

In Review

LASER SCIENCE

Water Proof?

SELF-CLEANING SYSTEM: A water droplet hangs on the edge of a metal surface that has been treated with a Rochester-developed process to repel moisture. Developed by optics researcher Chunlei Guo, the system uses extremely short (on the order of 10^{-15} second) bursts of laser light to alter the shape of nano-sized structures in the metal to make it nearly impossible for water molecules to penetrate. Potential applications for such “super-hydrophobic” materials include sanitation and other areas where repelling water-borne pathogens is important. **PHOTOGRAPH BY ADAM FENSTER**





FROM THE TOP Reunion Class

CLASS PORTRAIT: When *From the Top*, NPR's weekly showcase for young musicians, tapes a broadcast at Kodak Hall at Eastman Theatre in March, the production will visit the current home venue of several past performers on the show. Former *From the Top* guests who are now students at the Eastman School include (back row) Ben Fried '14E (cello), Ryan Norville '16E (flute), Quinn Delaney '14E (bassoon), master's student Kieran Hanlon (double bass), Jennifer Zhou '14E (flute), and DMA student Eun-Hye (Grace) Lee (piano performance); (middle row) master's student Stephanie Price (viola), Andrew Laven '17E (cello), Dominic Giardino '16E, (clarinet), and Aaron Bigeleisen '17E (voice); (front row) DMA student Wei-Han Wu (piano performance), DMA student Oliver Hagen (conducting), and Emily Helenbrook '16E (voice). PHOTOGRAPHS BY ADAM FENSTER; COMPOSITE IMAGE BY STEVE BOERNER FOR ROCHESTER REVIEW





FAN CLUB
Pep in Their Step

YEARS OF YELLOWJACKETS: The University's pep band celebrated its 10th anniversary of helping cheer on the Yellowjackets with a special performance at the Palestra in February. Greg Savich '06, who is now a PhD student in optics (at left, in blue), founded the band as an undergraduate and rejoined the group as the guest conductor. **PHOTOGRAPH BY ADAM FENSTER**



Key Characters

1. Greg Savich '06, optics PhD student (former director)
2. Dan Macguigan '14
3. Ethan Senator '15
4. Bennett Nidenberg '16
5. Ray Tengan '17
6. Nick Van Swol '15
7. Jon Strumpf '15 (student conductor)
8. Doug Bowlby '17
9. Ryan Challenger '14
10. Aurek Ransom '17
11. Bobbi Spiegel '17
12. Mo Heyden '17
13. Weiming (Catherine) Kong '17
14. Kiera Crist '15
15. Aubrie Sauer '16
16. Joe Bailey '15
17. Julia Morris '15
18. Annabelle Taylor '17
19. Crystal Hans '15
20. Abigail Eaves '17
21. Kathryn Strelevitz '16
22. Danika Teverovsky '16
23. Tyler Vasquez-Dorn '17
24. Rebecca Van Dyke '17
25. Mike Tamburrino '16
26. Dani Douglas '17



PRESIDENTIAL SYMPOSIUM

Eyes on Education

Community leaders, Warner School experts, educational innovators, and University officials commit to better education for Rochester's children.

By Scott Hauser

GIVING SCHOOLCHILDREN IN ROCHESTER the kind of education they need to succeed will take more than a village—it will take a city, a graduate school of education, a university, and a web of community partners.

That was the message from a special symposium focused on “Revitalizing K-12 Education in Rochester” held at the Interfaith Chapel in February. While recognizing that the city’s public schools face enormous challenges, community and University leaders, city school educators and administrators, educational scholars, and area educational innovators said they were ready to get to work.

▲ **COMMUNITY SPIRIT:** Improving Rochester’s K-12 public schools will take the help of the entire community, said Mayor Lovely Warren, who delivered the plenary address at February’s Presidential Symposium.

“Let’s have no delusions,” said President Joel Seligman as he summed up a half day of plenary addresses, panel sessions, and presentations. “The problems are hard, and they persist.”

But Seligman found reason for optimism in the commitment of panelists who described the success of their initiatives and their ideas for the future.

“We’re all in this together,” he said, adding that a strong K-12 educational system in Rochester is necessary for a vibrant city, which in turn plays a role in the success of the University. “As our Board Chair Ed Hajim ’58 has often noted, ‘A great university can be no greater than the community in which it lives.’”

Bringing together members of the community to start a conversation on Rochester’s public schools was the goal of the February 4 Presidential Symposium, hosted by Seligman and Raffaella Borasi, dean of the Warner School of Education. They

were joined by Rochester Mayor Lovely Warren, Rochester City Schools Superintendent Bolgen Vargas, faculty from the Warner School, representatives from area charter schools, and leaders of community programs that provide educational opportunities outside of a school setting.

Guests and panelists were frank about the challenges: in 2013, the City of Rochester ranked as the nation’s fifth poorest; the district, which enrolls 30,000 students, has a graduation rate that hovers at about 43 percent; and previous reform initiatives have been undermined by political and administrative skirmishes.

“Today in this city, for many people, their zip codes determine their futures,” said Warren, describing a “double standard” among some who assume families who rely on public schools should defer to policymakers and politicians who live outside the district to determine what’s best for children in urban neighborhoods. “I’m not



IDEAS: Superintendent Bolgen Vargas, Warner Professor Kara Finnegan, and Dean Raffaella Borasi offered ideas about K-12 education.

naive. Chipping away at the double standard of public education will be hard work."

She said one of her main initiatives in her first term as mayor will be to increase the availability of pre-kindergarten programs, noting that state and national leaders have also recognized the importance of early learning in improving K-12 education. She also emphasized that children in the city have fewer opportunities to take part in summer learning programs, which means their chances of "sliding" educationally during the summer are far greater than for other children.

Vargas echoed those themes, saying that expanding pre-kindergarten programs, providing more summer learning initiatives, and expanding enrichment programs are among the key elements in a strategy to

"We really want to be part of the conversation," Borasi said. "We are a major part of the community, and K-12 education is a responsibility of the entire community.

"Over time, we have added concrete initiatives that we undertake in the community. And we continue to look for new opportunities where we can use our resources best. We can't do it all, but there are specific things where we can try to make a difference."

Seligman said that the University has a track record of supporting K-12 education in Rochester, noting that the Warner School has received nearly \$20 million to support education reform in the Rochester area and western New York.

In addition, the University commits \$1.7 million each year in scholarships to gradu-

"When many universities have scaled back their support of schools of education, the University of Rochester is determined to invest in K-12 education as part of our commitment to the greater Rochester community and, most of all, its children," Seligman said.

Acknowledging that the issues facing public education in Rochester are too large to solve quickly, he asked that the symposium reconvene in early 2015 to assess progress and map out new areas for discussion.

Warren said she looked forward to an ongoing conversation with the University on education and a range of issues, noting the role that the University plays in the region as the area's leading employer.


"I think it's important that we all come together to move our community forward

"When many universities have scaled back their support of schools of education, the University of Rochester is determined to invest in K-12 education as part of our commitment to the greater Rochester community and, most of all, its children." —Joel Seligman

improve educational outcomes for the district. "I'm very pleased with the conversation that we're having today," he said.

Borasi said the Warner School and the University have deep ties to the city's schools and their students, providing professional development opportunities, developing after-school programs, initiating summer learning opportunities, educating teachers, and conducting research on urban education.

ates of Rochester schools, supports low-income students as they prepare for college through the University's Upward Bound program, and works with programs at Rochester high schools. He also noted the success of programs such as the Hillside Work-Scholarship Connection, which provides education and training to middle and high school students, and said the University plans to increase its participation in the program from 120 to 275 students.

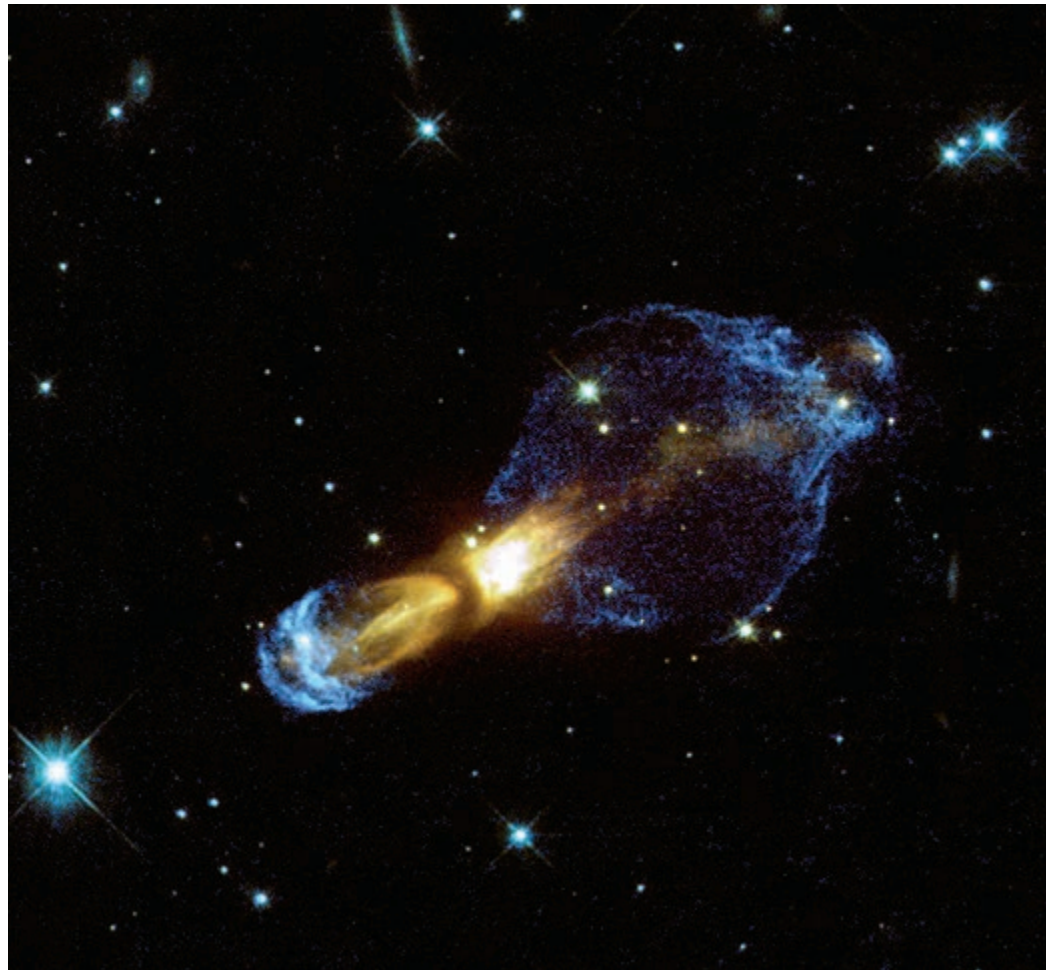
in a way that's realistic to the residents of our City of Rochester but also to our region," she said. "The fact is that the University is the number one employer in our region. That's not just the Mt. Hope area, but throughout the City of Rochester. It's very important. Those relationships—in research, in education, in the businesses that have been developed around what's happening at the University—are very important as we move forward." 

Stellar Deaths and Celestial Jets

How do some round stars evolve into highly aspherical clouds of dust that often have jets of interstellar material shooting in opposite directions? Rochester researchers say the answer lies in the death throes of binary star systems.

In a paper published in the *Monthly Notices of the Royal Astronomical Society*, **Eric Blackman**, professor of physics and astronomy, and his student **Scott Lucchini '13**, aimed to refine astronomers' understanding of how sun-like stars transition from one phase to another as they run out of hydrogen.

Astronomers have long known that such smaller stars often end up as planetary nebulae but have been puzzled why some emit powerful, bipolar jets of gas and dust. As sun-like stars die, they expand into discs of gas and dust that surround much smaller cores, a stage known as asymptotic giant branch stars. Past models suggested that as the discs enveloped nearby stars, they formed aspherical planetary nebulae.



JET SETTERS: Are binary star systems the reason some planetary nebulae collapse into colorful jets?

By studying observational data and theoretical models, Blackman and Lucchini refined that idea, noting that current models don't completely account

for the creation of the powerful jets. In the new study, they were better able to calculate the strength and energy of the magnetic flows between stars and

found that only two models, both of which involve the most strongly interacting binaries, could create the jetted versions of the nebulae. —Leonor Sierra

Possible Parkinson's Treatment?

A new Medical Center study shows that a population of support cells found in the brain called astrocytes could provide a new and promising approach to treating Parkinson's disease. The findings may demonstrate that a single therapy could simultaneously repair the multiple types of neurological damage caused by Parkinson's, providing an overall benefit that has not been achieved in other approaches.

In a study published in the European journal *EMBO*

Molecular Medicine, lead author **Chris Proschel**, assistant professor of biomedical genetics, and his colleagues reported that by carefully manipulating a population of central nervous system cells called glial precursors, they were able to induce the precursor cells to produce a specific class of astrocytes.

Early results indicated that the new astrocytes, which differ from other types of astrocytes in a mature brain, were more effective at building connections between

nerves and creating a suitable environment for growth and repair. Much like a repair crew, the implanted astrocytes helped the brain's nerve cells recover and resume normal activity.

A progressive neurological disorder, Parkinson's disease affects an estimated one million Americans. While the condition is associated with the loss of cells that produce the important neurotransmitter dopamine, the disease's impact is more complex and wide-ranging, disrupting

basic signaling functions and triggering the destruction of several other types of cells found in the brain.

Researchers say that while the preservation and restoration of dopamine-producing neurons is critical to slowing or reversing the course of the disease, it's increasingly clear that successful long-term therapies have to both protect the areas of the brain under attack and foster the repair of many cell populations.

—Mark Michaud

How to Measure Stroke Care

Are measures of mortality providing an accurate picture of care for stroke victims? According to a study by Rochester researchers, that may not be the case.

Published in the journal *Stroke*, the study found that wide variation in the use of do-not-resuscitate (DNR) orders can significantly skew a hospital's quality "ranking" based on mortality.

In an examination of data from 355 hospitals in California from 2005 to 2011, the study looked at 252,368 stroke cases and found that some hospitals used DNRs in an average of 2.2 percent of stroke cases, while others used them an average of 23.2 percent of the time.

As expected, the hospitals with a greater percentage of DNRs generally had higher mortality rates.

"With mortality increasingly being used as a marker for the quality of care provided to stroke patients, it is essential that we understand the impact of decisions made by physicians and families to limit or withhold care," says **Adam Kelly**, a neurologist with the School of Medicine and Dentistry and chief of neurology at Highland Hospital.

Physicians have questioned whether mortality is an appropriate measure of stroke care because DNRs are often put in place to limit some life-extending interventions for patients who have had a severe stroke.

But, the authors point out, mortality statistics do not distinguish between an individual who has died because of poor or unsafe care versus someone who died because a conscious decision was made to withhold invasive or heroic measures.

—Mark Michaud

Longer Life? Be 'In Control'

The less education you have, the more your attitude counts when it comes to staying alive and well. That's the finding of a new study conducted by personality researchers from Rochester and Brandeis University. Lead author **Nicholas Turiano**, a postdoctoral fellow in psychiatry, and his team found that adults without college degrees live longer if they feel like they're in

control of their lives. Those who reported feeling little control had mortality rates that were three times higher than those who felt in control. Published by the American Psychological Association's *Health Psychology* journal, the study followed 6,135 people, ages 25 to 75, for 14 years. Respondents were part of an ongoing, national questionnaire called the National Survey

of Midlife in the United States that collects assessments of perceived ability to exert influence over life circumstances. Turiano cautions that more research is needed to find out why or how people develop a strong sense of control, or when the development occurs, but researchers suspect innate and external factors contribute to a sense of control.

—Julie Philipp



TURF BATTLES: A lack of legislative focus often undercuts metropolitan areas, new research indicates.

Infighting May Undermine Large Cities in State Legislatures

Urban legislators have long lamented that they don't get their fair share of bills passed in state governments, often blaming rural and suburban interests for blocking their efforts. A new study confirms one of those suspicions but surprisingly refutes the other.

In an analysis of 1,736 bills in 13 states over 120 years, authors **Gerald Gamm**, associate professor of political science at Rochester, and Thad Kousser of the University of California, San Diego, found that big-city

legislation does get passed at dramatically lower rates than bills affecting less metropolitan areas, but the two conclude that infighting within city delegations often undermines legislative success for urban areas.

Reported in the *American Political Science Review*, the analysis was based on a study of so-called district bills, legislation that affects only a single locality or county. The researchers are the first to document the fate of big-city legislation and to test with hard data the reasons met-

ropolitan areas are often stymied in state politics.

"The data show that because of their large numbers, delegations from major cities like Chicago or New York are more likely to be at odds on legislation than smaller delegations, muddling cues for others in the chamber," says Gamm. "After all, if the delegates from a city can't coalesce behind a bill, why should legislators from other parts of the state vote for the law?"

—Susan Hagen

Historic Archives to Go Online

One of the most comprehensive and extensive firsthand accounts of 19th-century American political and social life will soon be available online. A three-year project to organize, scan, and create a website featuring photographs, diaries, letters, and other papers from the family of noted 19th-century statesman William Henry Seward got under way this winter. The collection, housed in the Department of Rare Books, Special Collections, and Preservation at River Campus Libraries, is the largest and most-consulted special collection in Rush Rhees Library.

Spanning the years 1730 to 1917, the collection includes journals, pamphlets, household accounts, estate records, and library inventories. Seward (1801-72) was a noted trial attorney, governor of New York, U.S. senator, and secretary of state under presidents Lincoln and Johnson.

The project is funded by a three-year grant from the Fred L. Emerson Foundation.



SEEING THE SEWARDS: One of the largest and most-consulted of Rochester's archives will go online over the next three years.

University and Eastman House Team Up for Degree

The study of the art, culture, history, and preservation of photography will have a new academic outlet in Rochester, thanks to a partnership between the University and George Eastman House International Museum of Photography and Film. The two institutions have teamed up to offer a joint master's degree in photographic preservation and collections management, beginning this fall.

The program is believed to be the only one in the United States dedicated to the study of the photograph as an object as well as the study of images in theoretical and historical context. Students will explore photography as part of material culture as well as its importance in conveying aesthetic, social, and political meaning, according to Thomas DiPiero, dean for humanities and interdisciplinary studies at Rochester.

In 2010, representatives from the University and the Eastman House agreed to establish broader and deeper research and teaching collaborations.

White House Recognizes Access Efforts

Rochester was one of nearly 150 colleges and universities whose initiatives to enroll low-income, first-generation, and minority students were highlighted as part of a daylong forum organized by the White House in January.

Known as the College Pipeline Initiative to Expand College Opportunity, the summit hosted by President Barack Obama was designed to mobilize efforts by higher education leaders as well as private sector, city, state, and philanthropic leaders to

help connect more low-income students with college and ensure that they succeed once they get there.

Rochester was featured in a 90-page report, "Commitments to Action on College Opportunity," which was released by the Executive Office of the President just before the meeting got under way.

In the report, Rochester outlined several of its current initiatives and plans for future efforts.

President Seligman Reappointed

Joel Seligman has been reappointed president of the University. In a statement from Ed Hajim '58, chair of the University's Board of Trustees, Seligman was praised for his accomplishments during his tenure.

"The Board of Trustees has enthusiastically endorsed Joel's reappointment, and I share in that enthusiasm. He has done a great job," Hajim said.

The University's presidents serve indefinite terms at the pleasure of the board and are re-

viewed periodically, usually every five years. Trustee Tom Sloan '65, '67 (Mas), who chaired the reappointment committee, said the committee talked with trustees, University officers, and student leaders, as well as conducted a survey of the faculty.

"The results were overwhelmingly positive and enthusiastic," Sloan said. "People appreciate the job Joel has done in providing vision, injecting incredible energy, and in communicating openly with all the University's constituents."



UR MEDICINE: A new branding campaign highlights Rochester's broad range of clinical services.

Introducing 'UR Medicine'

Taking a page from the playbook of successful corporate brands, the University has introduced a new name for its fast-growing clinical network. The name—UR Medicine—is intended to better capture the breadth of patient care services that the University's clinical units deliver across all affiliated institutions and collaborative programs.

The new identity will be used to brand all aspects of the patient care network, including Strong Memorial Hospital (along with its components Golisano Children's Hospital, Wilmot Cancer Center, Flaum Eye Institute, Strong West, and others), Highland Hospital, Thompson Health, Eastman Dental, the Highlands at

Brighton, the Highlands Living Center, and the University of Rochester Medical Faculty Group.

The new brand name was introduced with television commercials that were broadcast locally during the Super Bowl and the Olympics.

To see the ads and for more about the new identity, visit www.urmedicine.org.

Jim Thompson Named Special Counsel

Jim Thompson, who has served as the University's chief advancement officer since 2005, has been appointed special counsel to President Joel Seligman.

Thompson will advise Seligman on the future development of alumni relations and advancement as the \$1.2 billion *Meliora Challenge* nears its conclusion.

"Jim has built an outstanding Advancement program and team. Working with our Board of Trustees, Jim took the initiative in developing an ambitious strategic and implementation plan that today is well ahead of schedule for virtually every area addressed in this plan," said Seligman, citing the success of the George Eastman Circle, the University's Annual Fund, and volunteer boards that provide



ADVANCEMENT: Thompson oversaw the launch of Rochester's *Meliora Challenge*.

outreach to alumni and friends throughout the country.

Thompson will "focus on the next chapter in our alumni relationships and fundraising"

and will no longer be involved in the day-to-day operations of Advancement, according to Seligman.

Seligman said that Jim Osterholt will continue as interim senior vice president for Advancement, and there will be a national search for a permanent chief advancement officer. Dennis Barden of Witt Kiefer will lead the search.

Seligman also announced that Steve Dare, senior associate vice president, would become interim chief operating officer of Advancement.

"I am determined that while our capital Campaign may be completed on June 30, 2016, our momentum with respect to Advancement will continue," Seligman said.

Stroke Program Recognized

Strong Memorial Hospital is joining an elite group when it comes to highly specialized and complex stroke care. The Joint Commission and the American Heart Association/American Stroke Association recognized the hospital as a Comprehensive Stroke Center this winter, a designation that has been conferred on only two other hospitals in New York. The certification coincides with the launch of a new program dedicated to providing intensive care to patients with severe neurological disorders such as stroke.

The certification recognizes hospitals that have the infrastructure, staff, and training to receive and treat patients with the most complex neurological needs. Currently located in the Kessler Burn and Trauma Center at Strong Memorial Hospital, the program is scheduled to move to a new Neuromedicine Intensive Care Unit later this year.

Initiative Looks at Business and Government

The Department of Political Science has launched an initiative designed to foster education, research, and discussion among students about the relationship between business and government in the 21st century. Called the "Politics and Markets Project," the series is directed by David Primo, the Ani and Mark Gabrellian Professor and associate professor of political science and business administration. In the first event this winter, Primo moderated a panel discussion on the Affordable Care Act, "This Won't Hurt a Bit: ObamaCare and Your Future."

RESEARCH FUNDING

Funding Trends Worry Research Leaders

Is the United States in danger of falling behind when it comes to federal spending on research?

By Scott Hauser

AT A WASHINGTON, D.C., FORUM OF POLICY-makers and journalists last fall, Francis Collins, director of the National Institutes of Health, told a story of meeting with his counterparts from several countries: each reported how much their budgets were increasing, but when it was his turn, he told the international group he'd be lucky if the NIH's budget declined by only 5 percent. His counterparts didn't know what to say. They had, Collins noted, modeled their systems for funding basic research on the success of the United States over the past 75 years.

"We have been the envy of the world," Collins said, "but we're starting to be the puzzle of the world as people look at our trajectory and wonder how we lost our way."

While the comment is more sharply stated than most Rochester administrators would sum up the situation, there is growing concern about the future of federal support among those who oversee funding for the University's research initiatives. As budgets for the NIH, the National Science Foundation, the Department of Energy, and other major agencies level off or, in some cases, decline, the United States is in jeopardy of losing its role as the world's leader in scientific research, they say.

A February report from the National Science Board, which oversees the National Science Foundation and serves as an advisory group to Congress and the White House, underscored the concern.

"Research funding has been stagnant or in most circumstances, declining," says Josh Farrelman, director of governmental relations for the University.

Farrelman says budget cuts included in the March 2013 sequester, along with spending caps enacted through the agreement to end the 2011 federal debt-ceiling crisis, have been detrimental to the University's missions of research, education, and clinical care, as well as its ability to create new jobs and companies.

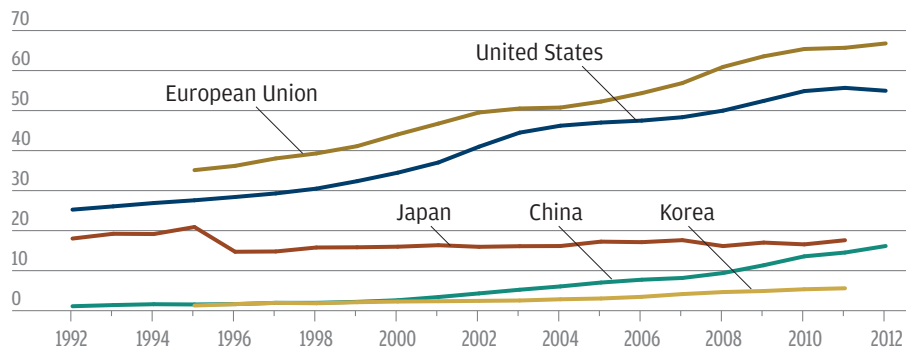
Research Lines

The investments that countries make in research and development are closely watched indicators of future trends in scientific and technological leadership.

TOTAL EXPENDITURES

Over the past 20 years several of the world's top economies—with the exception of Japan—have steadily increased real spending on higher education research and development.

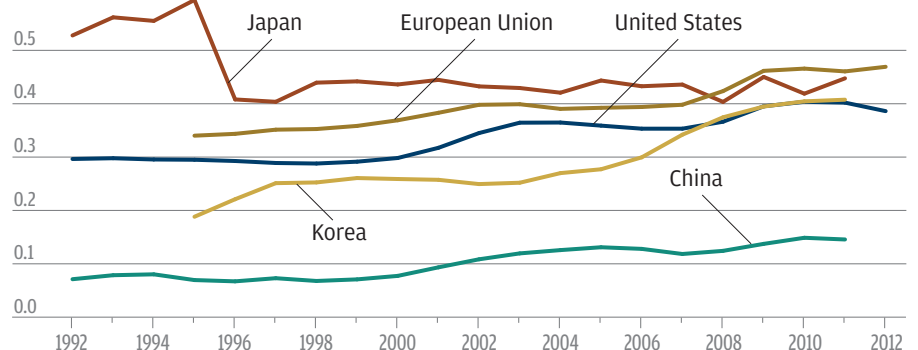
80 billions of 2005 U.S. dollars



EXPENDITURES AS SHARE OF GDP

But the picture becomes mixed when this spending is compared to each economy's gross domestic product. By this measure it appears to have stalled in some countries.

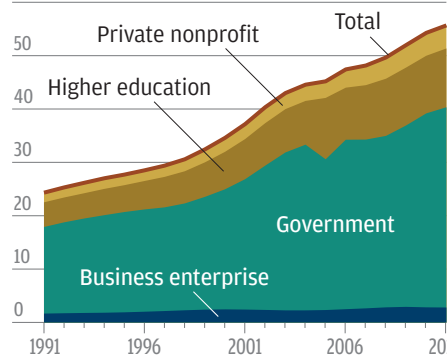
0.6 percent of GDP



U.S. FUNDING SOURCES

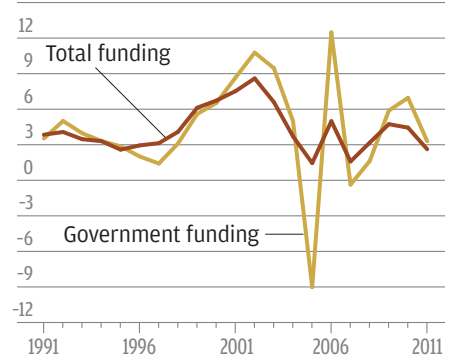
In the United States, government continues to provide the largest share of funds for higher education research and development . . .

60 billions of 2005 U.S. dollars



. . . but inconsistent funding levels from year to year play havoc with long-term planning and budgets.

15 percent change from previous year



SOURCE: Organization for Economic Cooperation and Development

Going into 2014, the situation has steadied a little bit, he says, thanks to a bipartisan budget act passed by Congress last December. But while the two-year budget provides some relief, it falls short of restoring agencies like the NIH and NSF to pre-recession levels, and it reduces the effects of the sequester on the agencies' budgets by only 25 percent for the 2015 fiscal year.

The result is that researchers at Rochester and other universities will find it increasingly difficult to win funding for their projects, says Rob Clark, senior vice president for research and dean of the Hajim School of Engineering & Applied Sciences.

"The competition has become even more fierce for an even smaller pot of money," Clark says. "It's important that we try to increase the budgets that fund the federally sponsored research agencies that we care very dearly about. If we're able to increase the overall pot, we will be able to, we think, compete very well for funding."

Rochester can claim considerable success in earning federal and other outside support. Over the past five years, the University has received nearly \$2 billion in research funding, the majority of which comes from federally sponsored research agencies, including the NIH, NSF, Department of Energy, and Department of Defense. On a per faculty basis, the University ranks among the top 15 institutions in the country.

Clark says the funding is important not only because it keeps Rochester at the forefront of research but also because of the way University-based research resonates throughout the economy.

"We have a strong history of leveraging federal funds to develop technologies and research that have had not only a national impact, but also a global impact," Clark says, noting Rochester's work in vaccine development, optics, medical imaging, and other areas. "We've also created 56 spinoff companies since 1996."

Although the NIH traces its roots to the late 19th century, it wasn't until the end of World War II that it took on its current role as one of world's leading funding sources for biomedical sciences.

In 1950, Congress established the NSF as an independent federal agency "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense."

The agencies and other federal programs modeled on them are credited with spearheading many of the technological,

scientific, and clinical breakthroughs of the second half of the 20th century. The NIH alone traces more than 80 Nobel Prizes to research conducted by NIH-funded scientists.

That scientific infrastructure has been a key component of the nation's economy, says Farrelman.

"Most economists agree that at least 50 percent of economic growth in the United States over the last half of the 20th century is a consequence of technological innovation, much of which results from federally funded scientific research," he says.

That's why it's troubling to see the agencies in danger of losing their international standing, he says.

According to statistics gathered by the Organization for Economic Cooperation and Development (OECD), spending on research at higher education institutions in the United States increased from about \$31 billion in 2000 to about \$63 billion in 2012.

"We have a strong history of leveraging federal funds to develop technologies and research that have had not only a national impact, but also a global impact," says Rob Clark, senior vice president for research, noting Rochester's work in vaccine development, optics, medical imaging, and other areas.

But since 2010, the total has leveled off, going from \$60.4 billion in 2010 to \$62.5 billion in 2011 to \$62.7 billion in 2012.

As a percentage of the nation's GDP, U.S. support for research and development in higher education has gone from about 0.30 percent of GDP in 2000 to about 0.39 percent in 2012, according to the OECD.

(For purposes of comparing across categories of data, the figures in the accompanying charts are in constant 2005 dollars.)

As countries like China, Korea, and Singapore emphasize the importance of research and development to their economies, they have increasingly invested in programs similar to those in the United States, and many of them are growing rapidly. For example, according to OECD figures, China has gone from spending \$2.3 billion on higher education research and development in 2000 to about \$18.5 billion in 2012. As a percentage of GDP, Chinese support has gone from 0.08 percent in 2000 to 0.15 percent in 2012.

"It's important to look at the overall trajectory of federal investments in research and put it into context of what's happening internationally," says Clark.

He says that as Rochester and other U.S. universities have been at the forefront of research for the past several decades, the world's top researchers and scientists often looked to the United States for their education, and usually stayed to launch their careers and build up their labs.

"That's still the case, but now we're trying to attract and keep the best and the brightest in a world where China, Singapore, South Korea, and other countries are making double-digit investments," he says. "They're competing with us to keep those folks in their own country or bring them home. It's always been a competitive environment, but the competition has stepped up."

Despite the tightening of federal budgets, Farrelman says there have been nota-

ble successes. In particular, the Laboratory for Laser Energetics received \$64 million in the recently approved 2014 spending plan.

That's about \$5.25 million more than the \$58.75 million allocated to the lab last year under sequestration.

But that was a small bright spot in the overall, international picture, he says.

"One of the main reasons countries like China and Singapore are investing so heavily is because they are trying to replicate not only major research institutions like Rochester, but also agencies like the NIH," he says. "They know that our process works and drives innovation and economic growth."

Says Clark: "I think everyone involved in research leadership at Rochester is keenly aware of how competitive the environment is and how tough the political environment is. We are very engaged in an effort to keep Rochester at the forefront of scientific research." **R**

YELLOWJACKETS

A Record-Setting Season

Strong winter performances send track and field teams to conference championships.

By Dennis O'Donnell

THE YELLOWJACKETS WERE SET TO BE well-represented at the ECAC indoor track and field championships in early March. That's after a series of record-setting performances throughout the winter season.

The team of Laura Lockard '17, Cameron Edwards '16, Emily VanDenburgh '15, and Yvette Igbokwe '15 broke Rochester's 4-by-200-meter relay record by nine one-hundredths of a second in February at Ithaca College, earning a trip to the conference championship meet. The four posted a time of 1:45.91, breaking the Yellowjackets' previous mark of 1:46.00 set in 2010 at the ECAC championships.

VanDenburgh is also ranked 16th among Division III long-jumpers.

Rochester's 4-by-400-meter relay of Lockard, Edwards, Brittany Schutrum '17, and Becky Galasso '14 broke the school record at Boston University's Valentine Invitational. They clocked in at 3:56.85, a time that was ranked as high as 10th in NCAA Division III and broke the previous Yellowjacket record of 3:58.35.

On the men's team, Boubacar Diallo '16 is one of the premier triple-jumpers in Division III. In late February, he was ranked 15th nationally in the event.

Altogether, 13 men and 17 women have qualified for the ECAC championships, which take place March 7 and 8 in Boston.

Rochester's men and women will run at home twice outdoors in April—at the Alumni Invitational on April 5, and at the Spring Invitational on April 26.

Other highlights from the winter and spring seasons:

Winter

Swimming and diving: Rochester women broke 15 records and posted 11 NCAA provisional qualifying performances, and the men broke nine school records and registered five NCAA qualifying marks at the



UAA championships. The NCAA championships will be held in Indianapolis, Ind., in late March.

Squash: Rochester defeated the University of Pennsylvania to claim seventh place at the College Squash Association team championships in February. The Yellowjackets finished 8-7 overall.

Men's basketball: Nate Vernon '14 became the 27th man in 113 years to pass the career 1,000-point mark. With three games

▲ **TRIPLE THREAT:** Boubacar Diallo '16 was ranked 15th nationally among all Division III triple-jumpers late in the indoor track and field season.

left in the season, he was 24th in career scoring.

Women's basketball: As the season came to a close, Loren Wagner was averaging double figures in both points and rebounds for the Yellowjackets (ranked 12th in Division III in rebounds per game) and was ninth in career rebounding. One of Rochester's key victories was a 72-68 win over Washington University at the Wash U. field house in St. Louis, marking the third straight year the Yellowjackets accomplished the feat.

Spring

Softball: The Liberty League champion



earns an automatic bid to the NCAA playoffs this season with the addition of softball as a sport at Clarkson. With career home run leader Nina Korn '14 and other Yellowjackets returning, Rochester is the preseason coaches' poll choice to win the league title.

Baseball: The Yellowjackets return with a solid, experienced cast of players both in the field and on the mound. Rochester is

▲ **CHANGE OF SEASONS:** Cameron Edwards '16 (above, left) and Emily VanDenburgh '15 helped lead the indoor track and field team while Nina Korn '14 is expected to help power the softball team.

picked to finish third in the Liberty League race.

Lacrosse: The Yellowjackets will look toward their top three scorers from the 2013 season as they battle for a Liberty League playoff berth.

Golf: In the fall, Rochester secured the top seed for the Liberty League match play championships and will host the finals in late April at the Mendon, N.Y., Golf Club. Earlier that week, Rochester will compete at Oak Hill Country Club in the University of Notre Dame Invitational.

Rowing: The Yellowjackets won the 2013 Dad Vail Regatta in Philadelphia, considered the small college national championship,



LEADER: Jane Possee received the Susan B. Anthony Lifetime Achievement Award.

ANTHONY AWARD

Jane Possee Honored by University

LIFETIME ACHIEVEMENT: Jane Possee, a longtime athletics administrator and former women's basketball, lacrosse, and field hockey coach, received the University's Susan B. Anthony Lifetime Achievement Award in February. The award, presented by the Susan B. Anthony Center for Women's Leadership, recognizes members of the University community who have achieved significant professional stature and have used their experiences and skills to help other women advance as leaders. "We are proud to honor Jane for helping change the landscape for female athletes on our campus and for supporting and guiding countless student athletes over the years," said Catherine Cerulli, director of the Anthony Center.

with the first varsity eight boat. All eight rowers, along with the coxswain, return.

Men's tennis: A four-match trip to the West Coast awaits during spring break. Rochester was 4-0 against Division III opposition early in the season. In late February, the Yellowjackets defeated Oneonta, 9-0, then lost to Division I Colgate the next afternoon.

Women's tennis: A spring break trip to the West Coast will be a test for a young team that has only two seniors. Rochester's fall schedule was filled with tournament-style competition. ®

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