

law

# GONE IN THE NIGHT

A STUDENT-RUN CLINIC HELPS BRING JUSTICE TO IMMIGRANTS UNFAIRLY DETAINED

by John Bringardner / GSAS '03

LAST YEAR, A TEAM OF NYU LAW STUDENTS WON A PRECEDENTIAL RULING THAT SAID "OPERATION RETURN TO SENDER"—A MASS DRAGNET OF ILLEGAL IMMIGRANTS OFTEN OCCURRING AT NIGHT—HAD CROSSED A LINE.

It was 4:30 AM, hours before the sun would rise, but the buzzer kept buzzing and the intercom was broken, so Clara hit the button that unlocked the apartment building's front door. It must be an emergency, she thought. Clara stepped onto the landing in her pajamas. A team of six armed Immigration and Customs Enforcement (ICE) officers marched up the stairs and flashed a warrant for her sister, Maria. Clara, a lawful permanent resident originally from Guatemala, didn't think

she could prevent the officers' entry, even though Maria wasn't there. Shining their flashlights around the darkened apartment, the officers found several members of Clara's extended family, including her brother, Erick. When they couldn't produce documents showing that they were legally in the United States, the officers handcuffed and herded them into a van. They drove Clara's family around Englewood, New Jersey, as the officers made another raid, and then another, before taking them to a detention center.

That March 2007 arrest triggered a Fourth Amendment legal battle over Erick's potential deportation. But the case saw a major turning point in September 2012, more than five years after the raid, when Nikki Reisch (LAW '12) and a team from the NYU School of Law Immigrant Rights Clinic won a precedential ruling from the Third Circuit Court of Appeals. The ICE officers—and "Operation Return to Sender," the wide-reaching sweep of illegal immigrants they were carrying out—had crossed a line. The deci-

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sion helped clarify for the first time when ICE officials' conduct may constitute the kind of "egregious violations" that would prevent them from detaining and deporting individuals they picked up in mass dragnets, a panel of Circuit Court judges said. Erick's is one of dozens of high-profile cases taken up in recent years by the immigration clinic, which has gained a reputation for digging in on particularly challenging legal questions. NYU professor Nancy Morawetz (LAW '81) and Michael Wishnie, now

co-director of Yale Law School's Worker and Immigrant Rights Advocacy Clinic, founded the clinic following a 1996 immigration reform bill that drastically altered the legal framework for immigrants in the United States, both legal and undocumented. The bill's most significant change was to lower the bar on fairness hearings, Morawetz says. Previously, almost all deportations had to be approved in a fairness hearing, at which an immigration judge would review the individual case and any potential mitigating fac-

tors. The reform, she says, turned it into a "one strike and you're out" system. The law clinic fights back on two fronts, assigning its two dozen students both individual legal cases and larger advocacy issues over the course of the year. Rather

offense, they are being treated as drug traffickers—and risk being kicked out of the country for something that would otherwise warrant little more than a slap on the wrist for a citizen. "The law in practice is totally different from what it sounds like as a sound

In just his first three years in office, President Obama deported more people than President Bush did during his entire tenure.

than simply partner with pro bono attorneys, or handle only discrete pieces of a case, the students are the main drivers, and their journeys through the system can lead from immigration courts all the way to the Supreme Court—where an amicus brief they drafted recently helped convince a majority of justices that lawful permanent residents with minor convictions in their past could leave and reenter the United States without risking their immigration status. "Just the sheer difficulty of the cases and having the students understand what it means to represent a client is important," says Alina Das (LAW '05), who co-directs the clinic with Morawetz.

bite," Morawetz says. "The simplest conviction can put a person's entire life in jeopardy." In 2012, the United States deported a record number of people and spent nearly \$18 billion on immigration enforcement, more than was spent on the FBI, DEA, and ATF combined. Following 9/11, enforcement became a major government funding priority, but in just his first three years in office, President Obama deported more people than President Bush did during his entire tenure. Das says that the Obama administration appears to be pushing current laws to an extreme as a way to show anti-immigration hard-liners that he's tough on enforcement, in order to create a political opening for reform.

Das says one of the most common issues they see is a marijuana conviction that results in the threat of deportation. The "Secure Communities" initiative, launched under George W. Bush in 2008 but greatly expanded under President Obama, was described to the public as targeting serious convicted felons for deportation. It's the kind of policy that may sound like common sense. But in practice, the initiative unfairly preys on a broad swath of people with low-level offenses, Morawetz says. Stop-and-frisk policies that target communities of color often net young people who have no idea that, when they plead out of a low-level possession

Several "generations" of students have represented Clara's brother, Erick, since his initial immigration hearings—all the way through ICE's decision not to pursue removal proceedings and to seek closure of his case, which occurred in August. It's a reminder of the patience required in these efforts. In fact, during Das's first week teaching at the clinic, in 2008, a case that she first worked on as a student was finally resolved, the end of an eight-year battle. "It was incredibly rewarding for the students and our client," she says, "but you have to fight so long and so hard for it." ■



THOUSANDS OF SCIENTISTS ANALYZED DIFFERENT PIECES OF THE PUZZLE THAT LED TO THE HIGGS BOSON'S DISCOVERY.

physics

# Higgs Hunting

THE COLOSSAL INTERNATIONAL QUEST FOR THE "GOD PARTICLE"

by Matthew Hutson

If you're going to claim discovery of a new particle—especially one nicknamed the “God particle”—you want to be sure of your results. *Really* sure. That's why, in the search for the Higgs boson, the threshold of statistical significance was set not at 95 percent confidence, as it is in some scientific fields, but at “5-sigma”: There had to be less than a one-in-3.5-million chance the findings were a fluke.

Late on the night of June 24, 2012, Sven Kreiss (GSAS '14), a physics graduate student at NYU, pooled two sets of fresh evidence from the ongoing research. He and 3,000 other scientists were collaborating on the A Toroidal LHC Apparatus, or ATLAS, one of the main detectors at the Large Hadron Collider in Europe. On that night, he was the first to see the collective data cross the 5-sigma finish line. The next day, he emailed his adviser, NYU Associate Professor of Physics Kyle Cranmer, to share the good news. His reply, by email: “Holy shit.”

The existence of the Higgs boson was proposed in 1964, along

with the Higgs field, which purportedly gives all fundamental particles their mass. (François Englert and Peter W. Higgs were jointly awarded the 2013 Nobel Prize in Physics for this “theoretical discovery.”) The boson fits into what's called the Standard Model of particle physics, a theory laying out the fundamental forces and particles thought to exist. By 2000, everything on the chart had been discovered except the Higgs boson, the lynchpin of the whole structure. If it did not exist, physicists would have to find some new explanation for decades of experimental results.

The problem is, it takes a huge jolt to get the Higgs field to cough up a Higgs boson, a particle that hasn't roamed freely since shortly after the Big Bang. So physicists had to build a machine capable of providing that jolt. The Tevatron particle accelerator at Fermilab in Illinois had enough power but could not produce enough particle collisions to make a reliable Higgs discovery before it shut down in 2011. It passed the baton to the Large Hadron Collider (LHC) at

CERN, the European Organization for Nuclear Research, in Switzerland.

The LHC works by sending two beams of protons in opposite directions around a 17-mile ring underground. The protons collide at nearly the speed of light inside giant detectors, including ATLAS and Compact Muon Solenoid, or CMS, where they create new particles. In a nuclear explosion,  $E=mc^2$  dictates that a small amount of mass is converted into a large amount of energy, because  $c$ , the speed of light, is a big number. “Here we do the reverse process,” Cranmer explains. “We take an enormous amount of energy, and with these collisions, we hope to produce a very small amount of mass, enough for something like a Higgs boson.”

While producing the Higgs is hard, detecting it is harder. Approximately one in a billion collisions will create the particle, and the detectors must be programmed to record only the collisions that look promising. ATLAS keeps about 300 of the 20 million that occur each second. Then the collisions must be analyzed. If a Higgs is produced, it decays almost immediately into smaller particles, such as two photons or four electrons, which are what the machine detects. Cranmer says that there are 10 to 20 decay possibilities, with teams of 50 to 100 people around the world focusing on each.

Once the teams have analyzed their data, they must combine their results into one analysis. “It's a fairly intricate puzzle,” Cranmer says. This is where he made his most central contribution, by developing what he calls a collaborative statistical modeling framework. ATLAS and CMS each have 3,000 people, and everyone has a different piece of that data puzzle. Cranmer found ways to integrate their individual findings so that overall progress toward that 5-sigma goal could be clearly assessed. “It's statistical analysis at a level that I don't think has ever been done before,” he says.

The Higgs has been found, but there are more blanks to fill. Now physicists must nail down properties other than its mass and its spin, such as how often it decays or how strongly it interacts with other particles.

The character of this boson may signal how to extend the Standard Model, which cannot offer a complete picture of the world. Scientists hope the Higgs will offer clues to theories of supersymmetry or dark matter, answering big questions about the structure of the universe.

In college, Cranmer was torn between studying the physics of the very big or the very small. He went small, but he notes that in high-energy physics, “There's this funny way in which the two extremes tie back into each other.” ■

psychiatry

# THAT OLD FEAR FACTOR

ARE SOME HARDWIRED, NATURAL ANXIETIES MISLABELED AS PSYCHIATRIC DISORDERS?

by Courtney E. Martin / GAL '04

It is often cited that public speaking is the No. 1 fear of most adults. Not cancer, which kills 20,000 people a day worldwide. Not plane crashes, which—although statistically rare—make for an awfully grisly death. If one is a mediocre or even bad public speaker, it might result in embarrassment but not physical peril. So why do people experience such anxiety about something that, in reality, has such low comparative stakes?

University Professor Jerome C. Wakefield, who teaches in the Silver School of Social Work, has an explanation with implications far broader than the much-feared spotlight. In his recent book, *All We Have to Fear: Psychiatry's Transformation of Natural Anxieties Into Mental Disorders* (Oxford University Press), co-authored with sociologist Allan V. Horwitz of Rutgers University, he argues that public speaking and other common fears—such as heights, snakes, and darkness—“are living fossils within our own minds, vestiges of what we were more appropriately, biologically designed to feel in long-past eras.”

As the argument goes, human beings once feared public speaking because they risked alienating others within their small, deeply interdependent communities. Today, if you flub a client presentation, you might lose an account; in Mesopotamia, you could have lost respect, food, protection from predators, and, in time, your life.

Wakefield posits that many

seemingly “excessive” anxieties may actually be perfectly normal. We're a naturally vigilant species, he says, instilled with err-on-the-side-of-caution triggers that were necessary for the many dangers early human beings encountered. But inside our relatively safe modern existence, with its low toler-

witz believe can lead to overtreatment. Reuters recently reported that diagnosed anxiety disorders have increased by more than 1,200 percent since 1980, and studies claim that more than half the population suffers from such disorders.

In light of these numbers, it wouldn't be outlandish for the

Diagnosed anxiety disorders have increased by more than 1,200 percent since 1980, and an estimated one-in-five adults now takes at least one psychiatric drug.

ance for human foibles, our normal fears are mistakenly classified as psychiatric disorders and treated accordingly.

Not surprising to Wakefield, this notion failed to appear in the *DSM-5*—the fifth version of the *Diagnostic and Statistical Manual of Mental Disorders*, published by the American Psychiatric Association in May 2013, which provides a common language and standard criteria for those in the field. The *DSM-5* contained revisions with potentially far-reaching consequences for anyone seeking psychiatric treatment, from those on the autism spectrum to those struggling with depression. However, like the *DSM-IV*, published in 1994, it made no reference to so-called natural anxieties, an omission that Wakefield and Hor-

authors themselves to fear making such a controversial argument. “What we're saying could have rather dramatic implications for the current approach to anxiety disorders,” Wakefield admits. “We are prepared to be excoriated and rejected by some of our peers.” Most notably, Andrew Scull, head of the sociology department at the University of California, San Diego, critiqued Wakefield and Horwitz's work in the *Los Angeles Review of Books*, writing: “The alleged features of normal human nature and the supposed hold our genes have over our behavior are as speculative as most neuro-maniacal accounts of modern man.”

But Wakefield and Horwitz, in rebuttal, can point to an exhaustive list of studies, the most obvious and convincing of which focuses

on the fears of babies. For example, as soon as these ostensibly anxiety-free creatures start exploring the wild world of stairs, counters, and many other height hazards, they sense danger and do their best to avoid falling. Moreover, children commonly have intense fears of wild animals they have never seen except in pictures but were genuine sources of danger in ancient environments. To this point, Wakefield and Horwitz's work has been favorably reviewed in *The American Journal of Psychiatry* and *The Lancet*, among others.

It's important to note that Wakefield and Horwitz don't argue that *all* anxiety is hardwired. They well understand the need for some people to turn to anti-anxiety medication; indeed, an estimated one-in-five adults now takes at least one psychiatric drug, such as antidepressants, antipsychotics, and anti-anxiety medications. But one might also try cognitive behavioral therapy or increasingly popular mindfulness practices to counter those fears, which, in Wakefield's view, are natural, if sometimes (but not always) outdated. Studies show, for example, that those with more intense fear of heights from youth actually have fewer injurious falls during their lifetimes. By simply exploring the biological roots of our reactions, Wakefield says, “It opens up a larger space of possible responses and suggests why, in the face of our natural anxieties, courage has always been considered a central virtue of humankind.” ■

# THERE'S NO PLACE LIKE HOME

## HOW NYU REINVENTED ITS STUDENT EXPERIENCE

In the not-so-distant past (also known as the 1990s), an incoming freshman might show up at NYU to meet an overwhelmed RA, sample some greasy cafeteria food, and take in a random dorm party. Now freshmen are ushered into their new chapter of life by a cosmopolitan welcome wagon, including curbside greetings on Move-In Day, organic vegan menu options, and a full week of icebreakers that include a group hypnosis session and a social media scavenger hunt.

It's no wonder that the Division of Student Affairs, the department responsible for this transformation, has captured 21 Excellence Awards from the National Association of Student Personnel Administrators in the past eight years—more than any college in the history of the program. “We have worked to create a robust and vibrant campus life that supports the academic enterprise—in and out of the classroom,” says Marc Wais, vice president for global student affairs.

Getting there took more than a decade of self-examination. In the process, NYU discovered that it could indeed be both things to students—an urban adventure where undergrads gain unprecedented independence, and also a close-knit, nurturing community.

Here's a look at some of the perks and highlights of campus life today:



NYU was ranked fourth by the Princeton Review on its 2013 “Dream College” list.  
**4!**

More than 450 student clubs were registered in 2012.  
**450**

There are more than 1 million visits to NYU athletic facilities every year.  
**1m**

SQUARE

### Welcome Week

That's entertainment: An orientation extravaganza packed with more than **400 activities** now attracts **40,000 attendees** each August. Even the Presidential Welcome and the annual *Reality Show: NYU*—the highly comic, unblushing student-produced musical that introduces freshmen to college life and all its pimples—are staged at landmark venues, including Radio City Music Hall and the Beacon Theatre.

**400+**

### Residence Halls

It all starts with a place to rest your head. Between 2002 and 2011, **NYU invested \$628 million** in student housing and student services to reimagine the residential experience. Many dorms now offer academic-themed floors to help students connect with those of similar interests under the tutelage of faculty. Within a given residence hall, students may live next door to an international professor, a writer-in-residence, or even an imam or rabbi—making NYU the most faculty-embedded residential-life program in the country.

**\$628m**

### Meals

After pondering the expanding universe or a passage by Camus, young scholars may unwind with a quinoa salad and carrot juice using the CampusDish nutrition app. The **dining halls provide gluten-free and vegetarian options alongside college classics such as burgers and fries.** The halls have also partnered with sustainable seafood, filtered water, and composting programs to ensure their green cred. And dining hours range from 7 AM to midnight, so there's always something cooking.

**17 hours**

### Wellness

When that first flu away from home hits, never fear. Some **24,300 students** were seen in **130,486 visits** at the Student Health Center in 2012. And when there are problems that may seem overwhelming, students can reach out to the nationally recognized Wellness Exchange. The trained health professionals who staff the 24/7 hotline received more than 12,000 phone calls in 2012—a 253 percent increase from 2005.

**24/7**

### Off-Campus

As good as things are on campus, New York City always beckons. More than **91 percent of students** hold a **part-time job or internship**, with **24 percent holding both.** In the past decade, more than 85 percent of undergrads participated in community service—landing NYU on the President's Higher Education Community Service Honor Roll with Distinction for five of the past seven years.

**91%**

### Jobs

It pays to have the right school on your résumé. For the Class of 2012, the Wasserman Center for Career Development reports that an average of **92.5 percent of graduating seniors** were employed **full-time or attending graduate or professional school** by late fall of the following year. Starting full-time salaries for NYU undergrads have increased to \$51,385, about \$800 higher than in 2011.

**\$51K**

PHOTO © NICK JOHNSON

# IN BRIEF

## GLIED APPOINTED NEW DEAN OF WAGNER

When Sherry Glied was training as an economist, she never would have predicted that she'd end up a health-care policy expert, or that she'd be sitting in the dean's chair at the Robert F. Wagner Graduate School of Public Service, a role she assumed in early August. Glied, who formerly served as chair of the department of health policy and management at Columbia University's Mailman School of Public Health, has published numerous works on health-care reform and mental-health policy, and has held multiple government advisory positions, including most recently the role of assistant secretary for planning and evaluation in the U.S. Department of Health and Human Services. She looks forward to mentoring Wagner students, especially during a period of such vast change in the realm

of health care. "The nice thing about health care is that it never stays still," Glied says. "It's always changing and if anything, the pace has only picked up."

—Morgan Ribera

## MORRISON NAMED LAW SCHOOL DEAN

Last April, NYU School of Law received a new captain at the helm: renowned constitutional law scholar Trevor Morrison. He succeeds Richard Revesz, who stepped down from the position after 11 years. Morrison previously clerked for U.S. Supreme Court Justice Ruth Bader Ginsburg, has taught at Cornell and Columbia universities, and spent 2009 serving as President Barack Obama's associate counsel.

As dean, Morrison plans to enhance the school's curriculum, launch new study-abroad programs, and establish a Washington,

D.C.-based government lawyering clinic, as well as expand loan repayment assistance. "These are challenging times for legal education, when some of the basic premises of our mission and approach are being reexamined," he says. "But part of what makes NYU so special is its capacity to equip students to succeed in today's marketplace while holding fast to the core values that have long made it a distinctive, and distinctively valuable, leader in legal education."

—Boryana Dzhambova

## SREENIVASAN HEADS NYU-POLY

The Polytechnic Institute of NYU has a new chief. Katepalli R. Sreenivasan was appointed president of NYU-Poly and will lead the affiliated institution through the final stages of its merger with NYU and its transition, in Janu-

ary 2014, to the university's new School of Engineering. Sreenivasan, a distinguished experimental physicist whose research focuses on the behavior of fluids and turbulence, joined NYU as a professor of engineering and physics in 2009, after more than two decades at Yale University and an appointment as director of the International Centre for Theoretical Physics in Trieste, Italy.

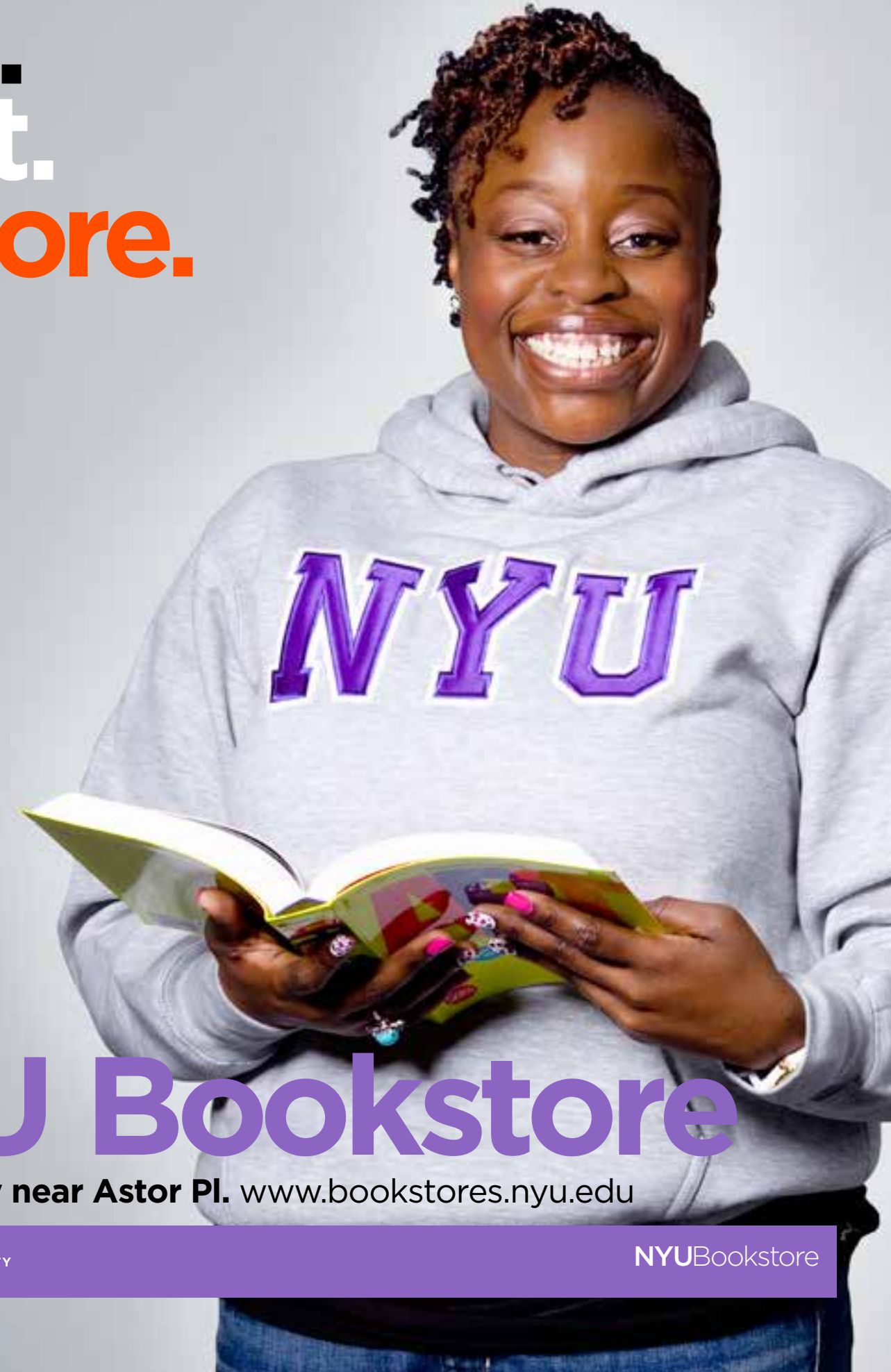
Sreenivasan views the merger as a chance to concentrate the university's efforts in urban engineering, bioengineering, and information technology for the good of all. "The resulting combination will enhance our collective opportunities in education, research, and economic development, benefiting Brooklyn, New York City, and the State of New York, along with our nation and the world," he says.

—B.D.



THE MUTINY ON THE AMISTAD WAS JUST ONE PIECE IN "RISING UP: HALE WOODRUFF'S MURALS AT TALLADEGA COLLEGE," WHICH WAS ON VIEW AT THE BOWSE GALLERY THIS FALL. SPONSORED BY NYU'S FACULTY RESOURCE NETWORK AND THE STEINHARDT SCHOOL OF CULTURE, EDUCATION, AND HUMAN DEVELOPMENT, THE EXHIBITION FEATURING THE WORKS OF WOODRUFF (AN NYU FACULTY MEMBER FOR TWO DECADES) WILL CONTINUE TO TOUR THE UNITED STATES THROUGH 2015.

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bioengineering

## BLOODY BRILLIANT

### UNDERGRAD JOE LANDOLINA MAY REVOLUTIONIZE HEALING

by Alyson Krueger / GSAS '12

As a kid, Joe Landolina loved to invent things. Growing up on his grandfather's vineyard in Pine Bush, New York, he experimented with new wine varieties in the two labs on the property. "It actually takes quite a bit of chemistry to make sure that everything is balanced in a good wine,"

Landolina (POLY '14) explains. "Under my grandfather's tutelage, [I] learned how to manipulate biochemistry." He even tried to create aspirin once but admits: "I don't know how well that went." Those early trials, however, set the stage for one very big feat. Now working toward his bachelor's degree in chemical and biomolecular engineering and, simul-

taneously, a master's in biomedical engineering and biomaterials at NYU, Landolina recently went public with an astonishing invention. Called Vet-i-Gel, the substance stops uncontrollable bleeding cold—something that could benefit everyone from patients in surgery to soldiers on a battlefield. Publications such as *The Huffington Post*, *USA Today*, and the *New York Daily News* have written about Vet-i-Gel, singing its praises. Landolina and business partner Issac Miller (STERN '12) have brokered partnerships with

doctors and research organizations across the country. All it took to put this in motion was some good old-fashioned competition. When Landolina arrived at NYU in 2010, he was dazzled by the \$175,000 prize he saw advertised for the winner of the Leonard N. Stern School of Business Entrepreneurs Challenge. So he decided to invent something. He called to discuss ideas with his father, a police lieutenant, who suggested he try to help EMS workers save more lives. Being that Landolina once had dreams of becoming

a surgeon, he took that a step further and conceived a product that could help medical professionals at all stages of crises.

To move forward, the freshman reconsidered some work from his past. In high school, Landolina had conducted informal experiments with polymers—the molecules that make up our DNA and proteins as well as other substances in the universe—learning how to turn them into solids. So he figured if he could invent a polymer that could act like skin, it just might close wounds and stop bleeding. He went to work reading as many books and papers on the subject as possible and traveling home on weekends to experiment with polymers in his grandfather's wine labs. Just two weeks later, he had derived a beige gel from a plant that could reassemble to mimic whatever surface it was applied to—including human skin. Vet-i-Gel was born.

At the time of the Stern competition, the judges viewed Vet-i-Gel as a glorified Band-Aid, something that could only cover a wound and facilitate healing (he took second place). But Landolina had a hunch that it could do much more. So he went to a local butcher shop in Brooklyn, bought a juicy, fresh pork loin, and sliced it down the middle, producing a great gush of blood. After applying the gel, the rampant bleeding stopped before Landolina's eyes, and the cut closed within seconds.

He *knew* he was on to something. After that experiment Landolina reached out to Herbert Dardik, former chief of surgery at Englewood Hospital in New Jersey, who agreed to test Vet-i-Gel on rats in his lab. Together they performed a 12-animal study over the course of two months. Every

time one of the researchers sliced into a liver or punctured an artery, the gel put the organ or pathway back together in seconds—and saved the animal's life.

Now, Landolina and Miller, whom he met during the Stern competition (they currently operate under the company name Suneris, Inc.), are working to formally produce the product, which they believe will especially benefit veterinarians, the military, and surgeons, but also the general public. Of course, this will require rigorous testing, so the first step is to attract backers who can finance more experiments and make plans for distribution. However, Vet-i-Gel is already being manufactured for veterinarians; more than 300 have expressed interest in it when it is ready for clinical evaluations later this fall.

Not only does Vet-i-Gel have a solid business plan, says Kurt Becker, a professor at NYU-Poly, but it also has some advantages that similar products don't: It's significantly faster in closing wounds, is much less expensive, and is easy to use (other products require applying pressure, something that isn't always easy to do in surgery or on a battlefield).

Landolina says that the substance may also be used for other medical tasks. Because it takes on the characteristics of skin and integrates seamlessly into the body, Vet-i-Gel may be able to deliver medicine to a particular spot or heal burns and other irritations. And the gel is designed to be absorbed into the body, so it never has to be removed (the full effects of the substance on the human body still need to be tested). "Ever since I made the material, it really does surprise me every single day," Landolina says. ■

chemistry

## Coolness Factor

by Kyla Marshall

This could spell the end of freezer-burned waffles and more: Building on the known behavior of antifreeze proteins found in fish and amphibians living in subzero climates, NYU chemists Kent Kirshenbaum and Michael Ward—along with grad students Mia Huang (GSAS '09, '12), David Ehre, Qi Jiang (GSAS '13), and Chunhua Hu—have synthesized protein-like molecules called peptoids that allowed them to lower the temperature of water significantly *below* its freezing point of 32° Fahrenheit—while keeping it liquid.

We all know too well that crystals form on month-old ice cream, but they also provide the framework for everything from silicon—an essential component of our most beloved gadgets—to kidney stones and gout. "We want to find out how crystals form, how we can predict the arrangement of individual molecules," Kirshenbaum explains. "And then we can start to think about how we can alter those events to produce crystalline materials that will be useful to us." The possibilities range from disease prevention to a new kind of freezing process. Such an innovation would be invaluable for cryo-preservation (the storage of stem cells, biological materials, and other tissues), which currently employs antifreeze solvents that can damage the tissue.

Might this technology be used to freeze the dead in hopes that we could wake them in the future? "It's not typically what I contemplate as an application for what we're doing," Kirshenbaum says. But he adds: "If somebody popped off my head after I passed away, and they were thinking about reanimating it later, I would hope that they care a lot about how it's being stored." ■