '05CC In Italian, stella fortuna means lucky star. But in Juliet Grames's debut novel, her title character seems to be doomed rather than blessed. Over the course of her long life – from a difficult childhood in a mountain village in Italy to her final years in a little white ranch house in suburban Connecticut - Stella always seems to be dodging strange and horrible deaths, a curse that becomes central to this sweeping multigenerational story.

THE NEW RULES OF

PREGNANCY by Adrienne L. Simone, Jaqueline Worth '97PS, and Danielle Claro Pregnancy is stressful, and although there are abundant resources, it can be hard for women to find clear, concise answers to their questions. **Obstetrician Jaqueline** Worth wanted to change that. Along with a fellow doctor and a talented cowriter. she created a compassionate guide that addresses everything from practical details (what to bring to the hospital) to big-picture issues (how to identify postpartum depression).

INSTRUCTIONS FOR A

FUNERAL by David Means '87SOA Though David Means won many accolades for his novel *Hystopia*, he has spent most of his career as Please Read This Leaflet Carefully

a short-story writer. Here he returns to the form with his fifth collection. In the opening story, "Confessions," which seems to double as an author's note, he warns readers not to look for an overarching theme: "There's simply no way to distill or describe what's in the stories." Still, this is a confident, imaginative collection, unified by characters often muddling their way through life-changing losses.

PLEASE READ THIS LEAFLET CAREFULLY

by Karen Havelin '13SOA Laura, a Norwegian immigrant living in New York City, finds herself dealing with a number of stressful situations: single motherhood, impending divorce, and, particularly, chronic illness. "For years, I've considered it an established fact that the female body is a pain in the ass," Laura says at the beginning of Karen Havelin's debut novel, and that statement turns out to be the crux of the book. Havelin writes boldly about the often overlooked maladies that women face and the almost comical lengths that they sometimes have to take to address them.

THE GENERAL'S COOK

by Ramin Ganeshram '01JRN George Washington's cook, an enslaved Black man named Hercules, has long been a figure of historical intrigue. Celebrated in Philadelphia society for his culinary acumen, Hercules was afforded privileges that other slaves were not. But while working for the Washingtons, he was also plotting a daring escape. Ganeshram's carefully researched debut novel chronicles the life of this fascinating man and imagines the end of his story, a plotline that has for centuries eluded historians.

RABBITS FOR FOOD

by Binnie Kirshenbaum '80GS In her first novel in more than a decade, Columbia School of the Arts professor Binnie Kirshenbaum introduces us to Bunny, a self-effacing middle-aged writer who finds herself institutionalized after descending into a depression. Wanting to keep her mind clear, Bunny refuses medication and instead chronicles the foibles of her fellow patients with a biting wit. Who knew a mental breakdown could be this funny?

A Newsroom Pioneer

Dorothy Butler Gilliam '61JRN, the *Washington Post*'s first Black woman reporter, talks with Karen Attiah '12SIPA, editor of the *Post*'s Global Opinions section, about her new memoir, *Trailblazer*

Columbia Magazine: What challenges did you face when you started your career in 1961?

Dorothy Butler Gilliam: I was twentythree, and DC was a very segregated city. We didn't have the public-accommodations bill. We didn't have the voting-rights bill. Even though the civil-rights movement was kicking into high gear, a lot of restaurants still didn't serve Blacks. Just getting the job done was a challenge. When I went to do an interview, time was of the essence, but I often couldn't find a cab to take me across town. When the drivers saw my dark-brown skin they would press down on their accelerators. People were so unaccustomed to seeing Black reporters that they wouldn't believe I was a journalist. I was once assigned a story about a white woman who had turned one hundred. When I got to her apartment building, the Black doorman looked at me coldly and said, "The maid's entrance is in the back."

CM: That must have been incredibly difficult, especially without mentors who had dealt with these barriers before. **DBG:** My Columbia professor John Hohenberg '27JRN had tried to prepare me for what it was going to be like. He said, "You have so many handicaps, you'll probably make it." The idea that my very person - separate from my abilities - could hamper my success prompted a tiny roar inside me. When I look back on that time, it felt like I was about to dive into a sea of white men, carrying weights they didn't have - in one hand was race, and in the other was gender. And that is some tough swimming. But if I didn't make it, it was going to be really hard for the next Black person to be hired.

CM: How did you get the job done, despite the obstacles? **DBG:** I had to think practically and I had to learn to be courageous when working in the Deep South war zone. A year into my job, when I was covering the integration of Ole Miss, I spent the night in a funeral home because I knew I would be risking my life if I tried to stay in one of Oxford's white hotels. But I was glad of a clean, safe place to lay my head. Besides, Black funeral directors were the go-to people for information for Black reporters.

CM: You struggled with depression and anxiety. Can you talk about the psychological pressures of being the first and only Black woman in these white spaces?

DBG: I think I was just so shocked. Going into white neighborhoods often amounted to an invitation to be abused. I had white colleagues who

wouldn't speak to me when they saw me on the street because they didn't want to acknowledge me in front of other whites. It was humiliating, and I was angry. But I took a lot of strength from religion and the Black church. Martin Luther King said that hate is too heavy a load to carry. So I tried to take that to heart.

CM: You wrote that when you first started as a reporter, you didn't want to be boxed in and only cover Black stories. What advice do you have for young Black journalists? **DBG:** I think that I was a little naive to stereotype myself. I wanted to show that I could do any type of story. But we had Kennedy in the White House, and he was talking about the "new frontier," and then came the war on poverty. Martin Luther King was a big part of the news cycle. Welfare was becoming an important topic. Black people were major players in those stories, and I was distancing myself from them. Now, when people say they don't want to do Black stories, it saddens me, because they are missing some really important things.

CM: Your book is a testament to the critical role that reporters play in the democratic process. Did you write it to remind everyone of that? **DBG:** When I decided to write a memoir, I had no idea it would be published in such a significant time. As I was reading the proofs, I kept hearing the term "fake news." Fellow journalists were being called the enemy of the people. I wanted to talk about the training, ethics, and hard work it takes to tell the truth, to the extent that it can be told.

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RARE FINDS

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Hungarian Rhapsody

is was a strong soul in a body frail but intense, with penetrating bright eyes, lively gestures, precise and ready words, always alert and courageous, as if the whole man were the blade of intelligence drawn from its sheath," wrote Columbia musicologist Paul Henry Lang of his Hungarian compatriot Béla Bartók 1940HON. Lang, who taught at Columbia from 1933 to 1970 and wrote the seminal *Music in Western Civilization*, considered Bartók the greatest composer of the twentieth century.

Born in 1881 in the Kingdom of Hungary, in a town now in Romania, Bartók spent his twenties traveling the countryside of Central Europe, recording and notating the unwritten music of peasants and the Roma. He began fusing those melodies and rhythms with the Western romanticism of Brahms and Richard Strauss, creating a hybrid by turns heroic, melancholic, and, to many ears, macabre. (Stanley Kubrick would use Bartók's *Music for Strings, Percussion, and Celesta* in the hallway scene in *The Shining*.) In 1940, Bartók, appalled by rising fascism, left Hungary, where he was a national hero, and settled, penurious and anonymous, in New York. At Lang's behest, Columbia created a modest research position in the anthropology department and hired Bartók, a pioneer of ethnomusicology, to transcribe and analyze a collection of Balkan folk songs. When funds for the project ran out in 1942, Bartók's colleagues raised money to extend the appointment. The following year he composed *Concerto for Orchestra*, perhaps his best-known work.

While at Columbia, Bartók also wrote a commentary on some 2,556 transcribed Romanian folk songs. In it he mourns the loss of this "unspoiled" music to the forces of "urban civilization." Upon his death in 1945, Bartók left this handwritten manuscript to Columbia, where it remains in the archives. In 1984, the Republic of Hungary presented a bust of Bartók to Columbia. The sculpted likeness, which sits in Dodge Hall, still looks on with probing eyes, alert and courageous.

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