BEHIND THE STORY
To the Case Western Reserve community:

The quadriplegic man is able to move.

The wrongly imprisoned are set free.

With these and so many other examples, people usually learn of an accomplishment once it is achieved.

In a time-pressed world, the order makes sense. Almost always, the development becomes newsworthy after it actually happens—not when the idea first emerges, not during many revisions en route to discovery, and certainly not when it fails, flops or flounders.

Yet there is a reason that nearly every superhero saga includes an origin story. As impressive as outcomes are, they seldom happen without a “why” that drives them.

This year’s report looks at some of Case Western Reserve’s biggest stories from the 2016–17 year. In each case, we try to illustrate the moment that matters most.

When the brother of a friend is paralyzed in a freak accident.

Or when students realize due process sometimes deserves doubt.

Or when a teenager discovers a passion for infectious diseases at a summer camp, then returns, years later, to try to defeat them.

I want to congratulate all of those chronicled in this volume—and the thousands more who contribute to Case Western Reserve’s mission in countless other ways.

As you will read, we had an extraordinary year—one whose roots date back years, and, in some cases, even decades.

I hope you find their stories as fascinating as I did.

Barbara R. Snyder
President
EVERYBODY HAS A STORY.

Where does it begin? What moment sparked such passion—and still drives to this day?

In the pages that follow, we highlight 20 members of the Case Western Reserve community—their achievements that earned recognition this year, and the experiences that inspired them.

We put you in their shoes, and take you behind their stories—

FROM THE LAB, where their research offers life-changing potential...

TO THE SPOTLIGHT, where their innovative ideas draw major attention...

ACROSS THIS CAMPUS, where their excellence inspires so many...

AND AROUND THE WORLD, where their work deepens understanding...

—to show you how we think beyond the possible.
When a teenage Bob Kirsch began dating his future wife, Donna, he quickly found that her family would become an important part of his personal life. It wasn’t until far later that he realized how much they would drive his career—and, decades later, catalyze a landmark discovery.

As the lead researcher on a project that gave a Cleveland man with quadriplegia the power to move his paralyzed limb with his thoughts, Kirsch created one of the world’s first intuitive brain-computer interfaces. The system, which allows a person to move the arm and hand—just by thinking—draws worldwide attention.

Kirsch’s inspiration? Donna’s late brother, paralyzed at 18 by a sports injury.

“I saw there were things I could do for people like him,” Kirsch said.

And with this breakthrough, he has.
As a child, Dustin Tyler bought an Atari 800XL—not to play games, but to program. This fascination with STEM fields ultimately led him to the then-emerging field of biomedical engineering. When he began working with patients at the Louis Stokes Cleveland Veterans Affairs Medical Center, Tyler quickly found a focus for his knowledge. Prosthetics could restore some sense of normalcy for amputees, but they craved more. “Everyone we talked to said, ‘I want to be able to feel again,’” recalled Tyler, the Kent H. Smith II Professor of Biomedical Engineering. Tyler and his team crafted a system that used electrical stimulation to give patients not only sensation, but also the ability to gauge the level of pressure applied. “Our goal is not just to restore function,” he said, “but to rebuild a connection to the world.”

“The patient told me, ‘I’m becoming two-handed again.’”

—Dustin Tyler
NATURE’S NAVIGATION

Roy Ritzmann’s research career began with a “dreaded” undergraduate course: invertebrate biology. Through that class, though, he found a lab opening, which, in turn, led him to learn from Nobel Prize winners and other experts in the field. From that point on, he was hooked.

Ever since, he’s worked to understand more about how even these seemingly simple creatures traverse complex paths.

One surprising answer? GPS.

The biology professor’s team found that, like humans and other mammals, cockroaches appear to have a sophisticated navigation system in their brains that helps steer them through new surroundings.

The finding likely represents convergent evolution—the idea that distinct animals developed similar systems to manage the same problems.

Ritzmann hopes to discover more about the cockroaches’ system to expand our understanding of how all animals navigate their surroundings.

“So some of the most amazing things we see in the animal world involve navigation.”

—Roy Ritzmann

DIGITAL DIAGNOSIS

When Pallavi Tiwari first got her hands on a computer as a high school student in India, she had to figure out by herself how to use it.

But even that self-taught experience was enough to steer her to technological studies—and, last fall, a discovery that may transform human health.

As an assistant professor of biomedical engineering, Tiwari works on ways that computers can improve patient care. One of her most recent projects involved identifying alternatives to risky biopsies for evaluating brain tumors. Using magnetic resonance imaging, Tiwari and her team developed artificial intelligence algorithms that taught the computer to distinguish between spots that either could be the recurrence of cancer or a benign effect of radiation—a task so difficult that neuroradiologists often turn to surgery to be certain.

In a test against two human experts, the computer correctly diagnosed 90 percent of brain scans, while the physicians only got about half right.

Tiwari still needs to assess the technology’s accuracy with larger numbers of scans, but if it continues to work, patients could well have more promising futures.

“The existing solution just wasn’t good enough.”

—Pallavi Tiwari
“I HAD A BAD DAY, AND I JUST WANTED A HUG.”

CLOSER CONNECTIONS

The night before her first Consumer Electronics Show (CES), Xyla Foxlin soldered circuit boards by the light of her iPhone, feeling unprepared and overwhelmed. But the next morning, people who stopped by her booth shifted quickly from casual curiosity to intense interest.

They “started pulling out their credit cards,” she remembered, “saying, ‘Can I buy this now?’”

“This” was Parihug, a wireless-enabled stuffed animal that can transmit cuddles to other Parihugs around the world.

The idea emerged from a stressful day as a second-year college student. With loved ones hundreds of miles away, Foxlin realized the only way to feel the connection she craved would be to create it herself. Three years after building her first prototype in the Larry Sears and Sally Zlotnick Sears think[box], Foxlin has raised more than $200,000 for her startup and even appeared in Microsoft television commercials.

In 2017, Foxlin returned to CES, where Case Western Reserve claimed more booths than any university, thanks in part to the assistance of the entrepreneurship program CWRU LaunchNet. The showing is just one of ways that demonstrates how our students think beyond the possible.

Xyla Foxlin
60 student startups created at the university since 2012

$10.1 million in external funding raised by student companies

50,000 square feet innovation hub, the Larry Sears and Sally Zlotnick Sears think[box] in the Richey Mixon building—the largest open-access makerspace at a university in the world

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“A healthy chill”

As a nurse for 30 years, Jill Byrne has seen firsthand how tempers and temperatures can rise in the operating room.

To help cool down her nurses and surgeons, Byrne developed a vest stuffed with ice packs that首届 CES in Las Vegas.“Wearing the vest, the surgeons are calmer and cooler—which is healthier for them,” said Byrne, a PhD student at the Frances Payne Bolton School of Nursing and a Cleveland Clinic nurse. “One even broke into song.”

The vest proved so popular that Byrne found herself making hundreds for colleagues, and Cleveland Clinic Innovations recognized the business potential of the concept. Byrne and Cleveland Clinic Innovations are seeking to bring the vest to market, with the product with a goal of licensing the vests exclusively to the Clinic.

Meanwhile, the idea applies to her academic endeavors as well. The subject of her dissertation? The occupational hazards of heat stress.

“The surgeon started singing show tunes.”

—Jill Byrne
SELF(IE)-HELP

Lance Vernon turned to dentistry after stints in special education and clinical research and found a risky but often-overlooked effect of a lack of health care access: periodontal disease.

Bleeding gums can sound minor, relative to untreated ailments like asthma or diabetes. Yet an abundance of research has shown that people with periodontal disease are more likely to suffer heart attacks and strokes—in some studies, more than twice as likely as those without the condition.

Since earning degrees in dental medicine and public health 15 years ago, Vernon, now senior instructor at Case Western Reserve’s dental school, has looked for better ways to help patients head off gum problems before they grow worse. He’s found evidence that, although people floss and brush their teeth, many need to improve their skills.

One solution: the selfie. In a study with colleagues in India, Vernon showed that taking a video selfie with a smartphone while brushing, and later having it reviewed by a dentist, can increase the accuracy and number of brush strokes—as if being supervised.

“Getting guidance by phone can be a new way to promote oral health and prevent disease,” he said.

“People were slipping through the cracks.”

—Lance Vernon

TRUE JUSTICE

Three wrongfully imprisoned men are free today—thanks in part to Case Western Reserve law students and faculty.

Three men who were convicted of murder in 1998, the East Cleveland men won release after students in the school’s Milton A. Kramer Law Clinic Center joined the Ohio Innocence Project in challenging the original verdict.

Under the supervision of senior law instructor Carmen Naso and associate dean Judith Lipton, the students spent months poring over documents and helping prepare the attorneys, including Naso, who argued the case in court.

Judges ultimately agreed that prosecutors’ withholding of information that was favorable to the defense—coupled with a witness recanting an identification—was enough doubt on the men’s guilt to overturn the jury’s decision.

For Naso, who has practiced law for more than 30 years, the case was a chance to right a grave injustice.

“We’ve done so much to improve our criminal justice system,” he said, “but if we’re really serious, we need to go back and fix our mistakes.”

“It’s beyond dispute that our system is fallible.”

—Carmen Naso
"I'm achieving dreams I never thought I'd be able to."
“Without something like this, the world could possibly never get rid of malaria.” —Brian Grimberg

Brian Grimberg first studied infectious diseases at Case Western Reserve as part of a gifted program for youth. A decade and a half later, he was back on campus—this time with malaria as his designated target.

The disease persists as one of the developing world’s deadliest, in part because of the difficulty of securing accurate diagnoses in remote areas. Grimberg, an assistant professor of pathology in the School of Medicine’s Center for Global Health and Diseases, connected with Distinguished University Professor Bob Brown and his physics research group to develop MOD (for Magneto-Optical Detector), a portable device that can detect malaria with one drop of blood.

It not only is 20 times faster than traditional rapid-test methods, but is also more accurate and less expensive. Last year, the team earned one of four Patent for Humanity awards given out by the U.S. Patent and Trademark Office.

“This teamwork with Brian is a poster child for the good things that can come out of interdisciplinary work,” Brown said.
MORE THAN A NAME

It’s not hyperbole when Makela Hayford calls double alumna Stephanie Tubbs Jones her hero.

Hayford is a sociology major (as was Tubbs Jones) who wants to earn a law degree to advance social justice (as did Tubbs Jones).

Hayford served as president of the university’s African-American Society (which Tubbs Jones helped found), and in 2016 co-founded the student group #webelonghere (which, in 2016, suggested that the university name its new residence hall name after Tubbs Jones).

She “embodied the type of leadership and student activism that creates lasting change,” Hayford told the student newspaper that year.

Tubbs Jones, who died in 2008, was the first African-American woman to become an Ohio Common Pleas court judge, and then the first to become a county prosecutor. In 1998, she became the first African-American woman elected to represent Ohio in Congress. Fittingly, the residence hall marks the first time a campus building bears the name of an African-American woman.

“We are thrilled this residence hall will celebrate her legacy,” Hayford said at the dedication. “But I don’t think Stephanie Tubbs Jones would want us to stop with this naming today.”

TRIPLE THREAT

University record-holder. All-American. National champion.

By the end of his sophomore year, C.J. Krimbill (CWR ’16) already had made university history as half of the NCAA champion men’s doubles tennis duo—the first time Case Western Reserve claimed a national title in that sport.

Over the years, his on-court success continued—and his off-court accomplishments proved just as impressive, among them a 3.94 cumulative GPA and extensive community service, including tutoring math and teaching tennis.

This combination of achievements made Krimbill an NCAA Today’s Top 10 Award recipient—the first athlete in school history and the first men’s tennis player in any NCAA division to receive the honor, which previously was awarded to the likes of Archie Griffin, John Elway and Drew Brees.

“I was by no means expecting this.”

—C.J. Krimbill

“She is my hero.”

—Makela Hayford

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“I KNOW THE VALUE IMMIGRANTS BRING TO OUR COMMUNITY.”

Cami Ross studied abroad four times as a college student—and each trip deepened her appreciation of immigrants. So when President Trump limited travel to and from several predominantly Muslim countries, Ross said she “thought of our students first.”

Ross, the program coordinator in the university’s Center for International Affairs, worked with her students from affected countries. She said she was “not sure whether they would be able to continue their studies,” but she was “not sure whether we would be able to help them continue their studies.”

As the program coordinator in the university’s Center for International Affairs, she worked with her students from affected countries. She said she was “not sure whether they would be able to continue their studies,” but she was “not sure whether we would be able to help them continue their studies.”

Ross rallied the community around a customized version of the national #YouAreWelcomeHere campaign designed to show campus support for international students.

Soon, #YouAreWelcomeHereCWRU buttons and signs began appearing everywhere. The idea: to remind international students that, at Case Western Reserve, they are valued, appreciated and always welcome.

A WELCOME OPPORTUNITY

Cami Ross
DATA IMPACT
When April Hirsh Urban befriended a childhood classmate too shy to speak to anyone else, she felt guided by the same force that inspires her today: an innate desire to understand the perspectives of those who need help.

“I try to see everything through a lens of potential impacts on already-vulnerable people,” she said.

Now a research associate at the Jack, Joseph, and Morton Mandel School of Applied Social Sciences, Urban has expanded her focus from one to many—and her tools from conversation to multi-layered analysis.

In a report for the Western Reserve Land Conservancy that she co-authored, Urban and her colleagues mined and mapped public data to find surprising outcomes. Chief among them: Violent crime rates are higher in areas with large concentrations of vacancies. The finding—and the statistics that support it—will help guide officials working to make Cleveland neighborhoods safer.

“All numbers tell their own story.”
—April Hirsh Urban

CARE AMID CRISIS
When severe childhood asthma forced Linda Burnes Bolton into frequent medical care, the compassion shown by nurses helped her recover. It also pointed her toward a career in nursing. Now a university trustee, vice president of nursing and chief nursing officer at Los Angeles’ Cedars-Sinai Health System, and an American Academy of Nursing “Living Legend,” Burnes Bolton has achieved such renown that she is asked regularly to contribute her expertise on critical health issues.

The most recent example involves opiates, where she joined Case Western Reserve faculty member Lee Hoffer on an expert committee providing analysis and recommendations for easing the epidemic.

Convened by The National Academies of Sciences, Engineering, and Medicine, the group issued a 482-page report in July that calls for expanding access to treatment, increasing research and encouraging more responsible prescribing among health care providers. The report found that, as of 2015, about 2 million people have a “use disorder” involving prescription opioids, and 600,000 have the disorder relating to heroin.

“As an anthropologist whose research focuses on heroin, I’m all too familiar with the havoc the drug can wreak,” Hoffer said.

As his research led him to know some heroin users, Hoffer detailed their everyday experiences as a way to humanize the problem for the public.

“Caring about others,” Burnes Bolton explained, “means doing what you can, no matter who you are.”

“Meet people where they are, even when they’re in a low place.”
—Lee Hoffer

26 percent of our student body is international
19 percent of the Class of 2021 is international—more than double the figure from five years before
16 faculty-led study abroad programs annually
81 countries represented in our student body

“Human caring saved me.”
—Linda Burnes Bolton

16 percent of our students spend time abroad
“My parents proved what a little help could do.”

—Sue Helper

Thanks to a boost from federal programs during tough times in the 1960s and ‘70s, Sue Helper’s parents were able to raise a family and achieve a dream: sending their children to college.

Helper seized the opportunity, winning acceptance to Oberlin College and then Harvard University for graduate school. After earning her doctorate there, she established such a strong scholarly reputation that, in 2012, the White House appointed her to work as senior economist with the Council of Economic Advisers and, then, a year later, as the chief economist of the U.S. Department of Commerce.

Back on campus as the Frank Tracy Carlton Professor of Economics at Weatherhead School of Management, Helper advocates for initiatives she believes benefit the nation. Among her favorite apprenticeships—and she hasn’t let a change in administration slow her efforts.

In the spring, she penned “Will Trump be the one to take apprenticeships to scale?”—a Brookings Institution piece that noted the president’s embrace of the German apprenticeship model. Citing research she conducted with former Department of Commerce colleagues, she noted that such programs not only benefit participants, but can provide significant return for companies as well.

“All people should have a chance to reach their potential, and apprenticeships are a proven path,” she said.

—Zhenghe “John” Wang

As a young researcher from China in graduate school in the U.S., Zhenghe “John” Wang found himself captivated by the possibilities of the then-emerging field of genome sequencing.

After earning his PhD, he began working with one of the world’s pioneers in the subject. Within a few years, Wang himself discovered a gene mutation that appeared to have a connection with colorectal cancer.

Now, through a promising clinical trial, he and his team are testing whether a one-two punch—blocking a key amino acid while delivering a specific chemotherapy drug—can “starve” the kinds of cancer cells found in patients with the mutation Wang found.

Recognizing the promise of this and other work, a group of researchers from Case Western Reserve and the Case Comprehensive Cancer Center has been named to one of 20 “Dream Teams” designated by the American Association for Cancer Research and Stand Up to Cancer. Wang is one of the national team’s co-leaders and heads up the Cleveland group.

“If we can starve the tumors, we can stop them from growing.”

—Zhenghe “John” Wang
DEGREES AND CAMPUS STATISTICS

July 1, 2016 - June 30, 2017

DEGREES AWARDED

BACHELOR'S .................................................. 1,249
MASTERS ...................................................... 1,451
PHD ............................................................. 206
OTHER DOCTORATE (JD, MD, DNP, DM, DMA, SDI) .... 451

DEGREES BY SCHOOL (UNDERGRADUATE AND GRADUATE)

CASE SCHOOL OF ENGINEERING .................................. 741
COLLEGE OF ARTS AND SCIENCES .................................. 675
FRANCES PAYNE BOLTON SCHOOL OF NURSING .......... 268
JACK, JOSEPH AND MORTON MANDEL SCHOOL OF APPLIED SOCIAL SCIENCES .................................. 191
SCHOOL OF DENTAL MEDICINE .................................. 81
SCHOOL OF LAW .................................................. 196
SCHOOL OF MEDICINE ........................................... 563
WEATHERHEAD SCHOOL OF MANAGEMENT ........... 654

CAMPUS

FACULTY (FULL-TIME) ........................................... 3,501
STAFF (FULL-TIME AND PART-TIME) .................. 3,098
CAMPUS SIZE (ACRES) ........................................... 267
UNIVERSITY FARM (HUNTING VALLEY, OHIO) .......... 400

ENROLLMENT (FALL 2017)

UNDERGRADUATE ........................................... 5,150
GRADUATE AND PROFESSIONAL .......................... 6,874
STATES REPRESENTED ........................................... 50
COUNTRIES REPRESENTED ...................................... 81

ALUMNI + HONORS

ALUMNI ........................................................... 112,661
NOBEL LAUREATES ............................................. 16

RESEARCH AND TECHNOLOGY HIGHLIGHTS

RESEARCH

SPONSORED RESEARCH PROJECTS .................................................. 1,364
SPONSORED RESEARCH PROJECT AWARDS .................. $337.1 million

TECHNOLOGY TRANSFER

NEW INTELLECTUAL PROPERTY DEALS WITH INDUSTRY .......... 59
LICENSING REVENUES .................................................. $2.21 million
NEW INVENTIONS ...................................................... 236

COMPETITIVE SPONSORED RESEARCH PROJECTS

PROJECTS AWARDED ........................................... 1,364
AWARDED, IN MILLIONS* ........................................... $337.1

363 ........................................... NATIONAL INSTITUTES OF HEALTH .................................. $204.7
55 ........................................... NATIONAL SCIENCE FOUNDATION .................................. $14.2
35 ........................................... DEPARTMENT OF DEFENSE .................................. $14.7
8 ........................................... DEPARTMENT OF ENERGY .................................... $3.3
15 ........................................... NASA .......................................................... $2.0
95 ........................................... OTHER FEDERAL .................................................. $5.9
153 ........................................... INDUSTRY ...................................................... $16.5
578 ........................................... NONPROFIT, FOUNDATIONS, ASSOCIATIONS, SOCIETIES .......... $66.7
62 ........................................... OTHER GOVERNMENT ........................................ $9.1

*NUMBERS HAVE BEEN ROUNDED.
FINANCIAL HIGHLIGHTS
July 1, 2016 - June 30, 2017

GIFTS AND PLEDGES FROM PRIVATE SOURCES

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TOTAL OPERATING SURPLUS*

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TOTAL OPERATING REVENUES AND EXPENSES

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</tr>
</tbody>
</table>

*Surplus includes revenue less expenses as well as uses of retained surplus.
EMILY MAYOCK
Editor

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DANIEL ROBISON
Writers

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ANAND UPADHYAY
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TED SIKORA
Videography

ANGELO MERENDINO
Photography

CHRIS SHERIDAN
Vice President, Marketing and Communications, and Senior Advisor to The President