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Fowzio Jama, 17C
JM Candidate

“For a technology leader, particularly in the financial services industry, balancing business risks associated with the fast pace of innovation and ever-increasing regulatory and data privacy concerns requires a higher level of thinking. As a practical matter, I can already look back at a specific work experience knowing that my contracts class helped surface questions I would not have asked before, saving our company more than the cost of the JM.”

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RESEARCH ISSUE

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MORE ONLINE AT EMORY.EDU/MAGAZINE

VIDEO: LIFELESS PARTICLES BECOME “LIFE-LIKE”
Watch how particles collectively switch back and forth between states—even when the environment remains stable.

VIDEO: WHAT NCI COMPREHENSIVE DESIGNATION MEANS
Winship is changing the way cancer is treated.

VIDEO: ALZHEIMER’S STORY
A unique program reaches at-risk populations.

ON THE COVER Illustration by Carlos Coelho at Infomen.
As I drive onto the Emory campus each morning, I can’t help but marvel a little. This is an impressive place. Its buildings are beautiful, its resources plentiful, its setting lovely and well kept, its facilities state of the art. And it’s forever busy; its streets and sidewalks are literally never still, and at night, its windows are a constantly changing constellation of lights. Within a thousand walls, it buzzes and clicks, whirs and sputters and hums, a million circuits aglow with signals.

Of course, somebody has to keep all those lights on, and Emory is fortunate to attract its share of funding—including many generous gifts and grants that support both the university’s infrastructure and the work being done within it. This issue of Emory Magazine is filled with examples.

Every element of this framework is valuable and important to the university’s mission. But in this special issue devoted to research, the spotlight shines brightest on another, less tangible, more vital resource: minds at work.

The faculty and students featured in this magazine are here because they are relentlessly curious, instinctive thinkers, compelled to question and driven to pursue answers. And they don’t hesitate to cross the lines of academic disciplines to put their heads together with fellow scholars.

There’s Andrew Hoover 20C, an undergraduate premed major who was so intrigued by the 1920s-era diaries of Emory professor and traveler William Shelton that he took a detour from his neuroscience and behavioral biology classes to explore, creating an interactive website that traces Shelton’s steps.

There’s Rafi Ahmed, a renowned immunologist who was parsing out how T cells respond to chronic infection when it became clear that his research had major implications for cancer treatments, too. He’s now collaborating with Winship researchers and making progress toward a clinical trial.

There’s Thomas Gillespie, an environmental scientist whose gritty, groundbreaking work in Madagascar has built new awareness around the urgent need for conservation, since it seems humans and animals swap germs a lot more easily and often than we previously thought.

There’s David Katz, a cell biologist who accidentally discovered a gene function that could help ward off diseases like Alzheimer’s before they start.

There’s Joseph Crespino, a history professor who mined thousands of pages of newspapers and letters in his deep research for a fictional biography of Atticus Finch; and Erin Tarver, an assistant professor at Oxford who brings the weight of classical philosophy to her analysis of professional sports.

As far as I know, there is no formula for calculating the worth of individual, original thought. But the mysterious processes and connections that spark and catch fire every day, quietly and invisibly, inside the heads of Emory’s faculty and students are the truest natural resource that universities have. That’s what really keeps the lights on.—Paige Parvin 96G
THE ARTICLE “THIS ACTION IS INEVITABLE” 

Inevitable” (summer 2017) about women at Emory reminded me of the story of Marjorie Gates, my mother. She had completed two years at Agnes Scott and applied to transfer to Emory in 1939. When she was interviewed by the university president, he asked her if she wanted to come to Emory to get her “MRS” degree (that is, find a husband). She said Emory had a better chemistry department than Agnes Scott, it had a payment plan, and she could ride to school with her brother, an Emory student. From Emory, she received a bachelor’s degree in 1940, a master’s degree in 1943, and (finally) an “MRS” in 1943, by marrying Dr. R. A. Day Jr., an Emory professor. Together, they raised four children, all of whom received degrees from Emory. Footnote: She did her graduate research under the direction of Dr. Evangeline Papageorge, mentioned in the article.

Michael A. Day 69C  
Pine Lake
Located in the basement of the Michael C. Carlos Museum, this is where conservators examine, document, and repair objects such as this Egyptian funerary mask and Hittite house model in preparation for exhibition or loan.
Chelsea Jackson 18C is one of thirty-two American college students selected as a 2018 Rhodes Scholar.

Jackson, a political science and African American studies double major in Emory College of Arts and Sciences, is the university’s twentieth student to be selected for the prestigious scholarship, which supports two to three years of study at the University of Oxford in England. She also is the fourth woman and the first African American student from Emory to receive the scholarship.

“I am immediately blessed to be selected,” says Jackson, who is from Lithonia, Georgia. “Just the resources available and the opportunity to live outside the US and interact and learn from scholars throughout the world is immense.”

Jackson has focused her undergraduate research and her community leadership on efforts to create a more equitable campus and Atlanta community.

“Chelsea is a passionate and committed student who uses her intellectual talents and commitment to social justice to better our world,” says President Claire E. Sterk. “She will be a wonderful ambassador for the United States and Emory as she continues her work at Oxford University.”

Jackson has been heavily involved with the Emory chapter of the NAACP and cofounded the Atlanta Black Students United (ATLBSU), a group with black student representatives from every school in metro Atlanta. The ATLBSU serves as a vital support system for students and a resource for allies.

Last year, she shifted from working as the group’s media representative to putting additional energy into her academic commitments.

Turning Ideas to Ideals

EMORY’S TWENTIETH RHODES SCHOLAR INTENDS TO IMPROVE THE CRIMINAL JUSTICE SYSTEM

ACTIVIST HEART Rhodes Scholar Chelsea Jackson will study criminology at Oxford University, which has a research center focused on the sociology of criminal justice. She wants to examine ways to reform the criminal justice system by, for instance, reducing the use of solitary confinement and expanding maternal rights for incarcerated women.
She presented a conference paper last year with her adviser, Andra Gillespie, associate professor of political science and director of Emory’s James Weldon Johnson Institute for the Study of Race and Difference. The project explores how different backstories influence public opinion when it comes to police shootings. She also was named Emory’s first Truman Scholar since 2011.

“Chelsea truly embodies the ideals of liberal arts and sciences education. Her pursuit of knowledge and inquiry informs her activism and her dedication to making our society a more just one for all,” says Michael Elliott, dean of Emory College and Charles Howard Candler Professor of English. “We are extremely proud of her, and I am looking forward to watching her career unfold as she leaves our campus to have an impact on the world beyond it.”

This year, Jackson is focused on her master’s thesis as Emory’s sole BA/MA candidate in political science. Her topic: examining whether the race of the prosecutor can affect racial discrepancies in the criminal justice system when looking at matters of discretion, such as whether to charge the accused with a felony or misdemeanor.

“Chelsea is brilliant,” Gillespie says. “She came to Emory with an abundance of brain power and the willingness to do the work to develop her skills. Her keen intellect and commitment to public service and social justice make her the student you dream of having the honor to teach.”

Jackson plans to earn a master’s degree in criminology at Oxford, home to a cutting-edge research center that focuses on the sociology of criminal justice. She hopes to examine how the law can be used to reform the criminal justice system by—for example—reducing the use of solitary confinement and expanding the maternal rights of incarcerated women.

“I want to learn how race and politics play out in other countries’ criminal justice systems to see how that shapes their worldview, and to consider new ideas and ways to solve problems that I have not thought of yet,” Jackson says.

After completing her Oxford degree, she plans to return to the US to attend law school to become a civil rights attorney, either with the Department of Justice or a broad-reaching nonprofit focused on social justice.

“The more empirical ideas I can learn, the more I can see how things are done elsewhere, the more I can be a better activist and propose better solutions,” Jackson says.—April Hunt

City Life

*Emory’s annexation into Atlanta approved*

The City of Atlanta and Emory announced in early December that the annexation of Emory had been approved by the City Council, effective January 1, 2018.

“Working together, Emory and the City of Atlanta will continue building a stronger future for neighborhoods across the metropolitan area,” says President Claire E. Sterk. “We enter this new stage of our relationship with enthusiasm and great optimism for what lies ahead.

“Emory is not leaving DeKalb County,” adds Sterk. “We remain steadfastly committed to our colleagues and neighbors in county leadership and beyond. Alongside the Centers for Disease Control and Prevention, Children’s Healthcare of Atlanta, and the other entities involved in annexation, we will pursue our shared mission of serving the common good in the greater metropolitan area and well beyond.”

Emory and the City of Atlanta have built alliances over many years. In addition to Emory University Hospital Midtown and Emory’s historical affiliations with Grady Hospital and the Morehouse School of Medicine, Georgia Tech and Georgia State, Emory’s stewardship of and investments in key business, arts, culture, and scholarship resources drive economic activity to the region.

“Emory and the city are entering an exciting new phase in their shared history and development,” says Robert Goddard, chair of the Emory Board of Trustees. “Our collaborative partnership will help Emory strengthen its commitment as a leading liberal arts research university to improving society on a local, national, and international scale.”
Emory Professor Max D. Cooper was named a laureate of the 2018 Japan Prize for the discovery of the dual nature of adaptive immunity, which identified the cellular building blocks of the immune system as we understand it today. The annual awards recognize pioneers in medicinal science and resources, energy, and environment and social infrastructure. Cooper is one of three scientists recognized this year for achievements contributing to the advancement of science and technology and promoting peace and prosperity for all mankind.

Emory leaders named as influencers
Emory President Claire E. Sterk and Emory Healthcare chair, president, and CEO Jonathan Lewin were among Georgia Trend magazine’s one hundred “Most Influential Georgians,” made up of leaders “who have exhibited the character necessary to inspire, challenge, lead, and influence us.” Doug Shipman ’93C, president and CEO of the Woodruff Arts Center, also made the 2018 list.

Justice at Emory Law
Sonia Sotomayor, associate justice of the US Supreme Court, visited the School of Law on February 6, participating in a Q&A with Professor Fred Smith Jr., who clerked for her during the October 2013 term. Sotomayor advised the rapt audience to engage fully in civic life. “Otherwise, we will be nothing but bystanders,” she warned. “Every one of us is here to make a contribution, but you have to have the heart to do it.”

Emory nursing graduates get a pass
Recent graduates of the Nell Hodgson Woodruff School of Nursing Accelerated Bachelor of Science in Nursing (ABSN) program achieved a 100 percent pass rate on the NCLEX national licensure exam, making it one of the top-performing ABSN programs in the nation. The school was ranked No. 4 nationally in the US News and World Report Best Graduate Schools guide and No. 1 in NIH funding among nursing schools.
Emory’s Board of Trustees has elected business executive Robert Goddard III to serve as its new chair. The resolution passed at the full board’s annual meeting in November.

Goddard, who has served as a trustee since 2008 and as vice chair of the board since 2016, succeeds John Morgan 67OX 69B, who is retiring as chair after serving in the role since 2013 and as an Emory trustee since 1996. Morgan will remain active as an emeritus trustee.

“Bob Goddard is a dynamic, thoughtful, and creative leader who understands the breadth and depth of Emory’s strengths and responsibilities as a leading research university,” says Emory President Claire E. Sterk. “His collaborative approach and his commitment to our faculty, students, patients, and alumni make him a compelling leader of, and advocate for, Emory University.”

Goddard is chairman and CEO of Goddard Investment Group, a privately held firm investing in commercial real estate, primarily in Atlanta, Dallas, Denver, Houston, Miami, and Washington, D.C.

“One of the qualities that sets Emory apart is our commitment to working together to transform society on a local, national, and international scale,” says Goddard. “I see that commitment across the university, from our colleges and graduate and professional schools, to our research and health care enterprises, each of which draws people from all over the world.”

Goddard, who holds a bachelor’s degree in economics from Mercer University, graduated from Harvard University’s Owners and Presidents Management program.

‘Twisted Roots and Branches’

ELLemann Lectures Trace Family Ties

T he 2017 Ellmann Lectures, given by acclaimed Irish author Colm Tóibín in November, turned on the subject of familial inheritance—or what Geraldine Higgins, codirector of the lecture series, calls “all the twisted roots and branches of the family tree.”

Tóibín’s subject was also personal, for he lost his own father when he was twelve and told a Guardian reporter in 2014, “Every writer has something in their childhood that nurtures them while seeming to be very damaging at the time.”

During the course of three lectures, Tóibín examined the lives and relationships of Oscar Wilde, James Joyce, and W. B. Yeats with their fathers. He began with the scandalous libel suit Oscar Wilde brought against John Douglas, the Ninth Marquess of Queensberry, after the latter—enraged over the affair between Wilde and his son, Lord Alfred “Boisie” Douglas—left an accusing card in plain view at Wilde’s club.

After a libel suit against his mother when Wilde was a child, the family maintained its social status. Based on this experience, Tóibín observed, Wilde “seriously misjudged how the judge, jury, and public would view him.” Despite being the toast of London in 1895, when The Importance of Being Earnest was entertaining audiences, Wilde would lose his trial, be sentenced to two years of hard labor, and fall out of favor with the public.

Tóibín took on the father of poet W. B. Yeats, John Butler Yeats, who abandoned his family to pursue life as a painter, only to have his success eclipsed by his sons, W. B. as a poet and Jack as a painter. Says Tóibín, “the father’s exile was enabling and inspiring for the son’s work.”

In the final lecture, Tóibín characterized James Joyce’s father as incapable of managing the family finances and was, according to James’s brother Stanislaus, “a man of absolutely unreliable temper.” Despite this, the elder Joyce would inspire his son’s work. “Hundreds of pages, and scores of characters in my books, came from him. I got from him his portraiture, a waistcoat, a good tenor voice, and an extravagant, licentious disposition, out of which, however, the greater part of any talent I may have springs,” Joyce wrote to his mentor, T. S. Eliot.

Tóibín concluded, “instead of openly killing his father, James Joyce sought not only to memorialize him but . . . use what he needed from his father’s life to nourish his own art.”—Susan Carini 04G
A system of lifeless particles can become “lifelike” by collectively switching back and forth between crystalline and fluid states—even when the environment remains stable.

Particles may be small, but in the field of physics, this is huge. Physical Review Letters recently published the findings by Emory physicists, the first experimental realization of such dynamics. “We’ve discovered perhaps the simplest physical system that can consistently keep changing behavior over time in a fixed environment,” says Justin Burton, assistant professor of physics. “In fact, the system is so simple we never expected to see such a complex property emerge from it.”

Many living systems—from fireflies to neurons—switch behaviors collectively, firing on and then shutting off. But the current paper involved a nonliving system: Plastic particles, tiny as dust specks, that have no “on” or “off” switches.

“The individual particles cannot change between crystalline and fluid states,” Burton says. “The switching emerges when there are collections of these particles—in fact, as few as forty. Our findings suggest that the ability for a system to switch behaviors over any time scale is more universal than previously thought.”

Burton’s lab studies the tiny, plastic particles as a model for more complex systems. They can mimic the properties of real phenomena, such as the melting of a solid, and reveal how a system changes when it is driven by forces.

The particles are suspended in a vacuum chamber filled with a plasma-ionized argon gas. By altering the gas pressure inside the chamber, the lab members can study how the particles behave as they move between an excited, free-flowing state into a jammed, stable position.

The current discovery occurred after Emory graduate student Guram “Guga” Gogia 22PhD tapped a shaker and slowly “salted” the particles into the vacuum chamber filled with the plasma, creating a single layer of particles levitating above a charged electrode. “I was just curious how the particles would behave over time if I set the parameters of the chamber at a low gas pressure, enabling them to move freely,” Gogia says. “After a few minutes I could see with my naked eye that they were acting strangely.”

From anywhere between tens of seconds to minutes, the particles would switch from moving in lockstep, or a rigid structure, to being in a melted gas-like state. It was surprising because the particles were not just melting and recrystallizing but going back and forth between the two states.

“Imagine if you left a tray of ice out on your counter at room temperature,” Gogia says. “You wouldn’t be surprised if it melted. But if you kept the ice on the counter, you would be shocked if it kept turning back to ice and melting again.”

Gogia conducted experiments to confirm and quantify the phenomenon. The findings could serve as a simple model for the study of emerging properties in nonequilibrium systems.

“Switching is a ubiquitous part of our physical world,” Burton says. “Nothing stays in a steady state for long—from the earth’s climate to the neurons in a human brain. Understanding how systems switch is a fundamental question in physics. Our model strips away the complexity of this behavior, providing the minimum ingredients necessary. That provides a base, a starting point, to help understand more complex systems.”

—Carol Clark
A MATTER OF DEGREE

The Mellon Mays Undergraduate Fellowship program puts doctorates within reach for minority students

An Emory program that expands opportunities for underrepresented minorities to earn doctorates and faculty positions has received renewed funding from the Andrew W. Mellon Foundation.

Emory’s Mellon Mays Undergraduate Fellowship (MMUF) program will receive $131,000 for the current year. Emory selects its own fellows, rising juniors in Emory College with demonstrated academic excellence and serious intent to pursue a doctoral degree in selected humanities and social sciences.

“As we prepare our diverse student body to contribute as scholars and thought leaders in the academy and beyond, we are committed to sustaining an environment at Emory that promotes full participation and inclusivity. The MMUF program provides an ideal platform to advance this objective and to support our students as they pursue their education and development as thought leaders with diverse intellectual interests and perspectives,” says Dwight McBride, provost and executive vice president for academic affairs.

The latest grant will pay stipends and research support to ten junior and senior fellows during the academic year. The Mellon Foundation also provides funding to cultivate the kind of social capital—mentoring, grant writing, conference presentations, how-to-publish workshops—that often makes the critical difference in graduate school and faculty success.

“MMUF is essential,” says Carol Anderson, Charles Howard Candler Professor and chair of the Department of African American Studies, who leads the Emory program. “The glaring lack of diversity in the professoriate is evident across the United States, where, for example, Hispanic males comprise only 2 percent of all tenure-track faculty. The numbers are nearly as low or lower for African American and Native American men and women, as well as Hispanic women.”

Since it was established in 1988, MMUF has supported 762 PhD graduates. Emory, which joined the program in 2000, has launched seven so far, many of whom are now in tenure-track positions, along with several former students currently in graduate programs pursuing doctorates.

Bringing more underrepresented students into the doctoral pipeline has a profound impact on knowledge production, the retention of a diverse student body, and the intellectual strength that diversity brings to academic communities, Anderson says. “This is why we do this work. Because of the initial leadership of the late professor Rudolph Byrd and then professor Dianne Stewart, the MMUF program at Emory is, without question, first rate,” Anderson says. “Our fellows are completing their doctorates at Harvard, Northwestern, Michigan, Brown, Rutgers, and more. They are the recipients of major fellowships, including the Fulbright.”

Since the 1990s, Emory also has served as the formal launching point annually for 106 fellows by hosting the UNCF/Mellon Summer Institute, which introduces the newly selected students to life as an academic. In addition to Emory, they come from colleges across the country as well as two universities in South Africa.

Fellows in the four-week immersion institute attend lectures on topics such as research, work-life balance, and the art and philosophy of teaching, as well as engage in weekly writing exercises to hone their critical thinking and analysis abilities. They also create a prospectus that forms the foundation for a two-year research project with faculty mentors.

The summer program prepares fellows for the MMUF, which, in addition to stipends, provides each cohort with ongoing mentoring, research support, and professional guidance from faculty, coordinators, and graduate students.

Fellows enrolled in PhD programs up to thirty-nine months after earning a bachelor’s degree are also eligible for up to $10,000 in loan forgiveness.—April Hunt

SERIOUS STUFF The Mellon Mays program prepares the next generation of college professors, helped by leaders like Cynthia Neal Spence (left), UNCF/Mellon programs director at Spelman College.
People who think farther into the future are more likely to invest money and to avoid risks, according to new findings by Emory psychologists.

While that conclusion may not seem revelatory, previous findings on the subject have been inconsistent—possibly due to factors such as observer bias in a lab setting and small sample sizes. What’s notable about this research, published by the Proceedings of the National Academy of Sciences (PNAS), is that it tapped big data tools to conduct text analyses of nearly forty thousand Twitter users and to run online experiments of behavior of people who provided their Twitter handles.

“Twitter is like a microscope for psychologists,” says coauthor Phillip Wolff, associate professor of psychology. “Naturalistic data mined from tweets appears to give insights not just into tweet- ers’ thoughts at a particular time, but into a relatively stable cognitive process. Using social media and big-data analytical tools opens up a new paradigm in the way we study human behavior.”

Coauthor Robert Thorst16G 22PhD, a grad student in the Wolff lab, came up with the idea for the research, worked on the design and analyses, and conducted the experiments.

“I’m fascinated by how peoples’ everyday behavior can give away a lot of information about their psychology,” Thorstad says. “Much of our work was automated, so we were able to analyze millions of tweets from thousands of individuals’ day-to-day lives.”

The future-sightedness found in individuals’ tweets was short—usually just a few days—which differs from prior research suggesting future-sightedness may stretch years.

“One possible interpretation is that the difference is due to a feature of social media,” Wolff says. Another possible reason is that prior studies explicitly asked individuals how far they thought into the future, while the PNAS paper used the implicit measure of previous tweets.

The researchers used a suite of methods to automatically analyze Twitter text trails previously left by individual subjects. Experimental data was gathered using the Amazon crowdsourcing tool Mechanical Turk, a website where individuals can complete psychology experiments and other internet-based tasks.

In one experiment, Mechanical Turk participants answered a classic delay discounting question, such as: Would you prefer $60 today or $100 in six months?

The participants’ tweets were also analyzed. Future orientation was measured by the tendency of participants to tweet about the future compared to the past. Future-sightedness was measured based on how often tweets referred to the future, and how far into the future.

The results showed that future orientation was not associated with investment behavior, but that individuals with far-future-sightedness were more likely to choose to wait for future rewards than those with near-future-sightedness. That indicates that investment behavior depends on how far individuals think into the future, rather than their tendency to think about the future in general.

“Twitter can provide a much broader participant pool than many psychology experiments that primarily use undergraduates as subjects,” Thorstad says. “Big data methods may ultimately improve generalizability for psychology results.”
The National Science Foundation has awarded another $20 million to Emory’s Center for Selective C-H Functionalization (CCHF) to fund the next phase of a global effort to revolutionize the field of organic synthesis.

“Our center is at the forefront of a major shift in the way that we do chemistry,” says Huw Davies, professor of chemistry and the director of the CCHF. “This shift holds great promise for creating new pathways for drug discovery and the production of new materials to benefit everything from agriculture to electronics.”

The CCHF began in 2009 as an NSF Center for Chemical Innovation, with a seed grant of $1.5 million and four collaborating universities. In 2012, the NSF awarded the CCHF its first $20 million, enabling it to grow to encompass sixteen US institutions and seven industrial affiliates, including six major pharmaceutical companies and one of the largest US chemical suppliers. The center also built global connections with major players in C-H functionalization in Japan, South Korea, and the UK.

The CCHF has led the way for explosive growth in the field of C-H functionalization, publishing more than two hundred papers on the topic through its collaborators. It has developed dozens of new catalysts for C-H functionalization, including four major classes from the Huw Davies group.

“During the past five years, we’ve developed the fundamentals for C-H functionalization and documented that the concept is viable,” Davies says. “Now we’re ideally positioned to maximize the further development of this chemistry and move forward to apply it.”

Traditionally, organic chemistry has focused on the division between reactive, or functional, molecular bonds and the inert, or nonfunctional bonds carbon-carbon (C-C) and carbon-hydrogen (C-H). The inert bonds provide a strong, stable scaffold for performing chemical synthesis with the reactive groups.

“C-H functionalization flips this model on its head. We’ve devised ways to make C-H bonds react so that they become functional,” Davies says. “And we’ve reached the stage where it is no longer the molecule itself that determines the process of the reaction—we’ve developed advanced catalysts that allow us to control which carbon-hydrogen bond within a molecule will react and when.”

C-H functionalization opens unexplored chemical space by taking petroleum byproducts, which have a lot of carbon-hydrogen bonds, and transforming them from waste into useful materials. It also strips out steps from the linear process of traditional organic synthesis, making it faster and more efficient.

The CCHF is not only transforming organic synthesis—it’s also creating new models for the way organic chemistry is taught and how labs conduct research. Where previously individual labs tended to work in isolation to tackle problems, the CCHF has broken down walls across specialties, institutions, and even countries to collectively take on the remaining challenges of selective C-H functionalization.

“We’ve got this incredible collaborative environment where organic chemists aren’t just sharing results—they’re sharing ideas,” Davies says. “That’s rare. And we’ve expanded beyond our network of universities to also engage the pharmaceutical industry.”

In 2015, the CCHF launched online symposia on recent advances in C-H functionalization. Graduate students and chemistry faculty from up to forty-five countries join the symposia, held about four times a year.

“We have leading voices in the field give these free talks that are easy to join live and participate in,” Davies says. “The aim is to further expand the field of C-H functionalization by introducing it to graduate students and other chemists around the world.”—Carol Clark
The Power of Plants

Cassandra Quave, an ethnobotanist with Emory College's Center for the Study of Human Health, elicits a handful of nods when she asks whether her students have seen or grabbed a bottle of aloe juice at a high-end grocery checkout. So-called green juices are restorative, according to ads propped up by the bottles. Good for the skin, one student murmurs. But today Quave is talking to her medical botany class about plants used for gastrointestinal needs. She explains that an Egyptian medical papyrus of herbal knowledge, dating to 1550 BC, identified aloe vera as a treatment that still works today: the stimulant from the family of lowering plants solves constipation by quickly speeding up the colon muscles.

“It always makes me laugh, because it’s basically a jug of laxative that people shouldn’t be chugging, but will, right as they stand in line,” Quave says of the neon green aloe juices. “It makes me wonder if they make it home without stopping.”

From aspirin to the chemotherapy drug Taxol, some of the world’s most common and important medicines come from plants. Quave’s Botanical Medicine and Health course combines botany, chemistry, anthropology, and pharmacology to give students the practical ability to suss out what is marketing and what is science when it comes to plant-based “cures” such as the aloe juice.

With a patent on a compound she teased from the roots of an elmleaf blackberry that helps battle antibiotic-resistant staph, Quave is a sought-after instructor. She starts with the ancient history and cultural interactions of botanical medicine before zipping through the plants that form the basis of drugs for everything from infectious diseases to cancer and the safety and ethical issues in ongoing research.

“Once they understand the Latin names of the plants and see how related species share chemistry, they can connect the dots to see how it all works,” Quave says. “That’s when it is really great, because so many of them say they think about the world and their health in a whole new way.”

A course that details the plant compounds and the underlying mechanisms of action of botanical drugs is also a prime example of the human health program, a pioneering effort that highlights Emory’s diverse efforts in health education, research, and the liberal arts.

Stephanie Pintas 1BC, a human health major, says the course has reinforced her plans to focus on integrative medicine—with its approach to preventive, holistic care—after medical school.

Pintas had her own success in researching apple cider vinegar as a treatment for skin fungal infections. The acidic pH of the vinegar can balance the alkaline pH that comes from such infections, effectively slowing the growth of the fungus.

“Homeopathy has given botanicals a bad rap, I think. But if you look at the science, you can see there is a lot of potential in plants. It’s good science,” says Pintas, who is further exploring her research in Quave’s lab as part of her honor’s thesis. Such knowledge is important not just for would-be physicians but also for anyone who wants to think more deeply about their own health care.

First-year student Kat Bagger 21C developed an understanding of the fine line between toxicity and treatment that comes with plant-based medicines. Digitalis, for instance, comes from the poisonous foxglove plant, but controlled use of the plant’s cardiac glycosides helps with congestive heart failure.

“I was one of those people who thought natural meant safe, but it’s so much more complex than that,” says Bagger. “It’s so eye-opening.”

—April Hunt
Scientists at Yerkes National Primate Research Center have identified an additional part of the HIV reservoir, immune cells that survive and harbor the virus despite long-term treatment with antiviral drugs. The findings are published online in the journal *Immunity*.

The cells display a molecule called CTLA4, the target of an FDA-approved cancer immunotherapy drug, ipilimumab. This information should help those trying to eradicate HIV from the body.

Researchers led by Mirko Paiardini, associate professor of pathology and laboratory medicine at the School of Medicine and Yerkes and part of the Emory Vaccine Center, infected macaques with HIV’s relative SIV and treated them with standard antiviral drugs similar to what humans receive for HIV. At the time of analysis, eight out of nine of the animals showed undetectable SIV in their blood. The team probed for CD4+ memory T cells, which are known to shelter persistent virus.

“We found that a certain group of memory CD4+ T cells displaying CTLA4, but not another co-inhibitor receptor called PD1, harbor viral DNA at higher frequencies than other groups of memory CD4+ T cells,” Paiardini says. “These cells can be found in multiple tissues, such as lymph node, spleen, gut, and bone marrow, and contain replication-competent and infectious virus.”

Guido Silvestri, division chief of microbiology and immunology at Yerkes and a Georgia Research Eminent Scholar, is a coauthor of the study. The Yerkes team worked with researchers at NCI/Leidos Frederick, led by Jacob Estes, using a technique called “DNAscope,” to visualize latently infected cells in lymph nodes. Previous research had shown HIV-infected cells persist in regions of the lymph nodes called B cell follicles. The newly identified group of infected cells is found outside the B cell follicles.

Working in collaboration with Rafick Sekaly at Case Western Reserve University, the research team also showed the CTLA4-positive PD1-negative cells have the characteristics of regulatory T cells, whose job is to put a brake on the immune system and prevent it from getting too excited.

“It provides a strong rationale for targeting these cells,” Paiardini says. “Depleting latently infected T-regs can not only reduce the reservoir, but also induce a stronger antiviral immune response.”

The researchers also worked with Vincent Marconi, a physician treating HIV in Atlanta, to confirm similar cells were present in human lymph nodes.

The human samples came from six HIV-positive individuals who had been on antiviral drugs for an average of three years.

Based on the team’s findings, Paiardini says, CTLA4 should be considered as an additional target when designing immunotherapies aimed at purging the viral reservoir.

**SEEKING THE CELLS WHERE HIV HIDES**

*Yerkes experts have identified new targets in HIV-infected patients already on antiviral treatments*

For decades, the Woodruff Foundation has served as the university’s advocate and partner, supporting education and making greater quality of life possible for Emory’s patients. In 1979, Robert W. Woodruff, the late leader of The Coca-Cola Company, and his brother, George Woodruff, gave Emory the then-record sum of $105 million, the first nine-figure gift to an institution of higher education.

The recent gift “will allow us to accelerate the scientific discoveries needed for breakthroughs in patient care and to extend our reach in reducing the burden of disease for patients and their families,” says Jonathan Lewin, Emory executive vice president for health affairs.
Global biomedical and public health research—whether introducing genetically modified mosquitoes to fight dengue fever or testing new medicines to prevent HIV transmission from mother to child—is aimed at finding and implementing solutions to some of the world’s most pressing health problems. That’s obviously a fundamentally ethical pursuit. Isn’t it?

Yes, says James Lavery, recently named the first Conrad N. Hilton Professor in Global Health Ethics. But failure to understand the social and political context in which the work is being done, or to know and address how stakeholders perceive a project’s implications, has the potential to sink even the most well-intentioned, well-funded, otherwise well-designed research study.

Lavery, who also is a faculty member in the Emory Center for Ethics, likens what he does to being an architect. He works with people who may be designing lovely and functional structures to make sure they don’t build upon unstable foundations or in unsuitable locations.

Consider the mosquito net program that died because the white color of the net represented death in the country where it was being tested. Or the HIV pre-exposure study that was abruptly shut down after the sex workers involved in the study, who felt their concerns had not been taken seriously, staged a protest at an international AIDS meeting. Both projects likely looked great on the blueprint but fell apart in the construction phase.

Global research is especially tricky, says Lavery, since the majority of programs are conducted in low- and middle-income countries by researchers and funding from high-income countries.
Researchers face different cultures, different languages, an imbalance of power and knowledge, and, sometimes, lingering distrust and fear of exploitation.

Lavery works to ensure that the core commitments and ethical intentions of global health research are translated into action and preserved through relationships with stakeholders, beginning with the scientists and people who fund them, and extending throughout the communities touched by studies.

He’s most interested in what he calls the human infrastructure of global health ethics, and community engagement is how this infrastructure comes about—how researchers identify and manage non-obvious stakeholder interests, demonstrate respect and trustworthiness, and build legitimacy by creating opportunities for dialogue and deliberation.

“I’m not trying to introduce additional obstacles for scientists,” says Lavery. Instead, he consults with them—and the people who fund them—to help plan, design, manage, and evaluate strategies for engaging with stakeholders in order to make their research more successful and ethically robust.

Creating a community engagement strategy is like imagining and creating a building, Lavery says. He sits with the scientists, discussing their vision, what they hope their “building” will accomplish and for whom. Who are the stakeholders? What are constraints of space, budget, regulations? Will it fit? Be appropriate? Accepted?

“Our work has been to figure out analogous elements, such as terms of research partnerships, ethical commitments, and guiding principles—methods for integrating community engagement activities with program management,” Lavery says. “We then help researchers and funders integrate these elements to develop blueprints and project management strategies.”

Based on years of investigating such “buildings,” including many that never got off the ground, Lavery and his team are constructing a “Learning Platform” to facilitate the process for funders and researchers. Each new building, or project, is completely different and customized.

James Curran, dean of the Rollins School of Public Health, believes Lavery will “provide leadership in public health ethics across the university and serve as a resource to Emory’s global ethics partners.”—Sylvia Wrobel
SALVAGING WRECKAGE

With more than three hundred thousand motor vehicle deaths in the US each year, and more than one thousand in Georgia alone, most of us either have been directly affected by a car accident or worry that we will be.

A new research project could steer those statistics in a better direction. Emory’s Injury Prevention Research Center, along with Grady Memorial Hospital and collaborators at the University of Michigan, have been awarded almost $4 million for a five-year project to study motor vehicle crashes in the metro-Atlanta area that result in injuries treated at Grady. The project is funded by the National Highway Traffic Safety Administration (NHTSA) and will create a Crash Injury Research and Engineering Network (CIREN) center for research.

With a goal to improve vehicle safety and support injury prevention, CIREN centers collect data on the performance of vehicles in crashes and the resulting injuries. CIREN is one of the NHTSA’s major data collection systems for motor vehicle crashes. Following an extensive quality-control process, CIREN case data are then made available to the public.

“Data from CIREN centers help drive rulemaking to make vehicles safer for passengers,” says Jonathan Rupp, associate professor of emergency medicine and principal investigator of the newly formed CIREN center at Emory and Grady. “CIREN relies on high-volume trauma centers like Grady’s Marcus Trauma Center to conduct research on injuries following car crashes. This CIREN award would not have been possible without the strong, collaborative relationship between Emory and Grady.”

Participants will be enrolled in the study when brought by ambulance or helicopter to Grady, Georgia’s busiest Level 1 trauma center, following a crash. The Emory/Grady center is one of seven designated CIREN centers in the US.

“Data from CIREN centers help drive rulemaking to make vehicles safer for passengers.”

CIREN centers are awarded funding for research for either a medical center arm or an engineering center arm. The Emory/Grady collaboration is one of two programs in the country that have been awarded both a medical center and an engineering center designation.

“This is an incredible honor that reflects the national prominence of Grady’s Marcus Trauma Center and the expertise of the engineering and medical teams brought together for this project,” says David Wright, professor of emergency medicine at Emory and coprincipal investigator of the CIREN award. “Collaborators will spend the next five years collecting and analyzing data to better understand the mechanisms of injuries from modern automobiles.”

Researchers expect to investigate sixty to sixty-five metro-Atlanta automobile crashes per year that result in injury. At the completion of the study, the investigators hope to have data on more than three hundred patients injured in crashes.

“Motor vehicle accidents are the No. 1 trauma we see at Grady, resulting in thousands of crash victims each year,” says Peter Rhee, chief of acute care surgery at Grady Health System. “We are excited to continue contributing to the work in the new CIREN center, in hopes of better understanding how to continually improve the safety of our drivers and passengers.”
The fear of holes, or trypophobia, is linked to a physiological response more associated with disgust than fear, according to a new study published in PeerJ.

Trypophobia is not officially recognized in the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders. But many people report feeling an aversion to clusters of holes—such as those of a honeycomb, a lotus seed pod, or even aerated chocolate.

“Some people are so intensely bothered by the sight of these objects that they can’t stand to be around them,” says Stella Lourenco, associate professor of psychology, whose lab conducted the study. “The phenomenon, which likely has an evolutionary basis, may be more common than we realize.”

Previous research linked trypophobic reactions to some of the same visual spectral properties shared by images of evolutionarily threatening animals, such as snakes and spiders. It is well-established that viewing images of threatening animals generally elicits a fear reaction in viewers, associated with the sympathetic nervous system, called the fight-or-flight response, in which the heart and breathing rate goes up and the pupils dilate. The researchers wanted to test whether this same physiological response was associated with seemingly innocuous images of holes.

They used eye-tracking technology that measured changes in pupil size to differentiate the responses of study subjects to images of clusters of holes, images of threatening animals, and neutral images. Unlike images of snakes and spiders, images of holes elicited greater constriction of the pupils—a response associated with the parasympathetic nervous system and feelings of disgust.

In contrast to a fight-or-flight response, a parasympathetic response slows heart rate and breathing and constricts the pupils. “These visual cues signal the body to be cautious, while also closing off the body, as if to limit its exposure to something that could be harmful,” says Vladislav Ayzenberg PhD, a graduate student in the Lourenco lab and lead author of the study. The authors theorize that clusters of holes may be evolutionarily indicative of contamination and disease—visual cues for rotten or moldy food or skin marred by infection.

The subjects involved in the experiments were college students who did not report having trypophobia. “The fact that we found effects in this population suggests a quite primitive and pervasive visual mechanism underlying an aversion to holes,” Lourenco says.—Carol Clark

Direct electrical stimulation of the human amygdala, a region of the brain known to regulate memory and emotional behaviors, can enhance next-day recognition of images when applied immediately after the images are viewed, neuroscientists have found.

The findings are the first example of electrical brain stimulation in humans giving a time-specific boost to memory lasting more than a few minutes, the scientists say. Patients’ recognition only increased for stimulated images, and not for control images presented in between the stimulated images. The experiments were conducted at Emory University Hospital in fourteen epilepsy patients undergoing intracranial monitoring, an invasive procedure for the diagnosis of seizure origin, during which electrodes are introduced into the brain.

“We were able to tag specific memories to be better remembered later,” says co-first author Cory Inman, postdoctoral fellow in the Department of Neurosurgery, who calls the result more of a scientific finding than a therapeutic one.

“We see this as a platform for the further study of memory enhancement,” says senior author and Emory neurology and neurosurgery professor Jon Willie. “The time specificity enables a lot of other experiments, since we know that there’s not a carry-over effect from one image to the next.”
A drug that stimulates neuron pruning can nudge mice away from habit-driven behaviors when combined with retraining, neuroscientists have found.

The results were published on November 30 in *Nature Communications*. The drug fasudil, approved in Japan for cerebral vasospasm and stroke, inhibits an enzyme that stabilizes cells’ internal skeletons. The researchers suggest that fasudil or similar compounds could be effective tools for facilitating the treatment of drug abuse and preventing relapse.

A large portion of the actions people perform each day come from habits, not from deliberate decision making. Going on autopilot can free up attention for new things, but it can also be detrimental in cases of drug-seeking behavior, says lead author Shannon Gourley, assistant professor of pediatrics, psychiatry, and behavioral sciences at the School of Medicine and Yerkes National Primate Research Center.

“Some habits are adaptive—for example, turning off a light when you exit a room—but others can be maladaptive, such as habitual drug use. We wanted to try to figure out a way to help ‘break’ habits, particularly those related to the highly addictive drug cocaine,” says Gourley.

She and former graduate students Andrew Swanson 17PhD and Lauren Depoy 16PhD tested fasudil in situations where they had trained mice to poke their noses in two chambers, based on rewards of both food and cocaine. Then the researchers changed the rules of the game. The mice had to learn something new, in terms of where to poke their noses to get the reward. In particular, the mice could now only get a reward from one chamber instead of both.

Fasudil helped the mice adjust and display “goal-directed” behavior, rather than their previous habit-based behavior by training the mice to supply themselves a sweet cocaine solution. Then researchers changed the nature of that experience by pairing the cocaine with lithium chloride, which made the mice feel sick. Fasudil treatment nudged the mice to give themselves less cocaine afterwards, rather than continuing to respond habitually.

The scientists envision this as modeling negative experiences associated with cocaine use in humans.

“Humans may seek treatment due to the negative consequences of cocaine abuse, but many people still relapse. We’re trying to strengthen the goal of abstaining from drug taking,” says Gourley.

Additional experiments revealed that fasudil didn’t make cocaine itself less pleasurable, but was specifically modifying the habit process—without affecting other forms of decision making.

Unlearning habits involves re-modeling connections made by cells in the brain. In the mouse retraining experiments, fasudil seems to work by promoting the pruning of dendritic spines, the structures that help neurons communicate and embody the strength of connections between them. In mice, fasudil appears to slightly reduce the density of dendritic spines in a region of the brain that is important for learning new behaviors.

“In this context, we imagine that fasudil is optimizing signal to noise, so to speak, allowing this brain region to efficiently guide decision making,” says Gourley. When fasudil is given to the mice a day after training, no changes in spine density are seen, indicating that it must be paired with new learning to have that effect.

Fasudil also inhibits Rho kinase, which stabilizes a major component of cells’ internal skeletons, loosening up cell structures.

Caution is in order when it comes to synaptic pruning, which can have unintended effects. Still, the study concludes, “Pairing Rho kinase inhibitors with cognitive behavioral therapy in humans could be an effective pharmacological adjunct to reduce the rate of relapse.”
The Jeschke-Graham Reading Room
Special collections materials at Pitts Theology Library include a 1470 edition of Eusebius’s Preparation of the Gospel. Though there are other extant copies of this printed work, the hand-painted illumination makes it truly unique.
NO ONE EXPECTED THE MICE TO SIMPLY DROP DEAD.

But they did. Their sacrifice led to an encouraging new direction in Alzheimer’s research at the Emory laboratory of David Katz.

In another campus research project, Emory scientists led by Keqiang Ye PhD have identified a therapeutic compound that may arrest the progressive dementia associated with both Alzheimer’s disease and Parkinson’s disease.

While following different approaches, both projects are using basic science research to unpack the complex mechanisms underlying neurodegenerative disease and find ways to arrest it.

“The biggest risk factor for Alzheimer’s and other dementias is age, and we have an aging population,” observes Susan Peterson-Hazan, the Education Core coleader at the Alzheimer’s Disease Research Center (ADRC) and a licensed clinical social worker who coordinates Alzheimer’s family education programs offered by Emory.

The US Census Bureau reports that 49 million Americans are age sixty-five and over, a number projected to jump to 88.5 million by 2050. The number of Americans with Alzheimer’s, according to the Centers for Disease Control and Prevention (CDC), is expected to rise proportionately from 5.5 million in 2017 to nearly 14 million by 2050.

The impact of this massive public health dilemma will be felt in every corner of society and the economy, according to Peterson-Hazan, particularly in the health care industry, state and federal budgets, business, and in the financial well-being of family caregivers. Direct caregiving costs alone could reach $1.1 trillion annually by 2050, the CDC estimates.

Then there’s the emotional cost. “It’s not unusual to see a family member drop off a loved one with Alzheimer’s at the emergency room, saying, ‘Doc, I can’t do it anymore. I know this isn’t the best thing, but there’s nothing else I can do.’” says Merrick “Rick” Lipman 95C 00M, an emergency room physician at the Veterans Administration (VA) Hospital in Decatur. “And it’s not just at the VA—this happens at community hospitals everywhere when family caregivers have reached their emotional and physical limit and don’t know what to do anymore.”

Says Peterson-Hazan, “If we can alter the course of the disease so it doesn’t progress, that would be an incredible gift to individuals, their families, and the community, and that’s of course the research goal.”

The gene lysine-specific demethylase 1 (LSD1) plays a critical role in the earliest stages of embryonic development by enabling undifferentiated cells, including stem cells, to turn into specific types of cells, such as neurons. It also serves an important regulatory function by ensuring that other genes that are supposed to be “off” remain so, thereby allowing embryos to develop correctly. Katz and his graduate students were studying the gene to learn more about how defects in the differentiation process may cause disease in the reproductive system.

In one early experiment, LSD1 was removed from a group of mice using genetic tools in combination with a
“drug-inducible knockout system.” LSD1 was deleted from the intended target areas, but also from the mice brains. The mice became cognitively impaired and paralyzed. Examination of their brains revealed changes in inflammation, cell metabolism, and cell communication consistent with Alzheimer’s disease and frontotemporal dementia (FTD), according to Katz.

At about the eight-week mark, all the mice died; it’s highly unusual for a gene-deletion procedure to result in death so quickly in adult mice.

Postmortem examination of the mice showed neurodegeneration and brain cell death in the hippocampus, the area of the brain associated with memory.

Perhaps even more remarkable, none of the mouse tissue samples contained the accumulation of sticky, toxic proteins—tau and beta-amyloid—generally considered to be the cause of dementia symptoms and cell death.

Following up with tissue samples from human Alzheimer’s and FTD patients, researchers found LSD1 embedded within the tangles of tau protein, but not in the nucleus where they belong, suggesting that cell death may not be caused exclusively by aggregates of tau and beta-amyloid after all, and instead are potentially related to LSD1 function.

“We stumbled onto something that nobody had considered,” says Katz. “We believe LSD1 could be either the major downstream component or maybe even the only downstream component for Alzheimer’s and FTD.”

The researchers hypothesized that neurons may require some kind of ongoing maintenance to remain viable and that this maintenance might be vulnerable to toxicity. “Most people think that once a cell becomes a skin cell or a neuron or whatever, that’s it—you no longer need the DNA-packaging mechanisms that LSD1 provides for the initial cell differentiation,” Katz explains. “Our data suggests that cell type needs to be continually maintained—at least in the brain—and this function is carried out by LSD1.”

He likens the process to housekeeping. “If you sweep the floor every day, you won’t get any dust buildup. But if you clean only once every few months, you’ll wind up with huge dust bunnies everywhere and your house will be a mess.”

 Tau protein aggregates build up in the brain as part of the natural aging process. The trouble apparently begins when LSD1 is blocked from entering the nucleus and then lost through attenuation, which is why it was significant that LSD1 was found in the aggregates in the tissue samples of human Alzheimer’s patients.

Once stuck in the aggregate, “it can’t get to the genes where it’s supposed to be doing its housekeeping job,” Katz notes.

“We think downstream processes—immune responses, cell cycle, and all kinds of things that cells have to do—are affected in Alzheimer’s disease because LSD1 is affecting a lot of different neural pathways, specifically repressing genes in many of those pathways.”

The next phase of the research, Katz says, includes a
series of experiments to identify a drug that will unstick LSD1 from the tau aggregates and force it back into neural nuclei, where it can perform its housekeeping function and prevent tau from killing neurons.

“LSD1 is a very interesting, completely novel target,” says Allan Levey, professor and chair of the Department of Neurology and director of the Emory ADRC. “There has been work over the past couple years suggesting that some other protein interactors with LSD1 in terms of regulating gene expression, particularly in development, may have an important role in Alzheimer’s disease. David’s work is the first to identify how important LSD1 is to that pathway and to neuron degeneration.”

Pioneering university-level research relies in great measure on the initiative, insight, and hard work of graduate students.

At the Katz lab, “most of the actual day-to-day experiments have been done by graduate students under my direction,” says Katz.

In fact, the initial discovery that the loss of the protein LSD1 in the mouse brain causes neurodegeneration that looks similar to Alzheimer’s in humans was made by neuroscience doctoral student Dexter Myrick 10C 22PhD, who joined the Katz lab in 2010 as a technician and has continued working there as a grad student.

“It was originally a stem cell project that turned into a neuroscience project,” says Myrick. “I was working on a project investigating the loss of LSD1 in adult testis stem cells in the mouse. However, this mouse was lacking LSD1 in the rest of its body as well. We monitor all our mice regularly for general wellness, and during these routine checks I started making some peculiar observations. It wasn’t until the first mouse succumbed to what appeared to be a neurodegenerative disease that I really took notice. At this point, I began monitoring these mice very closely and examining their brain tissue postmortem. That is how we made the initial discovery that all these mice lacking LSD1 were undergoing progressive neurodegeneration.”

Myrick’s current role in the lab is to further investigate what LSD1 is doing mechanistically in neurons. Specifically, how LSD1 regulates transcription via histone methylation in hippocampus neurons.

“In our mice, we are directly manipulating LSD1 levels, but in human Alzheimer’s, we think the interaction between LSD1 and tau is significantly reducing the levels of LSD1 available to be used in the affected neurons.”

Soon after Myrick’s unexpected finding, Michael Christopher 16PhD joined the research effort in early April 2012 while a genetics and molecular biology doctoral candidate.

“I did experiments and drug delivery where we deleted LSD1 out of the mice,” Christopher says, “and then I would monitor the mice and help do all the experiments that described what happens to the mice when you get rid of LSD1. I also performed all of the staining of the human brain tissue samples we had.”

He and Myrick are co-first authors of the paper describing the research, “LSD1 Protects against Hippocampal and Cortical Neurodegeneration,” published in October 2017 in the journal Nature Communications.

After graduating, Christopher accepted a postdoc position at the University of California–Los Angeles, where he studies cellular function similar to LSD1, but in a different system not related to neurodegeneration.

Amanda Engstrom 22PhD, a biochemistry, cell, and developmental biology major whose background included cancer and diabetes research, was highly intrigued by the Katz lab project. So when Myrick and Christopher asked if she’d like to pick up on their work, she jumped at the opportunity—and became a convert.
“I think it is super interesting,” says Engstrom. “I am also interested in pursuing a neuroscience postdoctoral fellowship, whereas I don’t think I would have considered that at all before.”

One of her projects in the Katz lab is investigating the specific interaction between tau and LSD1 that could lead to Alzheimer’s disease symptoms and neuronal cell death.

The shift in focus at Katz’s lab from stem cells to neurodegeneration required a tremendous amount of initiative on the part of his grad students, Katz says. “Even the techniques they were doing were things that we had never done in our lab,” he continues, “so we all tried to learn as quickly as possible.”

With Myrick the only neuroscientist in the bunch, Christopher and Engstrom demonstrated praiseworthy willingness to venture outside the comfort of their respective fields. Both were allowed to take neurosciences classes even though they were not formally enrolled in the program, which reflected well on the neuroscience program, Katz points out.

The great thing about working in the Katz lab was that “we followed the science and didn’t put ourselves in any kind of box,” Myrick says. “That gives you a unique perspective.”

Engstrom agrees. “We’ve learned a lot more by not sticking with what we already knew and following the data to wherever it leads us.”

Alpha-synuclein is to Parkinson’s what tau and beta-amyloid are to Alzheimer’s—sticky, toxic proteins that accumulate in brain cells, fostering progressive dementia and other symptoms of their respective diseases, and eventually causing neuron death.

Keqiang Ye, a professor in the Department of Pathology and Laboratory Medicine, heads an Emory research team that discovered an enzyme that acts on these substances in ways that accelerate their spread and toxicity in the brain.

Finding drugs to inhibit this enzyme—asparagine endopeptidase (AEP), which normally digests unneeded molecules from cells—could lead to treatments that halt the neurodegeneration of Alzheimer’s, Parkinson’s, and other dementias, he says.

The research began eight years ago, when Zhixue Liu, Ye’s postdoc at the time, prepared an experiment to investigate DNase inhibitor apoptotic degradation and mistakenly used an acidic solution instead of a neutral solution.

The accident produced a key finding, that AEP was activated under acidic conditions, but not under conditions with a neutral pH.

Ye knew that AEP cuts tau into smaller pieces, more prone to clump together and more toxic. Further experimentation showed that AEP has a similar effect on the beta-amyloid present in Alzheimer’s. Ye reasoned that AEP might also cut the alpha-synuclein protein that affects the brain cells of Parkinson’s patients. He was right.

Brain tissue samples from Parkinson’s patients revealed the presence of alpha-synuclein fragments, but not in control samples. In addition, AEP was found throughout the neurons, though it is normally confined to a particular part of the cell.

Ye says the question then became: As the brain becomes more acidic with age, “will this enzyme be activated and play some role in neurodegeneration?”

His work with mouse models supports the hypothesis that AEP contributes to the progressive build-up of proteins characteristic of Alzheimer’s and Parkinson’s disease.

“If we block this enzyme with inhibitors, we may be able to slow down the pathology and rescue the cognitive functions associated with these diseases, and also reverse the motor dysfunction in Parkinson’s,” he elaborates.

This aspect of Ye’s research is detailed in the July 2017 online edition of Nature Structural and Molecular Biology.

“We followed the science and didn’t put ourselves in any kind of box.”

“Dr. Ye is a prolific researcher who has embraced very big projects and has made a lot of progress across many fronts for Alzheimer’s and Parkinson’s disease,” ADRC’s Levey states. “He has been very successful developing therapeutic strategies based on his work.”

After screening about fifty-five thousand compounds, “We identified one brain-permeable compound that strongly inhibits the enzyme and prevents tau and alpha-synuclein cleavage in mouse models,” he says. “Now we are working on drug development and hope to initiate a clinical trial soon.”

Ye cautions against thinking of an AEP inhibitor as a possible cure-all. It’s not the only enzyme that cuts alpha-synuclein into small toxic pieces, and the full molecule can still aggregate and cause harm. Another unknown is whether an inhibited AEP would confer adverse effects on its waste-disposal function.

But given the urgency of finding effective treatments for Alzheimer’s and Parkinson’s, he believes the potential of this new approach is too exciting to not pursue.
Atwood Chemistry Center

The Dyer lab studies protein folding and functional dynamics—the structure and behavior of proteins. These amazing molecular machines perform functions relevant to critical challenges in human health and renewable energy. Pictured is a home-built resonance Raman spectrometer.
TRACING THE FOOTSTEPS OF

EMORY’S INDIANA JONES

By Scott Henry | Photography by Kay Hinton
Providing that historical context was one of the goals of the fall 2016 course Hoover was taking. Exploring the Ancient Mediterranean through the Carlos Museum had been conceived by Professor Cynthia Patterson as a way to leverage the collection housed next door to show students how firsthand study of artifacts can deepen—or perhaps challenge—one's interpretation of history gained through textbooks.

Many of the Carlos’s most significant pieces—including the oldest mummy in any American museum—had been brought from Egypt in 1920 by William Shelton, an Emory theology professor whose private journal and letters had been donated to the university in the 1980s. Almost as an aside, Patterson suggested to her class of undergraduates that Shelton’s papers could make for a worthwhile extracurricular research project.

“Sometimes in teaching, you just throw out hooks,” she now says.

Not long afterward, Hoover took the bait. A neuroscience and behavioral biology major on a premed track, Hoover had taken Patterson’s course because of his longtime interest in ancient Greece and Rome, but the Shelton detour piqued his curiosity. The Carlos Museum literature acknowledged that the professor had spent nearly a year traveling to Egypt, Iraq, Syria, Lebanon, and Israel in a search for artifacts for Emory, but Hoover wondered about the details of Shelton’s experiences. This was just after World War I—was such travel grueling, even dangerous? And how does one go about buying a mummy?

So, Hoover stopped by the Stuart A. Rose Manuscript, Archives, and Rare Book Library for a quick look at Shelton’s papers. In one of the first documents he reviewed, Shelton described in a journal entry how the expedition’s ship lurched to a halt on its way to Alexandria because a deadly Austrian naval mine left over from the war was spotted floating in its path.

“That’s what made me think that Shelton’s expedition was a lot more interesting than just a professor on a buying trip,” says Hoover.

Thus began Hoover’s own yearlong journey: applying for a university grant for summer study, spending hundreds of hours poring over more than 2,500 pages of Shelton’s letters and writings, meeting with Patterson to discuss how to interpret his findings, learning software coding in order to create an interactive online map showing Shelton’s travels, and, finally, delivering a presentation this past September playfully titled, “Emory’s Indiana Jones.”

Along the way, he followed the explorer’s exploits as Shelton described in his own words being captured by Syrian tribesmen, bribing an Iraqi warlord to provide safe passage through territory controlled by bandits, and visiting some of the most spectacular sites of antiquity—the Temple of Karnak and the Valley of the Kings in Egypt, the ancient cities of Ur and Babylon in Iraq, and the Dome of the Rock in Jerusalem.

“It felt a lot like a treasure hunt,” Hoover recalls. “His letters were a mix of family pleasantries and adventure tales”—punctuated by the occasional reference to a recognizable item in the Carlos collection.

Before he could launch his project, Hoover needed to obtain support. He had heard about the Summer Undergraduate Research Experience (SURE) program, which provides funding for students to continue their research full time over the summer months. Patterson

The Egyptian mummies, stone tablets, and ceramic vessels that first-year student Andrew Hoover 20C and his classmates were examining were millennia old and at least a century removed from the ancient tombs and sand pits in which they’d been found. Sitting in the gleaming cases and cool gray shelving of the Michael C. Carlos Museum, the objects were fascinating and exotic, mysterious save for the information typed onto their labels. What were the circumstances of their discovery? What efforts had gone into bringing them halfway around the world?
helped Hoover put together a proposal that netted him a stipend and on-campus housing for ten weeks. He is one of only about two hundred accepted each year by the Emory-run program, which also draws a select number of students from across the nation.

Patterson directs an interdisciplinary program called Ancient Mediterranean Studies, which takes a holistic view of the Greeks, Romans, Egyptians, and the other civilizations that vied for power and survival throughout the region. Not only would a study of Shelton’s travels draw direct connections between many of the places studied, but it also would form a link between ancient and modern times as the explorer navigated his way through a fraught postwar landscape in which the fading European colonial powers struggled to exert control over chunks of the crumbling Ottoman Empire.

Instead of returning to his home in Jacksonville, Florida, Hoover spent the first half of the summer sequestered in the Rose Library for some ten hours a day. Like other researchers, he was allowed to request one box of documents at a time, supervised by staff. Pages must be turned over carefully, often while wearing gloves to keep oil or other contaminants off the fragile paper. He used his smartphone to scan each page and upload it to his laptop, where he would make annotations in the virtual margins. In the evenings, Hoover would go on Google Books to read Shelton’s long-out-of-print memoir, *Dust and Ashes of Empires*, published in 1923.

William Arthur Shelton was a forty-five-year-old professor of Semitic languages at Emory’s Candler School of Theology when he was invited to join an expedition headed up by a friend, James Breasted, an eminent Egyptologist and University of Chicago professor who had recently founded that school’s Oriental Institute. While Breasted effectively had a blank check from the Rockefeller family to source artifacts for his institution, Shelton had the more modest backing of John Manget, a wealthy Atlanta cotton merchant and Emory booster.

“After the world war and the fall of the Ottomans, it seemed to many people like a good time to collect antiquities,” explains Patterson, who says the newly opened Mediterranean region was a little like the wild west—or, more properly, the wild Near East.

The expedition, grandly titled the American Scientific Mission, sailed from New York just before Christmas Day 1919 on a two-week transatlantic voyage. It was in the middle of the Mediterranean Sea when the ship encountered the stray mine. Shelton was alerted to the danger when he heard gunfire on deck from a crew member shooting at the explosive. “Our vessel was headed right into it and had we struck it we would perhaps have visited Davy Jones,” Shelton wrote home in a letter to his wife.

Arriving in Egypt in late January, the group headed up the Nile to Aswan, Luxor, and Abydos, which boast hundreds of royal tombs and prehistoric graves. Shelton would later write of walking through an ancient burial ground and seeing “grinning skulls sticking out of the debris, great mounds of broken pottery.” It was here that he bought his first mummy or, more accurately, a deconstructed set of mummy parts without a head—“just a bunch of rags and bones in a box,” says Hoover.

“Shelton remains something of an enigma to me, but I came to like him quite a bit.”
It wasn’t until nine decades later that radiocarbon dating confirmed that the body dated back four thousand years, making it the oldest mummy in the Western Hemisphere. In Cairo, Shelton bought many of the 220 items that would form the core of Emory’s collection, including ceramics, statuary, sarcophagi, and two more mummies. Some of the acquisitions came from the Egyptian Museum, others from private antiquities dealers, and still others from less established vendors. When Shelton secured a purchase, he’d mail it back to Atlanta from the local American embassy.

In the ancient Assyrian city of Nineveh—now modern-day Mosul—Shelton acquired a small item that was to be one of his major finds, the clay cylindrical seal of Nabopolassar, founder of the Neo-Babylonian Empire and father of King Nebuchadnezzar. Then, outside Aleppo, the party was captured by armed Arabs who released them only after discovering they were American rather than the hated British. Sailing for London in late July, the expedition finally returned to New York in September 1920.

During his research, Hoover saw Shelton’s personal side: his excitement at finding choice artifacts, his reverence for Christian holy sites, his sincere wonderment at seeing the Great Pyramid and the Sphinx, and, surprisingly, his increasingly chilly relationship with Breasted—who also wrote dismissively of Shelton in his own journal. Hoover also noticed a disconnect between what Shelton confided to his journal and the much rosier picture he painted for his wife. “His letters to his family are very relatable and personal, a mix of pleasantries and adventure tales” that omitted some of the near-disasters and narrow escapes, he says. On the other hand, his published memoir is much more formal and jingoistic as he repeatedly touts America as the greatest country on earth.

“Shelton remains something of an enigma to me, but I came to like him quite a bit,” Hoover says. Once Hoover completed his research, he worked for several more weeks with two specialists with Emory’s Center for Digital Scholarship, art historian Joanna Mundy PhD and librarian Megan Slemons, to develop an interactive web page showing the route of Shelton’s journey to the Near East. At each stop along the way, users can click on the map to learn what Shelton saw and did at that location, read excerpts from his writing and see the photographs he took to document his travels. Hoover also embedded links to pages in the Carlos’s website that show images of items collected at each location—when that information is known. Because of relabeling of artifacts over the decades, he had some difficulty determining the origin of some pieces, even after tracking down Shelton’s original list of acquisitions.

Shelton’s journey has been traced before. In 1989, when the Carlos was still known as the Emory University Museum, it staged Monuments and Mummies: The Shelton Expedition. The exhibition included a video showing Shelton’s route, with excerpts from his journal narrated by Professor Emeritus Max Miller PhD, who’d been a colleague of Shelton’s at Candler.

“We’re hoping more work can be done to further Andrew’s work and recreate some of the excitement of Shelton’s journey,” says Elizabeth Hornor, the Carlos’s longtime director of education. “Without Shelton’s acquisitions, the Carlos would not be the museum it is today, and his diaries and photographs are a wonderful opportunity for student research.”
Before his diagnosis of stage 4 metastatic lung cancer at fifty-nine, Ed Levitt had been a runner—proud of never needing a sick day, never missing a workout.

The closest he ever came to sick was when a local doctor diagnosed a severe pain in his side as kidney stones and sent him home to urinate in a strainer. No kidney stone appeared, but the pain went away. When it suddenly reappeared, a year later, it brought Levitt to his knees. A different doctor looked at his scans and told him he had six weeks to get his affairs in order.

Levitt, a sales director for Home Depot, had lots of business savvy but knew little about medicine. A neighbor insisted he call Winship Cancer Institute, an hour’s drive from his home in Acworth.

In 2004, an intensive workup at Winship confirmed metastatic non-small cell lung cancer (NSCLC) involving his lungs, lymph nodes, neck, spine, pelvis, and adrenal glands. “Cancer everywhere,” says Levitt. “I was a mess, sick and in pain.”

Levitt was placed on standard, state-of-the-art chemotherapy. It didn’t work. But Georgia’s only National Cancer Institute–designated comprehensive cancer center has earned a reputation for seeking, and finding, new ways to defeat the second-leading cause of death in the United States.

Levitt began a decade-long marathon of experimental treatments, taking advantage of Winship’s multidisciplinary clinical team and 250-plus active clinical trials. Whenever his cancer edged ahead, a different treatment pushed it back, simultaneously adding new knowledge to help both him and patients in the future.

In 2004, after chemotherapy failed, Levitt was among the earliest patients to receive gefitinib (brand name Iressa). At the time, clinicians and study investigators did not fully understand why his response to the new drug was so positive—tumors shrinking, pain gone, “my old normal back”—while other patients did less well.

Subsequent testing and studies showed that drugs like gefitinib get their power from inhibiting a mutation in the epidermal growth factor receptor (EGFR) gene. In healthy cells, EGFR allows healthy cells to grow, divide, and replace worn-out ones. In cancer cells, a mutation in EGFR allows—even encourages—their uncontrolled growth.
Genetic screening showed Levitt’s tumor was positive for the mutation, found in some 15 percent of NSCLC patients in the US. That provided a target for an evolving class of “precision” drugs aimed at specific mutations.

Taofeek Owonikoko, professor in the Department of Hematology and Medical Oncology at the School of Medicine and cochair of Winship’s Clinical and Translational Review Committee, believes another reason Levitt did well was the Winship team’s willingness to think outside the box. Surgery is generally not used for metastatic lung cancer, but Levitt’s case was unusual. His widespread cancer was responding to gefitinib everywhere except his adrenal gland. In 2008, surgical oncologist and professor David Kooby removed the adrenal mass, providing fresh tumor samples to use in emerging genetic testing that could predict the reason for treatment failure.

But it was working for Levitt. When Irressa was taken off the market, Fadlo Khuri, a former Winship oncologist and chair of the Department of Hematology and Medical Oncology, wrote a single patient protocol so that Levitt could continue to receive the drug through a special access program from the company, under direct FDA supervision and oversight by Winship’s safety committee.

The drug continued to hold the cancer back until 2011, when the only growth was...
in his lymph nodes. Surgical oncologist Keith Delman, professor and vice chair of education in the Department of Surgery, removed them, and Levitt returned to his active life, with regular scans and occasional radiation.

By April 2016, though, cancer was in the lead again—the drug stopped working. Levitt was a lucky exception; most patients develop resistance to gefitinib within two years. Now Owonikoko enrolled him in an international trial of a new, more advanced EGFR inhibitor: AZD9291 or osimertinib, brand name Tagrisso.

At the conclusion of the trial, led by Suresh Ramalingam—professor in the Department of Hematology and Medical Oncology, Roberto C. Goizueta Distinguished Chair for Cancer Research, and Winship deputy director—patients taking AZD9291 had significantly longer progression-free survival with lower rates of serious adverse reactions. The subsequent FDA approval was hailed as a new treatment paradigm for EGFR-mutation-positive patients—and a second chance for those like Levitt who had begun resisting earlier inhibitors.

But the very nature of cancer is to change. Eventually osimertinib went the way of its predecessors.

WHY SUCH RESISTANCE?
Ramalingam and Owonikoko turned to their basic-scientist colleague, Shi-Yong Sun, Winship professor of hematology and medical oncology. An expert in the biology of cancer, particularly the pathways involved in the survival and growth of cancer cells, Sun had a personal interest in resistance. His wife’s mother had died after her NSCLC stopped responding to a previously effective EGFR inhibitor. And he—an internationally known cancer researcher for more than twenty years, working with renowned clinicians at a top cancer center—did not know why. No one did.

To find the resistance-causing mechanism, Sun exposed human cancer cell lines with the EGFR mutation to gradually increasing dosages of AZD9291. As in patients, once-sensitive cells eventually became resistant. Comparing the before-and-after cell lines revealed excess expression of a cancer-causing oncogene called MET, another mutation found in 5 to 20 percent of NSCLC patients. When Sun added a MET inhibitor to AZD9291, the combination began to kill cancer cells again.

But what about the majority of patients without this particular mutation? Thanks to Sun’s lab, emerging understanding of the cascading biological signals that lead to cell survival or cell death may offer a solution. Since MEK and ERK proteins in this signaling pathway inhibit cancer cell death and promote cancer cell growth, Sun found that adding MEK/ERK inhibitors to the drug overcame acquired resistance, at least in cell cultures and in mice with tumors from EGFR-mutant NSCLC cells resistant to the drug. He believes this therapeutic strategy will work no matter what mutations or mechanisms are involved.

After observing both positive response and safety in tissue and animal studies, Sun, Ramalingam, and Owonikoko are now designing a Phase I clinical trial using existing drugs. Later, they plan to
work with longtime collaborator pharmacologist Haian Fu, head of the Emory Chemical Biology Discovery Center, to screen thousands of compounds to find one that could be optimized to take a different, potentially even more powerful approach.

**STAYING ONE STEP AHEAD**

When gefitinib no longer worked, and when side effects sidelined him from the new EGFR-inhibitor trial, Levitt immediately agreed to participate in another one. Until then, the drugs being tested had been designed to inhibit the effect of specific genetic mutations: targeted therapy, also known as personalized or precision therapy, one of the fastest-moving areas in cancer research at Winship and other leading centers. Now Levitt moved seamlessly into the other rapidly advancing area: the world of immunotherapy.

In the past, patients with EGFR-mutation-positive lung cancer were not considered good candidates for immunotherapy drugs like pembrolizumab (Keytruda), which help the immune system get back on track by blocking a receptor that turns it off. Ramalingam and others believed adding a drug like entinostat to Keytruda could change that. Entinostat selectively targets and attacks enzymes involved in tumors, upsetting their biochemical environment and paving the way for immunotherapy.

Entering the combined Keytruda-entinostat study also meant Levitt had now participated in the full scope of clinical trials. It was one of thirty Phase I trials under way at Winship, half of them in immunotherapy, designed to determine if a new treatment—already tested in cell cultures and animals—is safe to use at a range of dosages in humans with different types of cancers. Phase II looks at how well the treatment works for a certain type of cancer, and Phase III compares it with standard treatment.

“We wouldn’t have the treatments we do today if people like me weren’t willing to try new drugs in trials,” says Levitt.

A decade ago, Phase I studies were considered last-chance efforts, good at determining the best way to administer a new treatment but not so great at providing clinical benefit. That has changed markedly, says Donald Harvey, director of Winship’s Phase I Clinical Trials Unit.

Today, cancer is beaten back or held steady for more than one in five patients in these trials. At Winship, a growing number of patients on Phase I trials have seen improvement or extended periods of disease stability for more than five years. Sometimes a drug tested in Phase I is so obviously successful that it is fast-tracked for FDA approval without going through Phase II and III trials.

The reason for this begins in the laboratory, says Harvey, with a deeper, more complete understanding of the molecular biology involved in cancer and the immune response—and the development of drugs based on that understanding. This approach drives Sun’s work with resistance-based therapies as well as numerous other partnerships between laboratory researchers and clinicians at Winship.

Gregory Lesinski and Bassel El-Rayes, codirectors of Winship’s Translational Gastrointestinal Malignancy Program, have begun a Phase I trial at Winship to test a way to enhance immunotherapy for pancreatic cancer—one of the most devious and deadly of cancers—and colon cancer, one of the most common. A process called methylation turns off, or silences, genes that suppress tumors and repair DNA. When the team added a small molecule tested in Winship’s GI oncology lab to tissue cultures and mice with human pancreatic tumor cells, it turned the helpful tumor-suppressing genes back on.

Cell biologist Adam Marcus’s Winship laboratory has studied how the LKB1 gene mutation, found in 15 to 25 percent of patients with adenocarcinoma, a common form of NSCLC, increases the likelihood of metastasis and recurrence. The first step was discovering that the mutation causes overactive cell adhesion, an important step in metastasis. Second was demonstrating that a molecule to normalize adhesion lowered metastasis in mice with LKB1-mutated adenocarcinoma cells.

Now, after twelve years of collaborative research involving Marcus, Wei Zhou, and other Winship translational scientists
Today, cancer is beaten back or held steady for more than one in five patients in Phase I clinical trials.

A BETTER CHANCE
Donald Harvey, director of Winship’s Phase I Clinical Trials Section, says trials are no longer last-chance efforts that provide little clinical benefit. A growing number of Winship patients in Phase I trials have seen improvement or extended periods of disease stability for more than five years.

in cell biology, genetics, and drug development, as well as Ramalingam and pathologist Gabriel Sica, the team is gearing up for the first-ever clinical trial designed specifically for lung cancer patients with the LKB-1 mutation. Participants in the Phase I trial, headed by Ramalingam, will receive standard-of-care chemotherapy plus the molecule that prevented or reduced metastasis in mice. The trial also will determine if treatment has different effects depending on the location of the LKB1 mutation, increasing treatment personalization.

BACK FROM THE BRINK
Two years ago, when Lorraine Harris got the news that her NSCLC had returned with a vengeance, she told Owonikoko that she didn’t want to go through chemotherapy and radiation again.

The treatment had bought her almost three welcome years. But with cancer growing rapidly in her lungs and lymph nodes, what could she realistically expect?

“Dr. O,” as she calls him, gently reminded her that Winship is always developing and testing new treatments. And then Harris learned that she was going to have a granddaughter.

Her story began in 2015 with pain in her back. At her local hospital, she expected pain pills. Instead, she got tests—and a litany of diagnoses. Gallstones. Brain aneurysm and aortic dissection (a tear in the large blood vessel branching off the heart). And a mass in one lung, almost certainly cancer.

“I looked at my sister,” says Harris, “and we began to sob.”
She was referred to Emory University Hospital, where the life-threatening heart condition was the first order of business. That resolved, Winship interventional pulmonologists took biopsies and confirmed metastatic NSCLC. After six weeks of radiation with radiation oncologist Kristin Higgins and weekly infusions of carboplatin and paclitaxel chemotherapy with Owonikoko, her tumors began to shrink. For three-and-a-half years, the standard treatment kept Harris’s cancer in check.

And then, suddenly, it didn’t. In March 2015, a CT scan showed cancer in Harris’s other lung. The nodules in both lungs and lymph nodes kept growing. In the past, she would have had few options beyond palliative care. Advances in immunotherapy have changed that, something in which Winship takes special pride.

The new immunotherapy drugs that unleash a patient’s own immune system are built on groundbreaking discoveries led by Emory and Winship scientist Rafi Ahmed, whose titles include director of the Emory Vaccine Center and Georgia Research Alliance Eminent Scholar. These advances have become a widely noted example of what can happen when basic science research joins forces with a leading clinical center.

Ahmed wasn’t thinking about cancer when he began studying why specific immune cells, called T cells, responded so well to acute infections, attacking and remembering the pathogens responsible, but did so poorly when it came to chronic infections like hepatitis or HIV. Ahmed and then-graduate student Dan Barber 06PhD discovered that chronic infections kept stimulating the T cells, turning the immune response on. But the infections also increased levels of a receptor and a protein, PD-1 and PD-L1, that interacted to turn the
immune response off. This continuous on-off cycle exhausted the T cells, putting the brakes on the immune system. But blocking the PD-1 receptors allowed the tired T cells to rev up again.

Cancer researchers, in turn, leveraged that finding to eventually discover that, sure enough, cancer cells had figured out how to produce high levels of PD-L1, tricking the immune system into turning off efforts to kill them. That led to development of PD-1-blocking drugs that could release the brake, restoring and enhancing T cells’ ability to fight the cancer.

Ahmed thinks about cancer a lot now. His lab recently identified the specific type of T cells that respond to PD-1 therapy; together, he, Ramalingam, and Owonikoko are exploring how to use this finding to develop more effective therapies, with a clinical trial in the works.

The drugs that block PD-1 were developed elsewhere, but Winship doctors have been involved in clinical trials for these and almost every immunotherapy drug approved by the FDA. Before drugs like nivolumab (Opdivo) and pembrolizumab (Keytruda) were available outside of research institutions, Winship patients were benefiting from them. Ramalingam led one of two clinical trials that were the basis for FDA approval of Opdivo in advanced NSCLC.

That light turned green just months before Harris’s scan. Her biweekly Opdivo infusions were not difficult; she chatted with Winship nurses and crocheted caps for patients who had lost hair during chemotherapy (her own stayed in place). Within months, her cancerous nodules had shrunk to less than five millimeters.

In November, after two years of treatment, she returned for scans every three months; after her most recent appointment, Owonikoko stretched that number to four. She’s using the extra time to travel and enjoy her granddaughter and even newer great-grandchild.

Harris also participated in a clinical trial of blood-based biomarkers, designed to compare patients’ biomarkers with their outcomes to better predict who will respond to different therapies and how to turn non-responders into responders.

For Levitt, participation in the same biomarker study proved both a contribution and an opportunity. During his Phase I immunotherapy trial of Keytruda, he developed right side weakness that proved to be caused by the spread of the cancer to his brain. The trial’s strict guidelines meant he had to drop out, but the drug had already done its job by turning on his immune system. The brain mass removed by neurosurgical oncologist Jeffrey Olson contained only a small amount of cancer—and a large number of immune cells aggressively attacking it. Since Levitt’s biomarkers indicated he was likely to keep benefiting from immunotherapy, Owonikoko placed him back on treatment, outside the trial, and Winship Executive Director Walter Curran, an internationally recognized expert in advanced lung cancer and malignant brain tumors, planned and delivered Levitt’s fifth course of radiation treatments.

“Ed’s is an amazing story, based on the creativity and passion of Ed and Linda themselves and in their partnership with his Winship physicians,” Curran says. “It is also based on the fundamental discoveries about lung and other cancers that Winship and other research cancer centers are increasingly applying directly to our patients.”

Levitt, now seventy-five, says he considers being alive a badge of honor.

“The doctors always said that when things look dismal, think about the research,” Levitt says, “and the new treatments coming on board.”

**STRENGTH IN NUMBERS**

What makes Winship a research powerhouse, according to Kimberly Kerstann, are its 355 clinicians and basic, translational, and population scientists, working together.

Kerstann’s job as senior director for research administration is to make sure they have what they need to implement their discoveries. Money helps, and Winship has a robust pilot grant program to support its investigators’ novel ideas. Those early grants provide the critical funding to collect the data they need to be able to compete for more substantial federal and other funding, last year a total of more than $87 million in grants from NCI and other sources that fund 436 cancer research projects.

What also helps, she says, are the shared resources and core facilities that provide access to sophisticated equipment and technology that individual investigators would find it difficult to afford, acquire, and maintain and that provide high-level expertise in specific areas. These Winship cores are basically small businesses where researchers can apply for services, such as data analysis and management, or rent needed equipment by the hour, making their own research funding go further.

While Winship makes its cores available to any Emory scientist working in cancer, it also benefits from programs like the Emory Chemical Biology Discovery Center, a nationally funded facility also supported by Winship. When investigators studying the biology of cancer find a target—a genetic change promoting cancer growth, for example—the center’s robot-assisted high throughput screening allows them to screen thousands of compounds in minutes, looking for any with the potential to reverse those changes.

“Our goal,” says Kerstann, “is to continue to build on Winship’s strengths throughout the entire path to develop new or improved treatments, working with pharmaceutical partners or Emory’s Office of Technology Transfer to shepherd innovation from the lab bench into available treatments.”

The winners, she adds, “will be our patients.”
Why scientists are trying to keep the delicate, tattered
Gillespie, meanwhile, was always more interested in primates. In seventh grade, he phoned animal psychologist Penny Patterson, famous for teaching the gorilla Koko how to use sign language, and interviewed the scientist about Koko’s diet while punching out notes on a typewriter. He was pre-med at the University of Illinois, but spent his internship at the Brookfield Zoo in Chicago, working in the “Tropic World” primate exhibit. His favorite undergrad course was biological anthropology, the study of biological and behavioral aspects of humans and nonhuman primates, looking at our closest relatives to better understand ourselves.

Gillespie eventually took a year off before graduate school to work with primate communities in the Peruvian Amazon. The apes finally won out—Gillespie would choose a doctorate in zoology over medical school.

But it wasn’t long before the two fields of study collided. While monitoring the group behavior of colobine monkeys in Africa, Gillespie observed that some of the animals were eating bark from the African cherry tree—not a typical food source for them. When he dug deeper, Gillespie learned that human doctors in the region used that same bark to treat parasites in their patients. The monkeys, he realized, were self-medicating.

“That discovery in these monkeys brought me back toward the health science side of biology,” says Gillespie.
Gillespie’s return to a medical approach to zoology came not a moment too soon—for the sake of the primates and maybe even all of humanity. As an associate professor in Emory’s Department of Environmental Sciences specializing in the disease ecology of primates, Gillespie and his team of researchers have helped uncover a crisis among our nearest taxonomic neighbors. According to an article co-authored by Gillespie and thirty other experts and published in the journal *Science Advances*, 75 percent of the world’s five-hundred-plus primate species are declining in population, and a whopping 60 percent face extinction, largely due to human encroachment.

This is not just deforestation—which leads to habitat loss—and poaching, both of which are rampant. Scientists also have discovered the spread of pathogens from human hunters, farmers, loggers, and ecotourists to the non-human primates. The foreign germs morph into viruses that can wipe out communities of primates with no prior exposure or immunity. The diseases can also mutate into ailments that can be passed back to humans—and the next form of Ebola or West Nile virus could emerge from the jungle in a pandemic that could put our own existence in jeopardy.

“Yellow fever kills monkeys,” says Gillespie. “When people see that, they think monkeys are the source. But in reality, they are just the sentinels.”

**IT’S THE LITTLE THINGS**

Germs have long been history’s stealth killers. Generations of schoolchildren have been taught that the Native Americans were overcome by the guns and steel blades of European settlers, when in reality, around 90 percent of native populations were erased by smallpox, flu, measles, and other
“THE GOAL IS TO CONSIDER HUMAN HEALTH ISSUES IN LIGHT OF THE HEALTH OF ANIMALS AND THE ENVIRONMENT.”

diseases unwittingly delivered by the white interlopers. The American buffalo was said to have been hunted to the brink of extinction, but there’s evidence that there were ten buffalo for every bullet available on the Great Plains, and that it was more likely the introduction of cattle disease that did the great beasts in.

Gillespie and his colleagues are exposing the same misconception about primate populations all over the globe. For instance, in East Africa, Gillespie and his team observed widespread deforestation—logging and clearcutting for farming and development—that has greatly diminished gorilla habitats. Forest fragmentation, or turning one big forest into smaller copses of trees, has left the apes with limited food and resources. But rather than dying from malnutrition, many of the gorillas leave the forest and wander into the open, even into farmers’ fields, where they come into contact with human remains and those of domesticated animals, dogs, and livestock. The apes then carry those pathogens back to their vulnerable shrewdness—oddly enough, the term for a group of apes.

Previously, this link was difficult to prove—scientists couldn’t be sure that the diseases they were seeing were being directly transmitted nor from whom to whom. Now, through DNA fingerprinting, researchers like Gillespie have changed the game by tracking the movement of bacteria, like E. coli and associated antibacterial resistance.

“The beauty of this is we can actually track whether or not we’re seeing similarity in the bacteria between individuals,” says Gillespie. “We looked at the bacteria of monkeys, people, and domestic animals and found that the degradation equaled similarity. The proximity could lead to bacterial transmission.”

This scenario is playing out in microcosm on the island of Madagascar. Once a paradise of flora and fauna diversity, there is hardly any natural habitat left on the island due to human development, including deforestation from slash-and-burn agriculture. Gillespie says he can leave the capital of Antananarivo and drive eight hours without seeing a native plant. When he flies over the country, he notes that there’s so much sediment floating out into the ocean from all of the erosion, what’s left of the landscape resembles the surface of the moon.

But the few pockets of habitat remaining are filled with a wondrous diversity of species that would defy imagination—and that’s part of the problem. Tourists and guides trapse into those last-standing rain forests, leaving germs as a souvenir for the wild residents.

Gillespie and his team have journeyed into the roadless island jungles to trap mouse lemurs—the world’s smallest primates and one species that isn’t critically endangered. The scientists bait traps with bananas, hang them in trees, and almost always return a few hours later to find a tiny, very angry lemur. They do a quick health screening, collect fecal samples, and microchip the creature before releasing it so that its health can be monitored.

“Were finding that where we have tourism, lemurs are getting hammered with human pathogens,” says Gillespie.

The researchers also visit the neighboring villages, where diarrheal disease is widespread and deadly, especially among children. There they have collected human fecal matter from the villagers to compare with the lemurs’.

“When these positive samples are sequenced, we will have a better idea of whether the pathogens are originating from humans or from other lemurs,” says Lydia Rautman ’18C, who, along with fellow Emory environmental science grad student Kelsey Shaw 23PhD, works with Gillespie in Madagascar. “At this point, it seems unlikely that the lemurs are a source of disease for humans, but past research has suggested we may find that giardia in lemurs is associated with proximity to humans.”

All this work is based on what Gillespie calls the “one health” concept—the growing understanding in the broad scientific community and beyond that the threat of disease knows no boundaries, and that efforts to push back will need to cross the lines between fields of expertise as well.

“The goal is to consider human health issues in light of the health of animals and the environment,” says Rautman.

“In our lab we have a number of projects involving many different taxa, including bats, rodents, ticks, and, of course, primates. My focus is the small wildlife component of a larger study that also considers rodents, livestock, and human behavior as influencing factors in human disease. Being surrounded by such interdisciplinary projects has furthered my understanding of disease ecology and the complex relationships among humans, animals, and the environment.”

SPREADING THE WORD

Brian Hare 98C, an associate professor of evolutionary anthropology at Duke University, says he has seen the impact of the one health approach in his own work with great apes in the central
Congo basin. Although that’s far west of Gillespie’s studies in East Africa, their common interests keep the two following one another’s research projects and comparing notes.

In the Congo, Hare explains, there is plenty of untouched forest for gorillas, chimps, and bonobos. Unfortunately, due to the lack of farmland, human residents resort to illegally hunting apes for food. Gorilla meat also fetches a pretty penny on the black market, attracting bands of poachers. The concern is not so much the pathogens that the hunters carry into the wild, but orphaned gorillas of the hunted who, without human intervention, would perish and further diminish an already shrinking population.

Hare works at sanctuaries where he and his colleagues nurture and raise these orphaned apes into adulthood. The problem is that the babies have never before been exposed to humans—or their diseases. Now they have both encountered hunters and are living in close quarters with scientists.

“Our immune system doesn’t have any way to defend them,” says Hare. “We’re exposing them to all these viruses and bacteria. We’re racing to try to understand how we can better take care of them.”

Once the gorillas reach adulthood and are ready for release back into the wild, the pathogen transfer concern is reversed. What if the newly freed orphan carries a human germ back to into the wild?

“The fear is they might come into contact with wild ape populations and infect them,” says Hare. “And that could cause an epidemic that we’re not even aware of. There’s a need for this type of research if we are going to save our closest relatives.”

Sanctuaries serve an important function at the interface of animal welfare and species conservation, Gillespie says. “Both animal welfare and conservation are ethical imperatives, but what promotes one does not inevitably benefit the other. That’s just one of the many things that we’re learning as we work to conserve and care for chimpanzees.”

The growing field of study known variously as one health, ecohealth, planetary health, and conservation medicine has made it clear that there is also a need for action on the part of governments and the public.

“We’ve always known that wildlife is affected by habitat loss and poaching,” Gillespie says. “But we now know that the threat of disease is actually a conservation issue as well. That’s been a big shift.”

The path forward, according to Gillespie, will require not only the protection of primates from hunting and habitat destruction, but also the broader promotion and support of human health. For instance, most endangered primates live close to impoverished villages and communities with scant access to clean water, which means behavior change—such as improved sanitation practices—is an important part of the solution.

“The most effective interventions involve empowering community members to teach others,” says Rautman, “and the most successful research will take an interdisciplinary approach.”

And experts must continue to build awareness that protecting primate populations isn’t about saving the “monkeys” seen at the zoo or on TV. If pathogens can pass from humans to apes, the inverse is also true—contagion is a two-way street.

“Zoonosis is the origin of HIV, malaria, Ebola, all sorts of scary things,” says Hare. “This isn’t altruism; this is mutualism. That’s why Tom’s work is so important—not just to protect the great apes, but to protect ourselves.”
Winship Cancer Institute
In one of the Winship research labs that take up three floors altogether, microscopic cultures quietly go about the business of biochemical transformation, awaiting their chance to contribute in some small way to future treatments for cancer.
Joseph Crespino
Jimmy Carter Professor of Twentieth-Century American Political History and Southern History since Reconstruction, Department of History
A historian of twentieth-century America with expertise in the political history of the post-World War II era, his published work has examined intersections of region, race, and religion in US politics.

Rohan Palmer
Assistant Professor of Psychology, Emory College Department of Psychology
Palmer studies genetic and environmental factors related to substance addiction. He recently received an NIH Pioneer Award from the NIH National Institute of Drug Abuse.

Michelle Wright
Longstreet Professor of English, Emory College Department of English
Wright has incorporated physics theory on time into her work on how “blackness” is defined, and has written on issues of black identity, blackness and sexuality, and racism in technology.
Joseph Crespino
Long before Joe Crespino became a professor in Emory College of Arts and Sciences’ Department of History, he read To Kill a Mockingbird as a middle schooler in Macon, Mississippi. Growing up in the 1970s in a town much like Harper Lee’s fictional Maycomb, Alabama—where racial tensions were “very real and very palpable”—Crespino formed a singular attachment to the figure of Atticus Finch.

“You read this and you want to grow up and help your community and help your state—to grow up and be like Atticus Finch,” Crespino says. “Most people who read the book realize at some point that Atticus Finch is not a real person and they move on with their lives, but I just kind of got hung up on that, I guess.”

Though he eventually relinquished the idea of going to law school—one he still entertained while completing a history fellowship at Stanford University, where he earned a master’s and PhD—Crespino remained captivated by the character, contemplating his complicated role not only in literature, but also as an influence on political culture.

Author of In Search of Another Country and Strom Thurmond’s America, award-winning historical analyses that have been lauded for examining the origins of modern conservative politics, Crespino will publish Atticus Finch: A Biography in May with Basic Books. As the title implies, the book is a nonfiction history of the fictional character and his influence on modern politics.

“I’ve always been fascinated by the character, but also by the persistence of this book in popular culture,” Crespino says. “It is like a primer for American middle school children, and children around the world, for values of tolerance and empathy and decency and what an important role they play in a multiracial society.”

Although based on a fictional character, Crespino’s biography scrutinizes Atticus Finch by examining the life and opinions of Harper Lee’s father, Amasa Coleman Lee, who practiced law and served in the Alabama state legislature from 1926 to 1938 and was owner and editor of the Monroe Journal from 1929 to 1947. The elder Lee was a prolific editorialist, writing several editorials each week about politics at the local and state levels and addressing national and international topics, from the rise of fascism in Europe to the evolution of the New Deal.

“It was fascinating to read those eighteen years’ worth of editorials, to be able to kind of recreate his political worldview and see how it shaped his daughter’s,” Crespino says.

Other primary sources included a collection of letters from Harper Lee from Monroeville in the 1950s to her friends in New York that were owned privately by a lawyer and rare book collector in San Diego, and correspondence between Harper Lee’s editor at HarperCollins and various publishing houses.
Michelle Wright

“Miss Recent PhD Wright has no business writing on these matters.”

As Michelle Wright's first book, Becoming Black, based on her dissertation, was being evaluated by a publisher, those words stared back at her from an outside reader's report. She had been put on notice for her age and gender.

Going big quickly became Wright's signature as a scholar. “Becoming Black,” writes Rebecca Wanzo of Washington University in St. Louis, “is an introduction to racialized Enlightenment discourse on subject formation, an overview of the most important black responses to these philosophies, and a feminist intervention into theories of diasporic black identity. Such an all-inclusive project could easily be unwieldy, but Wright demonstrates mastery of her subject matter and reveals how the integration of these textual histories is a necessary foundation for scholars of the black diaspora.”

The daughter of an African American father who served in the diplomatic corps and a Czech-Polish American mother who was a schoolteacher, Wright was educated abroad until high school. When it came time to enter Woodrow Wilson High School in Washington, Wright was afraid of being harassed for “talking white or acting white.”

Her parents did not discuss race, feeling that to do so only made it worse. They married in the late 1950s, at a time when interracial marriage still wasn't legal everywhere. “In a way,” says Wright, “their reticence to speak about race worked for me because then I was on my own to figure things out.”

During her first year of graduate school, Wright encountered Patricia Hill Collins's Black Feminist Thought. “I learned that my experiences and identity are actually worthy of thought and reflection,” she says. “Then, as now, it is rare to find a scholarly book about black women.”

In the research that led to her second book, The Physics of Blackness: Beyond the Middle Passage Epistemology, Wright got interested in questions such as, Does the meaning of blackness change over space and time? Rather than seeing blackness as a “what,” isn’t it a “when” and a “where”? She is drawn to such topics because of the payoff—that “you are forced to rethink almost everything.” The book challenged Middle Passage epistemology, the dominant narrative of African diasporic identities that reduces the complexity of blackness in the West by stressing the process of being captured in one world to be forcefully brought into another.

Wright's book has been the topic of panels at two major scholarly conferences, and she has run workshops on how to approach scholarship with this more inclusive notion of blackness.

Believing that there is no “flawless ideology,” Wright reserves the right to investigate anything, even long- or deeply held ideas. As she comes to any new project, she observes two rules: “Step back. Throw your arms open.” It’s advice that has served her well so far.—Susan Carini 04G

Rohan Palmer

As an undergraduate, Rohan Palmer worked in a lab observing whether female mice could overcome their anxiety to leave the safety of the nest and retrieve babies that he and other researchers had moved away.

Intriguingly, the study showed that some strains of mice performed differently from others in overcoming their emotions to perform their motherly duties. Moreover, females exposed to more testosterone in the uterus performed worst at this and other maternal tasks.

“It was understanding behavior at its core,” says Palmer, assistant professor of psychology in Emory College. “What helps us understand what makes us individuals better than looking at the environment and the biology?”

Palmer’s new focus on that question is among today’s most pressing: What makes some people addicted to drugs or alcohol, and not others?

His innovative approach, to find and characterize the layer of biology on top of factors such as environment to find an answer, has earned him a 2017 Avenir Award for Genetics or Epigenetics of Substance Abuse Disorders from the National Institutes of Health Director’s Pioneer Award program.

The five-year, $2.34 million award is among a handful of grants given to recognize “highly creative” scientists from the nation's top universities and to encourage high-impact approaches to the broad area of biomedical and behavioral science.

“This is a special award, more so because very few beginning investigators receive this honor,” says Ronald Calabrese, the college's senior associate dean for research.
Palmer’s work aims to understand how genetic differences contribute to a generalized vulnerability to addiction, first by studying existing DNA samples from hundreds of thousands of people who self-report drug use or those being clinically treated for addiction.

Pinpointing regions in the human genome that confer susceptibility to addiction is just the first step of this novel project. The complexity of this behavioral genetic approach then integrates evidence across multiple species that have been or are being studied elsewhere to prioritize specific genes that explain addictive behaviors.

With that, Palmer will be able to develop a predictive model—available to other researchers, not for commercial use—to infer genetic risk for substance abuse. “For me, behavioral genetics is all about understanding people,” he says.

Palmer’s “MAPme” project, planned to launch in the fall, will follow a subset of first-year students for a year in order to understand how patterns of drug and alcohol use relate to a person’s psychological well-being, personality, genetic profile, and level of cognitive functioning.

“The unanswered question over all of this is what’s really happening in people over time,” Palmer says. “Do people drink more because of poor impulse control, poor memory, or genetics? As we are able to put together the genetic factors and the environmental factors for these and other drug-related behaviors, we may know.”

—April Hunt

Jaap de Roode

Jaap de Roode pays attention to the little things. Like, bugs. Specifically, how they use natural substances to keep themselves alive.

Take monarch butterflies. In 2010, de Roode, associate professor of biology in Emory College, made the significant discovery that monarchs use toxins found in milkweed to cure themselves and their offspring of parasites.

Learning how insects and other animals use plants and other materials to self-medicate is important, he says, because it has “direct implications for human health and food production.”

“Yet most people will just see an insect and call their pest control agency and move on, and that’s it. What they’re missing is this beautiful understanding of these creatures,” he says.

Until a little more than a decade ago, primates were among the only animals besides humans thought to have the capacity for self-medication. Chimpanzees, for instance, had been observed in the wild eating plants with antiparasitic properties but with little or no nutritional value.
Most people will just see an insect and call their pest control service and move on.

Then some birds were found to line their nests with plants that ward off parasites, fungi, and other pathogens. Ecologists in Mexico published a study suggesting that house sparrows and finches may be studding their nests with cigarette butts because nicotine reduces mite infestations. And the evidence for self-medication is even stronger in insects.

“Is it now clear that animals do not have to have a big brain or advanced cognitive skills to use medicine found in nature,” de Roode says. “We’re seeing that these behaviors can be innate.”

During the past fifteen years, these ecological and evolutionary findings have changed how scientists approach infectious diseases among humans, wildlife, and livestock. But de Roode is worried about bees.

In the US, managed honeybees are vital to the production of more than half of the leading crops for human consumption, including fruits, nuts, seeds, and vegetables. But colonies are declining by between 30 and 40 percent annually. Drought, pesticides, viruses, and other pathogens are all potential causes, and commercial beekeeping practices are helping them along, according to a paper recently coauthored by de Roode and published in Nature Ecology and Evolution.

For example, in the wild, some honeybees mix their saliva and beeswax with tree resin to form what is known as propolis, or bee glue, to seal holes and cracks in their hives. The substance helps keep diseases and parasites from entering the hive and inhibits the growth of fungi, bacteria, and mites. Yet bee farmers tend to select insects that don’t produce these resins because they are more convenient to manage, but may have behavioral deficiencies that make them less fit.

One possible solution is to support bees’ natural behavioral resistance to disease and parasites.

“Propolis is sticky. That annoys beekeepers trying to open hives and separate the components so they try to breed out this behavior,” de Roode says. “But given the antiparasitic properties of propolis, beekeepers should consider reintroducing this trait in their honeybees.”—Carol Clark

Tarver’s own identity was shaped early on by some of the most powerful forces in American culture—the deep South, church, and football. Raised in Baton Rouge in an evangelical Christian family, Tarver’s childhood was dominated by LSU football games—the Christmas-like anticipation of each weekend, the elaborate game-day rituals, and the tidal waves of shared emotion that surged through thousands of Tigers fans with every yard gained or lost.

Later, in graduate school at Boston College and then Vanderbilt, Tarver would revisit those experiences as she sought to master the texts of ancient philosophers—Cicero, in particular, “raised the question of whether I could be absolutely certain of who I was or if I was misunderstanding myself,” she says. She also began to grapple with profound questions about race and gender, acknowledging her own privilege for the first time. That’s when she began to consider the American sports industry and its impact on individual identity in a new way.

“For people who are devoted sports fans, I’m suggesting that those practices are integral to making them who they are,” says Tarver, who published her first book, The I in Team: Sports Fandom and the Reproduction of Identity, last year. “When Auburn fans say they bleed blue and orange, they are saying something not too far from the truth. The practice of being a fan is a central feature of their being the human being that they are.”

The book also explores the impact of sports fan frenzy on athletes, like college and professional football players, who—if they’re lucky—make a lucrative but short-lived career out of entertaining stadiums filled with roaring mobs at grave personal risk.

And another thing. “Sport is perhaps the most rigidly gender-segregated arena of public life, and one of the most strongly racialized,” Tarver says. “I came to realize that these things I grew up loving were, in many cases, deeply unjust. How much of my own experience of self as a young woman was caught up in the exploitation of these young men, mostly men of color? It’s a normal human desire to have these rituals, but there are other ways to achieving that goal that are less destructive.”

Tarver probed these themes in a New York Times op-ed published last year, where she challenged fans to consider whether they treat the players they cheer for as human beings, or as mascots. Not long afterward, she was contacted by former NFL player Alan Grant, who confided that the question resonated for him. This semester, Grant will Skype in to Tarver’s Oxford class as a guest lecturer on the philosophy of sport—brining his experience, his expertise, and of course, himself.—Paige Parvin 96G
And the Medal Goes To . . .

Emory honors Crystal Johnson 00N (from left), Laura Mitchell-Spurlock 95OX 97N, Jason Slabach 13N, and Kenneth Walker 56ox 58c 63m 65mr 70mr 71mr (pictured in inset, center) with the Emory Medal, the university’s highest alumni award.
THE COURAGE TO CARE

THE 2018 EMORY MEDALISTS VOLUNTEERED TO SERVE ON THE FRONT LINES OF THE EPIC BATTLE TO DEFEND HUMAN HEALTH

THESE ALUMNI TAKE “CRITICAL CARE” TO A WHOLE NEW LEVEL.

For more than seven decades, the Emory Alumni Association has honored alumni who embody the highest ideals of service to the university and the community with the Emory Medal. “All the recipients are fine examples of both Emory’s global reach and global leadership,” says Sarah Cook ’95C, senior associate vice president for alumni affairs. “They exemplify the best of our alumni.”

The first of the two medals goes to a group of nurses—Crystal Johnson ’00N, Laura Mitchell-Spurlock ’95Ox ’97N, and Jason Slabach 13N—who demonstrated both bravery and skill when treating patients with Ebola virus disease at Emory University Hospital.

The second 2018 medalist is Kenneth Walker 56Ox 58C 63M 65MR 70MR 71MR, a doctor who has spent his career mentoring medical students, serving a major hospital, and shoring up the medical education system in a nation hobbled by conflict, corruption, economic instability, and the collapse of the Soviet Union.

“I am proud to be a part of the selection committee for these winners,” says Ashley Grice, Emory Alumni Board president. “These recipients are amazing examples of what Emory excellence looks like.”

“Emory Medal recipients represent the noblest achievements and highest aspirations of our community,” says President Claire E. Sterk. “I am thrilled that we have the opportunity to honor and recognize this year’s winners. They have demonstrated courage, creativity, and perseverance in the midst of daunting challenges. We are grateful for their example.”

BRAVE HEARTS

In late summer 2014, Ebola virus disease was taking a heavy toll in parts of Africa. As the medical community monitored the crisis, Emory Healthcare teams had been practicing and training in anticipation of need.

So when an American medical missionary based in Liberia, Kent Brantly, contracted the disease, Emory University Hospital (EUH) was prepared to admit him for medical care in its highly specialized Serious Communicable Diseases Unit.
Hospital staff members were given the chance to volunteer for the challenging assignment, which would require intensive training, extraordinary safety precautions, and some degree of risk.

Nursing school graduates Slabach, Johnson, and Mitchell-Spurlock raised their hands. The training that followed was even more rigorous than they had anticipated. As Mitchell-Spurlock put it in a later interview, “That’s how our team became a family in one afternoon.”

Despite public concern, Slabach said, “I was very glad they brought Dr. Brantly to Emory. He’s an American citizen, and I’m a believer in taking care of our own. And he’s a health care worker and a missionary. I wanted to support that.”

“We teach our nurses to be leaders,” says Linda A. McCauley 79N, dean of the Nell Hodgson Woodruff School of Nursing. “These three had full-time jobs, but still stepped up to volunteer.”

When Brantly was able to leave EUH after nearly three weeks of treatment, “That was the ‘wow’ moment,” Johnson said. “He hugged us all without any of the Tyvek suits on, then he turned and grabbed his wife’s hand and they walked down the hall like they were getting married again. That was just beautiful.”

The three nurses went on to help educate and calm a nervous public by doing media interviews and appearing on the Today Show to demonstrate safety measures.

“A GEORGIA DOCTOR”
Walker, professor of medicine at Emory’s School of Medicine and chief of internal medicine at Grady Memorial Hospital, recalled in a recent video interview how he also became executive director of Partners for International Development and the champion of the Atlanta-Tbilisi Partnership.

“The dean of the medical school called one day in 1992 and said, how about going to Tbilisi for me next week?,” Walker remembers. “And I said, sure, Jeffrey, where is Tbilisi?”

As part of a US outreach effort to help stabilize the former Soviet Union, Grady and Emory’s medical school had been selected to partner with a Georgia hospital. When Walker first arrived, the newly independent nation was struggling; the economy was faltering and necessities including medical goods were in short supply.

“We visited all these hospitals, and I saw that Georgia was a small country and that the health care system was something that one could deal with as a unit,” Walker said.

Under Walker’s leadership, the Atlanta-Tbilisi Healthcare Partnership has launched a wide range of projects that foster sustained interaction, resource and knowledge sharing, and medical student exchange opportunities between Emory and Georgia health care institutions. In 2004, then-president of Georgia Mikhail Saakashvili named Walker an honorary citizen.

“Ken is the consummate Southern physician,” says Leon Haley, Emory School of Medicine executive associate dean of clinical services for Grady Memorial Hospital. “He has taken his concern and his compassion from Atlanta, to the state of Georgia, to the Republic of Georgia.”

Walker also was one of the early innovators of electronic medical record-keeping and serves on the Board of Regents of the National Library of Congress, with a focus on the presentation of medical knowledge.

“He’s extremely committed to his life’s work,” says Perry Rahbar, founder and CEO of the analytics company dv01 and a longtime friend to Walker. “He’s an inspiration. He works relentlessly toward all of his goals while managing to make family out of everyone he comes into contact with.”

In 2016, Walker received the Lifetime Heroic Achievement Award from the Georgia Hospital Association. In the accompanying video, Walker said, “When I wake up in the morning, I think of a cartoon I once saw of Lyndon Johnson. It showed him sitting on the edge of his bed, getting up, and saying, ‘World, I’m coming—ready for me or not.’ “

—Elizabeth Cobb Durel

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Alumni in Research

MATTHIAS STEFFEN 98C is chief quantum architect at IBM Research, where he helps develop IBM Q quantum computer systems for public and commercial access.

Quantum computers are powerful machines built on the principles of quantum mechanics, a branch of physics that explores how the physical world works at the most fundamental levels. At this level, particles behave in strange ways, taking on more than one state at the same time, and interacting with other particles that are very far away.

Quantum computing harnesses these quantum phenomena to process information in a novel and promising way. By harnessing such natural behavior, quantum computing can run new types of algorithms to process information more holistically, fundamentally speeding up certain operations that are not possible in conventional computing. One potential application includes quantum chemistry with the promise of accurately simulating molecular interactions, which may be important to drug development in the future.
“We are very proud of the IBM Q Experience, which is available for anyone to use. We have five- and sixteen-qubit devices available and tutorials for using them that are being used in classrooms. There also is an IBM Q Awards program now for developing course materials, building tutorials, publishing papers, and specific code modules for these small quantum computers. There have been more than thirty research papers published by scientists who otherwise wouldn’t have access to an experimental device like this to test theories,” Steffen says. “We want to enhance these capabilities over time and build an ecosystem that will allow us to really figure out what it can do. This helps us figure out bugs and get ideas for what works and what appeals to a wider community.”

**MICHELLE BERREY 86Oxford 88C 92MPH** is developing drugs designed to help patients with weakened immune systems ward off devastating viral infections.

Berrey is president and chief executive officer of Chimerix, a biopharmaceutical company dedicated to discovering, developing, and commercializing medicines that improve outcomes for immunocompromised patients. Berrey joined Chimerix as chief medical officer (CMO) in 2012 and was named CEO in 2014.

Before joining Chimerix, she served as CMO at Pharmasset, a small biotech focused on treatment of hepatitis C, from 2007 until its acquisition by Gilead Sciences in 2012. Previously she spent eight years at GlaxoSmithKline, where she was vice president for viral diseases, clinical pharmacology, and discovery medicine. Throughout her career, she has focused on viral diseases with a significant impact on public health, including HIV, chronic viral hepatitis, and DNA viruses.

“We are focused on solutions that can improve outcomes for patients who are undergoing a potentially life-saving stem cell transplant. As we learn more about the potential risks associated with more aggressive transplants now being pursued, we have a better understanding of the impact of reactivating or reawakening viral infections that may have been dormant since the first exposure to these viruses as small children,” Berrey says. “Reactivation of any one of these viruses can result in an active viral infection, which can quickly become life-threatening. And reactivation of multiple viruses, once believed to be a rare event, is now expected in two-thirds of stem cell transplant recipients.”

Chimerix’s lead product candidate, brincidofovir, has shown the potential to treat or prevent viruses from all five families of double-stranded DNA viruses that affect humans, including the herpesviruses and adenoviruses. Brincidofovir has received Fast Track designation from the FDA for adenovirus, cytomegalovirus (CMV), and smallpox, and Orphan Medicinal Product Designation from the European Commission for adenovirus, CMV, and smallpox. The company also has brought forward a new clinical candidate, CMX521, the first direct-acting antiviral specifically for the treatment and prevention of norovirus.

With years of expertise and innovation in human genomics, **KEVIN MCKERNAN 95C** founded Medicinal Genomics to build a stronger scientific environment for the study of cannabis-based therapeutics and blockchain technologies for tracking and verifying cannabis genetics.

McKernan pioneered the sequencing of the cannabis genome in 2011 with the intention of building a “map” of all of the genetic factors that might predict the expression of compounds—including cannabinoids, terpenes, and flavonoids—in different strains of cannabis. That allows scientists to cultivate different strains of cannabis with the characteristics best suited to treat specific conditions. The cannabis genome is roughly ten times more diverse than the human genome.

“The wonderful thing about the cannabis plant is the compounds are very safe, it has more chemical diversity than all of Pfizer and Merck, and it’s about to become an over-the-counter, open source, so if we can combine that with personalized medicine, we see this as two huge economic tsunamis colliding,” says McKernan, who earned his bachelor’s degree in biology from Emory with a focus on cloning and expressing norepinephrine transporters.

Through the website Kannapedia.net, Medicinal Genomics publishes genetic information obtained using the company’s cannabis strain identification and registration service. Growers provide samples and Medicinal Genomics provides the identity, heritage, and chemistry of the cannabis and hemp plants to identify the exact strain and key characteristics of the plant.

Genetics also can be used to determine plant gender, detect harmful microbes, and patent strains, as well as informing breeding decisions. Sequencing and registering strains can also protect producers as cannabis production starts generating patents and trademarks.

“This is a marketplace that is emerging out of a black market,” says McKernan. “DNA sequencing techniques can be used to see what products are a right fit for the right patients.”

In October, Medicinal Genomics is holding its CannMed 2018 conference at the University of California–Los Angeles’s Luskin Center to showcase the leading research in cannabinoid, genomics, personalized medicine, and blockchain technology.
Female leaders are often disparaged more than men for being direct in conversation, especially in tough negotiations or when making difficult requests. Female executives will tell you: What’s assertive in men is bossy in women. It’s backed by research.

But through an analysis of 71 behavioral studies, Melissa J. Williams, Associate Professor of Organization and Management at Emory University’s Goizueta Business School, finds women aren’t penalized for assertiveness when actions are nonverbal, instead of verbal.

While women might be censured for being verbally assertive, the same isn’t true when they use nonverbal or paraverbal dominance. That’s because dominance often works nonconsciously. Consider, for a moment, how identifying the leader of a group happens almost instantaneously. That’s nonverbal dominance in action. The good news is these nonconscious cues – unlike conscious ones – don’t bring up stereotypes about how women “should” behave.

“When you see a woman standing tall and speaking loudly, our evidence suggests you won’t consciously label her as dominant or domineering,” Williams says. “But right away you’ll know she’s in charge.” She believes women have options to influence and persuade without incurring social penalties. They include standing tall, using expansive gestures, making eye contact, speaking louder, and even interrupting.

Actions alone can’t eliminate prejudice, but Williams’ work suggests women shouldn’t respond to criticism just by backing down. Emerging female leaders can – and should – avail themselves of all the tools at hand.

Credit Facebook executive Sheryl Sandberg. Leaning in (literally) can be a conduit to authority – minus antipathy.
Just as many of us were gathering to celebrate the holidays with families and friends, the Centers for Disease Control and Prevention released its annual report on the toll of the opioid crisis in 2016. While drug overdose deaths are up a shocking 21 percent from 2015, the death toll is even higher among fifteen- to twenty-four-year-olds.

These grim numbers show an escalating deadly crisis that is far from under control and that is taking a particularly brutal toll on our teenagers and young adults. Yet, despite the dire consequences, this public health epidemic is mired in a fragmented and tepid national response.

As a social scientist who has spent decades tackling major public health issues such as HIV/AIDS and addiction, I see a clear and distressing pattern in how our country addresses these crises. Our cultural disposition is to initially place blame and responsibility solely on the afflicted—or addicted—individual. This accusatory mindset leads to a disproportionate emphasis on criminalizing the behavior, rather than addressing it as a societal problem that we all must own. We stigmatize and shame. We punish and incarcerate. We expect the addicts to find their own solutions. It is their problem, not ours. This approach further contributes to these public health crises spiraling out of control, as we now see with opioids. We only unite in a belated societal call to action when a crisis reaches epic proportions. It is time to break this dangerous pattern.

Both with HIV/AIDS and opioid addiction, the result is not just loss of opportunity and life. It is also the erosion and dissolution of entire communities—from lost wages to unaffordable health care costs and broken families.

In my native country, the Netherlands, as well as in other European countries, the response to opioid addiction is pointedly different. Addiction is seen from the start as a mental health issue that requires education, outreach, treatment, and sustained collaborative action. Officials seek to rehabilitate and heal drug abusers, not to discard them. The culture supports a collective effort in which everyone plays a role in turning the tide.

Even though there is finally a long-overdue national awakening to our opioid epidemic, the financial and social impact of a crisis that has been brewing unchecked is daunting. But what keeps me up at night is the long-term impact the crisis could have on our youth. An entire generation is growing up believing that prescription pills are more often than not the go-to remedy for all ills. The line has blurred between legal and illegal use.

When we treat addiction from the very beginning as an illness rather than a crime, we can then take a more comprehensive and collaborative approach. At Emory, we are working with businesses, government, and public health agencies, particularly in the Southeast, to bring together stakeholders across the region to share ideas and combine efforts. Because of our unique role in society, universities can—and must—be leaders not only in education and research, but in helping build a national consensus around how we address public health crises.

That consensus begins with an understanding that what our society lacks in the early stages of a public health epidemic is a collective willpower. As long as the problem is “theirs” and not “ours,” we will waste precious time, resources, and, most important, lives in criminalizing instead of stemming the crisis.

Just as we finally came together to bring the HIV/AIDS epidemic in the US under control, we are now slowly making a paradigm shift in our societal commitment to fight the opioid epidemic.

But when this crisis abates, we must step back and face our initial base instinct to adopt an “us-versus-them” mentality when it comes to public health issues. We cannot wait until a public health crisis has caused monumental damage and touched every segment of our society until we make it our own.

A version of this essay originally appeared on CNN.com.
Yerkes National Primate Research Center

This micro PET facilitates noninvasive neuroscience research by producing high-resolution brain images. PET imaging, combined with the center’s MRI machines and in-house radiochemistry lab, help Yerkes researchers answer critical questions about neurodegenerative diseases.
Paul P. Jackson Jr. ’82Ox ’84B  
and Tami Puckett
He is vice president of a business solutions company. She is a sculptor and professional home organizer and designer.

He named Oxford College as his life insurance beneficiary, and this gift will help fund scholarships like the one he received as an Oxford student.

“EVERYWHERE WE GO, IT SEEMS, I see someone I know from Oxford. We call this ‘the X factor.’ If not for the scholarship that Oxford offered me, I would have attended a state school and missed out on making these friends and contacts. My education helped prepare me for anything that the real world has thrown at me. I made this planned gift because I would like to provide the same opportunity down the road for Oxford students, so they can run with it.”

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University students, faculty, and staff were treated to a rare snow day in early December, giving students a little extra study time during final exams.