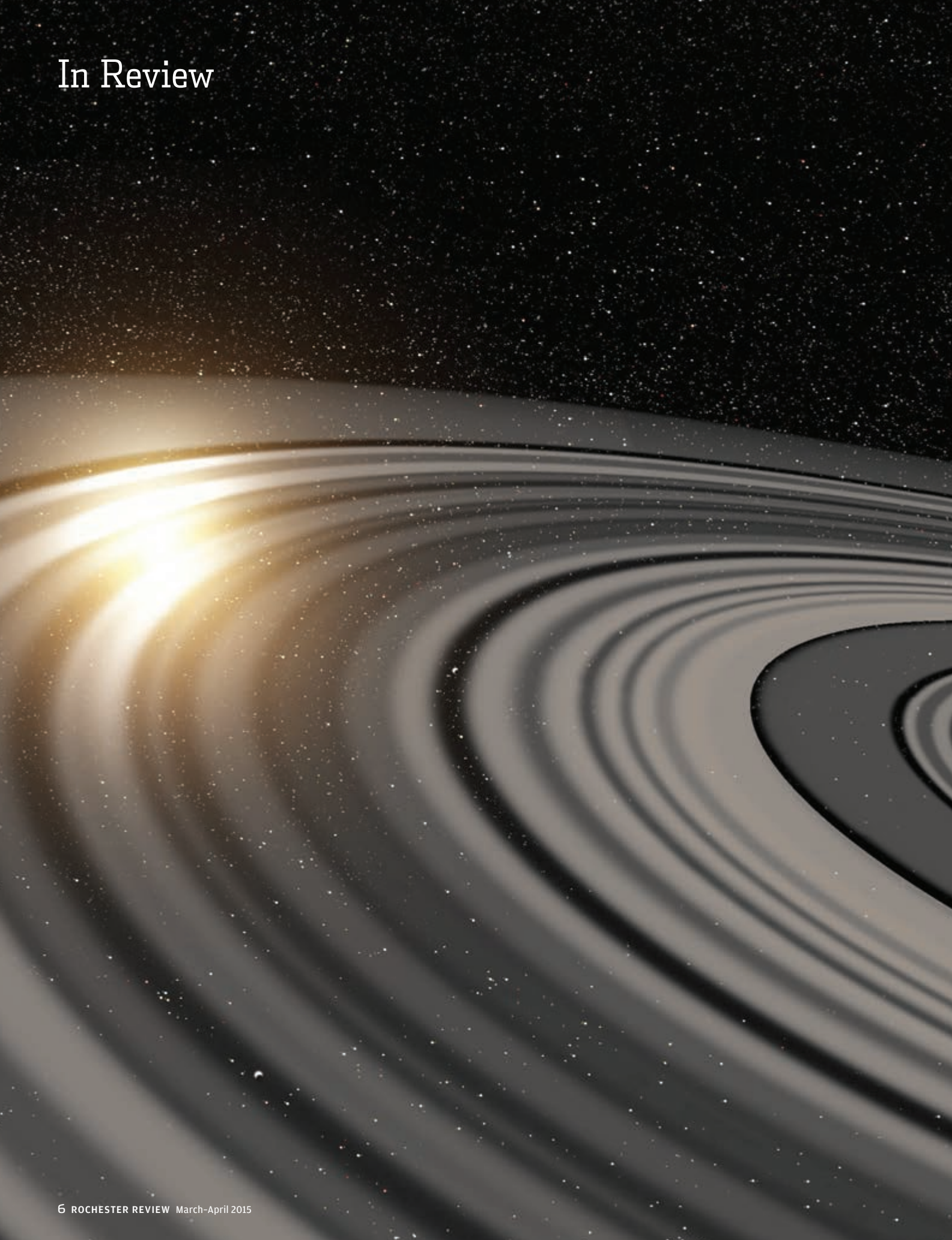
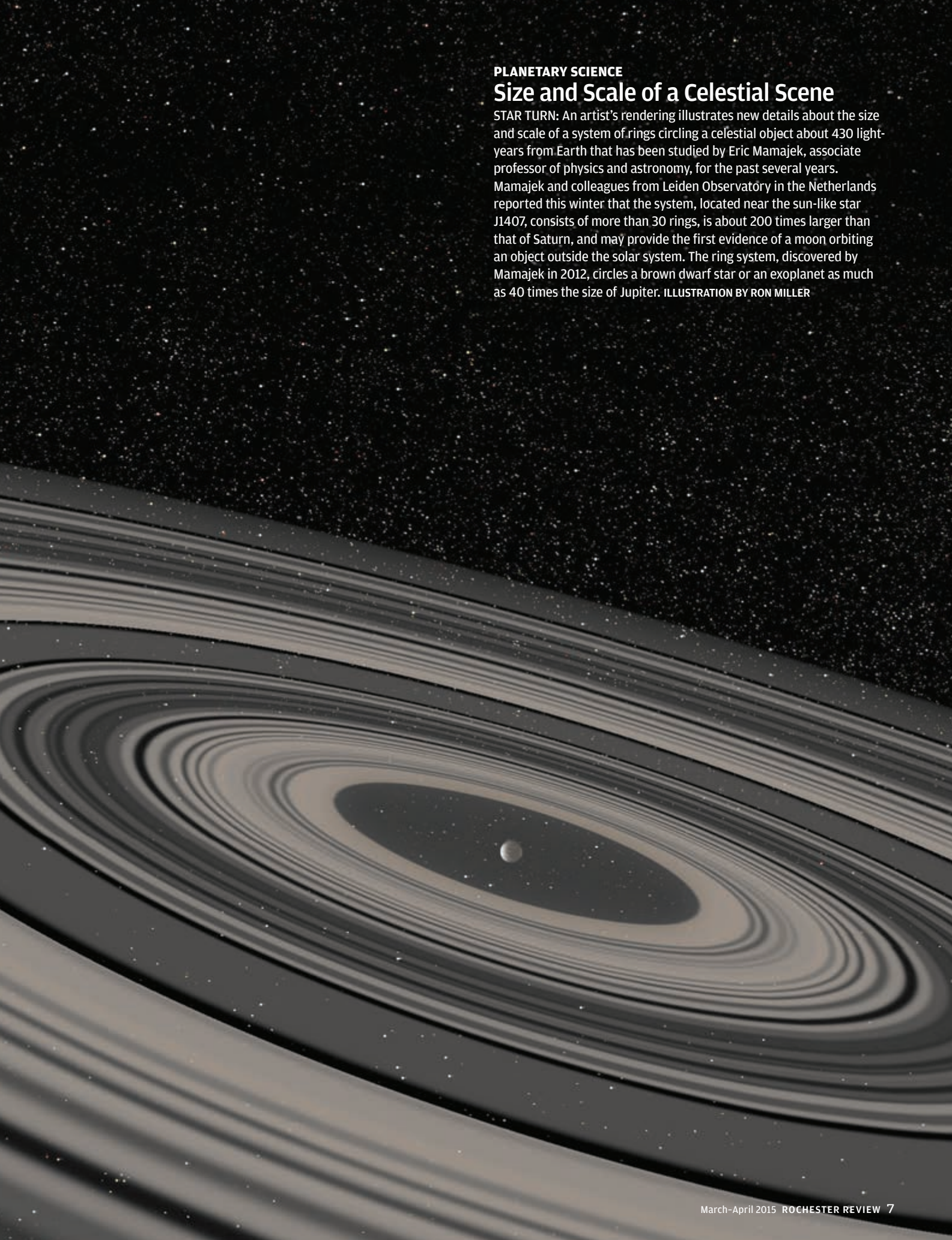
# In Review





**PLANETARY SCIENCE**

## Size and Scale of a Celestial Scene

STAR TURN: An artist's rendering illustrates new details about the size and scale of a system of rings circling a celestial object about 430 light-years from Earth that has been studied by Eric Mamajek, associate professor of physics and astronomy, for the past several years. Mamajek and colleagues from Leiden Observatory in the Netherlands reported this winter that the system, located near the sun-like star J1407, consists of more than 30 rings, is about 200 times larger than that of Saturn, and may provide the first evidence of a moon orbiting an object outside the solar system. The ring system, discovered by Mamajek in 2012, circles a brown dwarf star or an exoplanet as much as 40 times the size of Jupiter. ILLUSTRATION BY RON MILLER

**AWARDS SEASON**

## Garnering a Grammy

LIFE OF A LUTENIST: Paul O'Dette, professor of lute at the Eastman School of Music, won the second Grammy of his career at this year's Grammy Awards competition. O'Dette and Stephen Stubbes, who serve as artistic codirectors of the Boston Early Music Festival, were nominated for their work as conductors for the album *Charpentier: La Descente d'Orphée aux enfers*. The album features Christel Thielmann, assistant professor of conducting at Eastman, along with Avi Stein '97E and Zachary Wilder '06E. The 57th Annual Grammy Awards marked the sixth time that O'Dette has been nominated for a Grammy. Also at this year's event, Bob Ludwig '66E, '01E (MM) won three Grammys for his work as an engineer. He won for Best Surround Sound Album, for his work on Beyoncé's self-titled album *Beyoncé*; Best Engineered Album Non-Classical, for Beck's *Morning Phase*; and Album of the Year, for *Morning Phase*—the third year in a row that Ludwig was recognized in the Album of the Year category. Altogether, Ludwig has won 10 Grammys as well as two Latin Grammys. **PHOTOGRAPH BY ADAM FENSTER**

**CLINICAL SCIENCE**

## Armed Against HIV?

ORAL EXAMINATION: A member of a Medical Center team testing a new vaccine to prevent HIV holds one of the trial's capsules. Rochester researchers and colleagues at Beth Israel Deaconess Medical Center are conducting a clinical trial to see whether the vaccine—which is unusual because it is being given in the form of a capsule rather than a shot—can prompt a more robust immune response against the virus that causes AIDS. The study, conducted in collaboration with the International AIDS Vaccine Initiative, began early this year. PHOTOGRAPH BY ADAM FENSTER

ADMINISTRATION

# A Head for Business

## Raising a profile requires a long view, says the new dean of the Simon Business School.

**Interview by Kathleen McGarvey**

Andrew Ainslie was inducted as dean of the Simon Business School in February, succeeding former dean Mark Zupan. He is the school's seventh dean. A native of Zimbabwe, Ainslie came to Rochester from the UCLA Anderson School of Management, where he was senior associate dean of the full-time MBA program. Ainslie received a bachelor of science degree in electrical engineering from the University of Cape Town in 1983 and an MBA in marketing from Cape Town in 1990. In 1998, he earned a PhD in marketing and statistics from the University of Chicago Booth School of Business.

**What is your vision for Simon?**

I think I'm being fairly consistent in saying I don't have one, because I think it's dangerous to walk in with strong preconceptions. I know what our task is: our primary task is improving where we stand in the rankings. Simon stood in the high 20s for most of the '90s, and we've allowed that to drop a little. I think a very sharp and long-term focus pays off for every member of the business school community. The bigger question is how to achieve that—and usually it takes a lot of detailed, small moves, not one gigantic move.

We've started down that road with the appointment of David Tilson as associate dean of the MBA program. We know we need to find our students the best career opportunities possible, and that's a gigantic issue. It requires that we attract students who are attractive to corporate America, that we have a curriculum that serves them well, and that we help them in going out to the marketplace. In the long run that will bring us better students, and better recruiters, and better opportunities for our students. And in some sense it becomes a self-reinforcing cycle.

**How is business education changing?**

Business education changes a lot less than a lot of people would like to admit. Sometimes it feels like we go through cycles. In the late '90s, everyone was interested in business analytics, but with the dot-com bust, some of that interest went away. But in the late 2000s, it started to come back. This is a cycle we love, because Simon

**DETAILED MOVES:** New Simon School Dean Andrew Ainslie says that moving the school higher in the rankings will involve many small steps, but the underlying principle is focusing on "getting our students great careers." Ainslie, who was formally inducted in February, succeeds former dean Mark Zupan and is the school's seventh dean.

JOHN SMILLIE

is well positioned for it. Simon has been much more focused on analytics than most schools and instrumental in introducing the idea of analytics of businesses in general. Some of the strongest intellectual property and capital that comes out of great business schools is in business analytics, and we have amazing research going on all over this school, in operations, strategy, marketing, accounting, finance, pricing.

**What are some of the challenges and opportunities for Simon?**

Geography is a challenge, but I don't like playing on that too much because I think one of the worst things any manager can do is allow a challenge to become a scapegoat. And it may seem insurmountable—we can't move to New York City tomorrow—but it's not so much insurmountable as it is something that requires us to work a little harder. We have buses that run regularly between here and New York City to help students get there. We've run trips to places like Silicon Valley recently. We're remote from the major markets, but so are Cornell, Dartmouth, and Michigan, for example. We believe this is a surmountable issue.

Another challenge, I suppose, and it's related to why it matters so much about rankings, is we're both a small school and a school that's sitting in the 30s in rankings. We don't have the brand equity some other schools have. We have to get out there and let recruiters know why they should be interested in our students. We're a strong regional school and a strong international school. We're good at attracting students from China and India, but it's hard to recruit students nationally. We need to do better in the Midwest and on the West Coast.

**How do you shift the rankings?**

A million small things. You have to focus on the objective function, and that's getting our students great careers. We're a professional school and we have to remember that. When it comes to a new program or initiative, my first question is always going to be, how does that help us with our objective of getting our students great careers? And if it doesn't do that directly, we need to think about why we're doing it.

**Simon has a large body of international students. How does that fit into the school's long-term goals?**

We owe it to both ourselves as a community and to each individual that we bring into the program to be very clear about whether we believe we can do the best we can by them in terms of getting them placed. And that means that we have to remember that an international student, to be hired in the United States—and I went through this as an immigrant—must get an H-1B visa, and if they don't, companies trying to hire them might be left with an open place. Foreign students have a higher bar than do American students. We need to be sure they stand a really good chance, and I think that's ethically sound for the school and the students we bring in.

There has been a tendency to bring in students to bolster GMAT scores, and that seems to me to be a terrible reason to bring in a larger number of foreign students. Every time we look at a candidate we need to think, how will this candidate do in the corporate world?

**In other venues, you've identified a well-rounded class as a priority. How do you achieve that?**

We don't focus on one thing. I think it's easy for people to say we need students who are "X," and X might be incredibly intelligent, it might be amazingly good at networking, it might be deep experience in a particular career or field. And I think at different times different schools have said, we're really going to focus on one of those things.

But you need to be looking across all of those. I'm not saying every single candidate needs to be all of those—that's impossible to find. But we need to be thinking about all three and finding people who have one or two so that we don't become monotone as a class. There are many things people look for in candidates for their companies, and we need to think as they think.

**Student satisfaction increased significantly during your tenure at UCLA. What contributed to that satisfaction?**

I don't think there are any simple answers. At UCLA, we bumped up from 21st to third in student satisfaction in the *Businessweek* rankings. And that was in part because of student involvement. We all need to realize that we're in this jointly and everyone can benefit from getting involved. As students get involved, talk to us, and work with us, everyone benefits. Students should have a strong say in how the school is managed, and they should be involved in student governance, committees, and clubs, to put everybody in a stronger position over the years. And that's tough for them because the hard work students do today may only benefit the classes after them. But as the school does better, the equity of your MBA goes up. It's also important they get involved afterward as alumni.

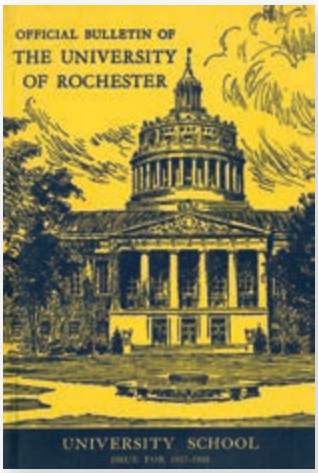
It's the perennial battle: I guarantee you that the school at number three in the rankings is trying to be number one. All of us are constantly thinking of how to be better, and in part it's a product of a long-run engagement with our community.

**What has best prepared you for your new job?**

I think it was the really wonderful privilege of running the MBA program at UCLA. Anyone who steps into a position like this without having that sort of administrative experience would find it very difficult. UCLA is a fantastic school, but at the time I walked into that position they felt they'd been struggling a little and their reputation wasn't where it deserved to be. Working on that for four years was an incredible experience. But my new position is much richer. My job now becomes to get everybody the materials and assets they need to do well, helping each of our academic groups make sure they can get great new people onto the faculty, helping alumni find ways to get involved in the school, and helping students do the best they possibly can.

Another advantage I have is that I spent 10 years in industry, before the 20 years I've now spent in academia. That combination is very useful. Universities are unique entities, and understanding a university requires you to have spent a long time at it. I think it's difficult for people who become deans from corporations to understand the academic environment—but it's also important to understand the corporate environment we're sending our students into, and that's the advantage of having spent time in both places. ®

"We're good at attracting students from China and India, but it's hard to recruit students nationally. We need to do better in the Midwest and on the West Coast."
*—Andrew Ainslie*




# Ask the Archivist:
## Whither the 'general studies' program, aka 'University College'?

*A question for Melissa Mead, the John M. and Barbara Keil University Archivist and Rochester Collections Librarian.*

**How long did the UR offer the University College program?—Charles Masick '65, '68 (MS) (both through University College), '70S (MBA)**

For more than 65 years, from 1916 to 1982, the University College—as the program for students who enrolled as part-time students and those who took classes in the evenings and on the weekends was eventually known—was an integral academic division operating alongside the regular undergraduate College and graduate schools. With an enduring legacy of thousands of alumni in the Rochester area and beyond, it has existed in various forms throughout our history.


**ECLECTIC EDUCATION: Students enroll for classes during registration for the University College of Liberal and Applied Studies, circa 1960. The program, which traces its roots to the early part of the 20th century, existed until 1982, when its courses were absorbed into other schools and units.**

In 1850, it was possible for qualified students—later given the designation "eclectics" and what today might be called "nontraditional students"—to take courses at the University as nondegree, "partial course" candidates. With the encouragement of our second president, David Jayne Hill, an "Extension Department" was organized in 1894 to offer evening and Saturday lectures "to bring systematic university instruction within reach of all classes of men and women . . . without interfering with their daily work."

Lectures in the sciences and humanities were offered, taught by University faculty, including Professors Burton, Lattimore, Fairchild, Forbes, and Shedd. Several courses were taught by Helen Barrett Montgomery, who was designated an "Extension Lecturer on History"; in this role, Montgomery predates Elizabeth Denio, who is generally credited as being our first woman instructor, by almost a decade.

Montgomery was a strong proponent of the admission of women to the University, and she was the first woman elected to the Rochester School Board in 1899, a remarkable accomplishment given that her election was 20 years before women had the vote.

This effort ended in 1902, but an extension division was re-established in 1916. Many of its enrollees entered the workforce directly from high school and were interested in taking college-level courses "with a view to increasing their knowledge and individual economic value," according to the *Bulletin.* As before, the classes were coeducational and taught by University faculty, usually during the late afternoons and evenings, and on Saturdays.

By 1944, the utility of the division for educating returning service men and women was self-evident, and it was reorganized to give it equal standing to other divisions in the University. Renamed "the University School of Liberal and Applied Studies," its students would earn bachelor's and master's degrees in general studies, business administration, accounting, and nursing, and they could take a full-time courseload. Students in the school had their own government, held events and dances, and published their own newspaper called the *Campus Crier* and a news-sheet called the *Chanticleer.*

In 1958 the schools of business, education, and engineering (today the Simon, Warner, and Hajim schools) opened and began enrolling "both full-time and part-time evening session students" in classes relevant to their disciplines. The school became the University College of Liberal and Applied Studies in 1972; a final *Course Bulletin* was issued for 1981–82, after which the school was fully absorbed into the other divisions and schools of the University.

The opportunity for "all who find life interesting and desire better to understand it" that was heralded in 1916 continues today through the Office of Part-time Studies, which provides "students, adult learners, business professionals, educators, and the community the opportunity to take classes on a part-time basis for intellectual enrichment or professional development."

### Need History?

Do you have a question about University history? Email it to rochrev@rochester.edu. Please put "Ask the Archivist" in the subject line.



UNIVERSITY LIBRARIES/DEPARTMENT OF RARE BOOKS, SPECIAL COLLECTIONS, AND PRESERVATION

STUDENT LIFE

# Stepping Up

## The Black Students' Union hosts an annual competition fostering community and celebrating African-American dance.

Interview by Kathleen McGarvey

Alexandra Poindexter '15, a political science major from Lawrenceburg, Indiana, is president of the Black Students' Union, or BSU. Founded in 1968, the group organizes educational and cultural events that promote diversity within the University community. In February, BSU hosted its 12th annual step show for students in Rochester-area schools.

**What is a step show, and what's its history?**

Stepping has a rich tradition rooted in African-based communities and uses movement, words, and sounds to convey a message. It draws originally from African foot dances such as gumboot, a dance created by South African miners who would communicate with the stomping of their boots. The stepping tradition in the United States stemmed from African-American fraternity and sorority life's song and dance rituals starting in the early 1900s. A step show is simply a showcase of a community or school's talents in the genre of stepping. This show can be competitive or exhibition. Most step shows usually have a theme.

**How did the BSU create its annual step show?**

We started in 2004, when LaShara Evan '05, '06W (MS) was in her first term as president. She and her copresident, Tanisha Lisle Johnson '05, '07W (MS), along with the social and cultural chair, Yannize Joshua '08—who was also the Black History Month chair—wanted to revamp Black History Month into four major events. This included the step show, the Pan-African Expo, the Black Tie Affair, and a dating auction.

**How does the show work?**

The show is typically split up by grade level. This year, we had an elementary and middle school category and a high school and college category. All teams in each category competed for one specific prize.

**What is your group's connection with students in the community?**

BSU has been involved in various pre-college initiatives over the years. Usually the schools reach out to us and we help to provide tutoring, college advice, or mentorship.

The step show in particular works as outreach as it brings the students into the University space. In the past, students have said that they didn't feel like the University of Rochester was an attainable goal or they would never just come and visit here. The step show gives the students an easy way to be a part of the University space and also meet students who have similar backgrounds.

**How does the community, on campus and off, respond to the show?**

The show has been well received. All sorts of people come to our step show. I take pride in the number of community members who come out annually to support their steppers!

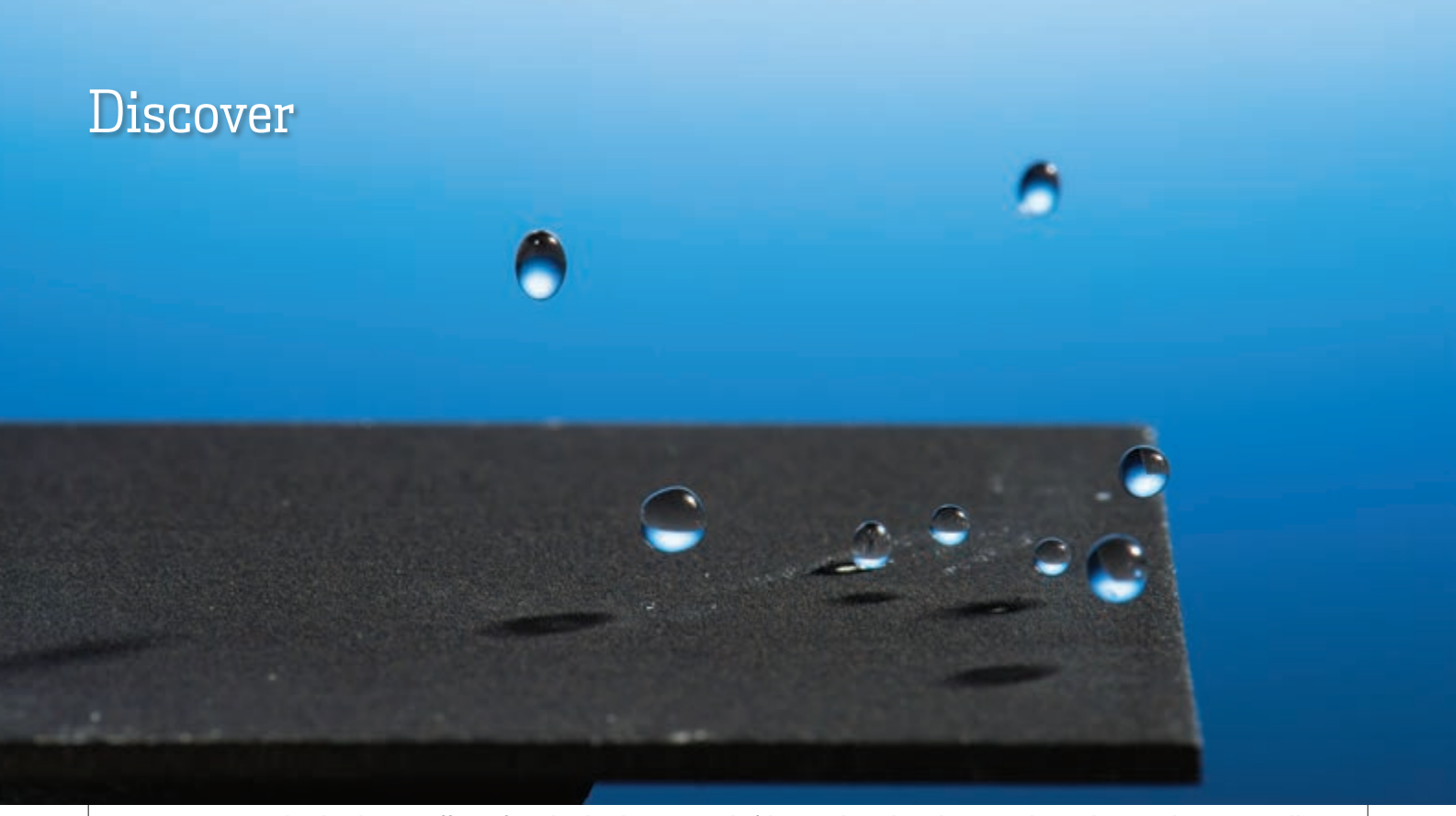
**What about the show makes you proudest? And what's the most fun?**

What makes me most proud of the show are the step show participants. They take this competition very seriously, and as a high school student, I don't think I had an outlet to which I dedicated so much passion and drive to win. A close second would have to be my executive board. It's a high-intensity event, and it takes all 12 of us to manage the day and ensure it runs smoothly.

What is most fun is the day of the competition. The atmosphere, the anticipation of the sets, the performances are all so much fun. It is a very challenging process to get the step show well organized, but it all pays off when the step teams hit the stage.

INTRODUCTIONS: Alexandra Poindexter '15, president of the BSU, says the group's annual step show is fun and serves as a way to introduce school-age participants to college.

ADAM FENSTER



**BOUNCING: Water droplets bounce off a surface that has been treated with a new laser-based process that makes metals water-repellent.**

# Optical Scientists Create Highly Water-Repellent Metals

Institute of Optics scientists have used lasers to transform metals into extremely water-repellent, or hydrophobic, materials without the need for temporary coatings.

Super-hydrophobic materials are desirable for a number of applications, such as rust prevention, anti-icing, and sanitation. But most current hydrophobic materials rely on chemical coatings.

In a paper published in the *Journal of Applied Physics*, Chunlei Guo, professor of optics, and Anatoliy Vorobyev, senior scientist with Guo's group, describe a laser-patterning technique that creates an intricate pattern of micro-and nanoscale structures to give the metals their new properties. The work builds on earlier research by the team that used a similar technique to turn metals black.

"The material is so strongly water-repellent, the water actually gets bounced off," says Guo. "Then it lands on the surface again, gets bounced off again, and then it will just roll off from the surface."

The work has piqued the interest of the Bill and Melinda Gates Foundation, which has supported the research, for its potential applications in collecting rain water and creating cleaner, healthier latrines in developing countries. —Leonor Sierra

## Neutrinos Can Deliver 'Glancing Blows'

In what they call a "weird little corner" of the already weird world of neutrinos, physicists have found evidence that the tiny particles might be involved in a surprising reaction.

Neutrinos are famous for almost never interacting with other matter. For example, 10 trillion neutrinos pass through your hand every second, and fewer than one actually interacts with any of the atoms that make up your hand. However, when neutrinos do interact with another particle, it happens at very close distances and involves a high-momentum transfer of energy.

A new paper published in *Physical Review Letters* shows that neutrinos sometimes can also interact with a nucleus but leave it basically untouched—inflicting no more than a "glancing blow"—resulting in a particle being created out of a vacuum.

Kevin McFarland, professor of physics, is a scientific co-spokesperson with an international collaboration that carries out neutrino-scattering experiments at Fermilab, near Chicago. McFarland, who also heads the Rochester team that was primarily responsible for the analysis of the results, compares neutrino interactions to firing a bullet at a bubble, only to find that the bubble was left intact.

"The bubble—a carbon nucleus in the experiment—deflects the neutrino 'bullet' by creating a particle from the vacuum," McFarland says. "This effectively shields the bubble from getting blasted apart and instead the bullet only delivers a gentle bump to the bubble."

Producing an entirely new particle—in this case a charged pion—requires much more energy than it would take to blast the nucleus apart, which is why the physicists are surprised that the reaction happens as often as it does.

"The production of pions from this reaction had not been observed consistently in other experiments," McFarland says. By using a new technique, the team measured how much momentum and energy was transferred to the carbon nucleus—showing that the nucleus remained undisturbed—and the distribution of the pions that were created.

—Leonor Sierra and Peter Iglinski



ADAM FENSTER

## Is the U.S. Slipping in Medical Research?

Once the undisputed center of global innovation in medicine, the United States is steadily losing ground to Asia and Europe—and will, if trends continue, relinquish its leadership in the coming decade.

That's the conclusion of an analysis in the *Journal of the American Medical Association*, coauthored by Ray Dorsey, the David M. Levy Professor in Neurology.

The study tracked medical research activity from 1994 to 2014 in the United States, Europe, Asia, Canada, and Australia, compiling data on funding by public and private sources, the creation of intellectual property, and the size of the medical and scientific workforce.

U.S. spending on medical research grew at an average annual rate of 6 percent between 1994 and 2004, according to the report. The pace fell sharply in the following decade, when the annual rate of growth decreased to 0.6 percent, falling behind the pace of inflation. With the exception of the temporary increases brought about by federal stimulus spending in 2009 and 2010, the last five years have seen a decrease in research funding when adjusted for inflation. Overall, medical research and development funding has declined in real terms by 13 percent since 2004.

The report highlights a move away from investing in early-stage research. The authors point out that new knowledge often takes from 15 to 25 years to go from a discovery in the lab to a clinical application in people. With the private sector moving more resources to late-stage research, that leaves the shrinking resources provided by the federal government and often very small companies as the primary sources of funding for early-stage, high-risk research.

—Mark Michaud

## Discovery May Explain Why We Gain Weight

Rochester researchers believe they're on track to solve the mystery of weight gain. They've discovered that a protein, called Thy1, has a fundamental role in controlling whether a primitive cell decides to become a fat cell—making the protein a possible therapeutic target, according to a study published online in the *FASEB Journal*.

The research brings a new biological angle to a problem that's often viewed as behavioral, says lead author Richard Phipps, who holds the Wright Family Research Professorship in the Department of Environmental Medicine.

The protein was discovered 40 years ago and has been studied in other contexts, but its molecular function has never been known. Phipps's laboratory showed for the first time that when fat cells are developing they lose Thy1, suggesting that obesity could be treated by restoring the protein.

The researchers are also working to develop an anti-obesity drug and have applied for an international patent to protect the invention.

—Leslie Orr


**POINTS OF VIEW: Early 20th-century postcards and other images shed light on Japan's modernization and pop culture.**

## Digital Humanities Project Turns Lens on Prewar Japan

A new interactive archive and research project called "Re-envisioning Japan: Japan as Destination in 20th-Century Visual and Material Culture" is now online.

Created by Joanne Bernardi, associate professor of Japanese, and developed with the help of the Digital Humanities Center, the project uses images and objects to investigate representations of Japan and its place in the world in the first half of the 20th century.

Bernardi—who first visited Japan as an undergraduate with prize money she won in a national photography competition—has documented views of the country and its modernization with hundreds of early 20th-century postcards, films, brochures, advertisements, and other objects now on display in the online archive.

"What a lot of people have in their minds about prewar Japan is rising fascism," Bernardi says. "And yes, there was that. But there was also a very vibrant popular culture."

The archive can be visited at http://humanities.lib.rochester.edu/rej.

—Bob Marcotte

COURTESY OF "RE-ENVISIONING JAPAN"

# Living Well in the Dying Light

## Talking with patients about what's important to them is the key to palliative care.

**Interview by Karen McCally '02 (PhD)**

How can clinicians best care for patients nearing the end of life? Sally Norton is the inaugural Independence Chair in Nursing and Palliative Care. A faculty member at the School of Nursing since 2001, Norton has secondary appointments in the Departments of Family Medicine and Medical Humanities at the School of Medicine and Dentistry.

**When and how should clinicians start an end-of-life conversation?**

Some people think it's never too early to start these conversations. For clinicians, I think it's when somebody has a serious progressive illness and the treatments that are available become increasingly burdensome, to the point where the burdens may begin to outweigh any benefits.

Some people will want to continue treatments that may have even a little bit of benefit, and they'll tolerate a lot of burden. Other people may say, "I don't want all this burdensome treatment that makes me feel terrible. I would rather have a shorter amount of time where I feel better." The opportunity to make that choice is predicated on thoughtful and informed conversations.

When the conversation begins, it's essential first to try to find out what the patient understands about what's going on now. Clinicians have to strike a fine balance between spending a lot of time talking in their comfort zone, which is their area of expertise, and checking in with the patient and family about what they understand. We can think that we're communicating really well, but not really have the other half of that equation. If you leap right in to your own understanding of what patients might need, it can be really far off the mark.

**What's the role of the palliative care clinician?**

Palliative care clinicians focus on what's most important to you: what symptoms bother you the most; how can we help improve the quality of your life; and what would quality of life look like for you? Patients who receive palliative care may still receive active treatment to prolong life. One thing palliative care clinicians might do is help people establish goals for care. Or reestablish goals for care if the conditions change. Sometimes people have this idea that they're going to do this treatment, and their goal is it will cure their disease. When it becomes increasingly clear that the treatment isn't going to cure the disease, then the clinician has to help the patient understand that they aren't going to get the outcome they'd hoped for. So they help the patient to see "Here are the outcomes that are clinically feasible, given where you are now." Often that means: what's important to them, what treatments are available, what are the side effects? And what are their goals? Do they have short-term timelines that they really want to meet, that they would tolerate some pretty high-burden, low-efficacy treatments for? Or not?

**COMMUNICATOR: Norton cochairs a national task force to identify quality measures to improve practices in palliative care.**

**What's the state of quality and access to palliative care?**

Right now there's a lot of variation nationally. Every patient deserves the best care we can provide. We've made tremendous progress recently through a project called Measuring What Matters, which I cochair. It's a joint task force between the American Academy of Hospice and Palliative Medicine and the Hospice and Palliative Nurses Association. We've identified a set of quality measures that are meaningful to patients and families, and that will allow us to benchmark, evaluate, and improve our practices across all settings that deliver palliative care. Those standards are rolling out now. Rochester is really an epicenter of research and clinical practice in palliative care. Right now, we're implementing palliative care teams in nursing homes, trying to figure out what helps it be successful and what barriers get in the way. We're doing amazing work in communication. We have an incredible web of investigators and clinicians who work together quite well.

**We think of best-case scenarios in terms of cures. What's a best-case scenario for a palliative care patient?**

The best case scenario is that people receive the best treatment to provide the highest quality of life possible. I've seen people who didn't want to live any longer get wonderful treatment of their pains and symptoms. All of a sudden, they start making different choices. They might start eating. You see the world differently when your symptoms are addressed.

Some of the earliest successes are in Oregon, where I did my postdoc. Partly, it was because they passed the Death With Dignity Act. It caused clinicians to say, "We don't want people to choose to end their own lives because we're not doing a good job managing their symptoms." So you saw a real shift in Oregon toward some of the most progressive palliative care in the nation. There was an increase in the percentage of patients who died at home, who died with home hospice, and a tremendous decrease in deaths in the hospital among certain subpopulations. And a miniscule number of people who actually went through with the Death With Dignity assisted suicide protocol.

# Cloak and Mirrors

## Looking behind the invisibility-producing 'Rochester Cloak.'

The "Rochester Cloak" was all over the news in the fall. A simple invention that uses four lenses to hide objects from view—reminiscent of the invisibility cloak J.K. Rowling dreamed up for Harry Potter—the cloak is excitingly new while simultaneously tapping into ancient longings.

"The desire to be invisible has been around for thousands of years. The Greeks had it, and it's been part of popular stories for centuries. Invisibility is just fun to think about," says John Howell, professor of physics.

The cloak developed by Howell and doctoral student Joseph Choi uses ordinary lenses to hide an object from a range of angles. Director of the Center for Coherence and Quantum Optics, Howell is at the helm of several funded research projects on subjects from cold atoms to quantum imaging to slow light. But the simple, unfunded projects on cloaking have captured a lot of people's imaginations.

He first started thinking about cloaking while on sabbatical three years ago, when he came across a paper by a group of Cornell researchers on temporal cloaking, or hiding an event in time. "And when I saw their experimental layout, I realized there were really simple ways to think about cloaking in space, not just in time," he says.

One way was so simple that he and his sons built it at home using two L-shaped fish tanks they fashioned out of plexiglass. "When you look into a fish tank, you see all kinds of optical illusions," he says. "You can see the same fish twice—but with an L-shaped tank, if you look in the right place, you can see the fish disappear." Using two such tanks, Howell and his sons created a device that cloaks the object in between them. Then they started experimenting with lenses and mirrors, doing a playful demonstration of principles involved in cloaking and creating the kind of optical illusion magicians have used for centuries. "But the thing that was always limiting in those situations is, it pretty much only worked if you looked in a single direction. If you moved to one side or the other, then the optical illusion went away." Howell and Choi set their sights a little higher, but not so high as the kind of device that would make an object invisible from any vantage point, like the fictional Harry Potter's cloak—or wearable, come to that. "We wanted to solve a simpler problem—we call it multidirectional rather than omnidirectional."

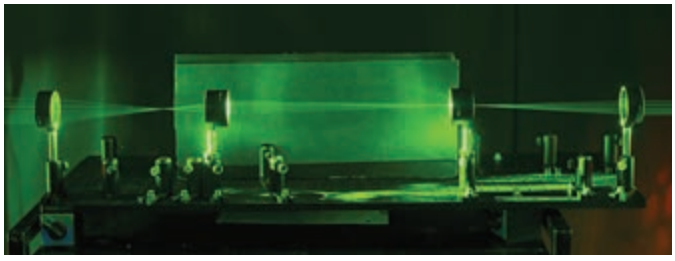
Howell and Choi created a mathematical formula in which they can replace a volume of space with a set of optical instruments that behave exactly as a volume of space would. "So you think light has gone in a straight line—in other words, it satisfies all your deep intuitions about how light should behave, except that light's not behaving that way," says Howell. "The lenses have exactly the same mathematical properties as light propagating through space, and so it's as if the lenses aren't there."

He says he can imagine many applications for such a cloaking device, from giving surgeons unobstructed views to eliminating blind spots for drivers, but adds that the project has been "mostly for fun, low-tech fun." Nevertheless, it has been intriguing enough that he and Choi are continuing to hone their cloaking technique.

"A physicist likes to answer open questions," says Howell. "And there's been a long-running open question about whether you can achieve broadband—covering all the spectrum of physical light—omnidirectional invisibility: no matter how you look at it, it's invisible. There are some good arguments for saying that might not be possible. But what we're saying is, OK, that's a hard problem—but can I solve a simpler problem? Can I have broadband multidirectional invisibility? And we believe the answer to that is yes. In how many directions is still an open question."

"Just because it's simple doesn't mean it shouldn't be studied," says Howell. "We study things that are a lot harder—and those are fun, too."

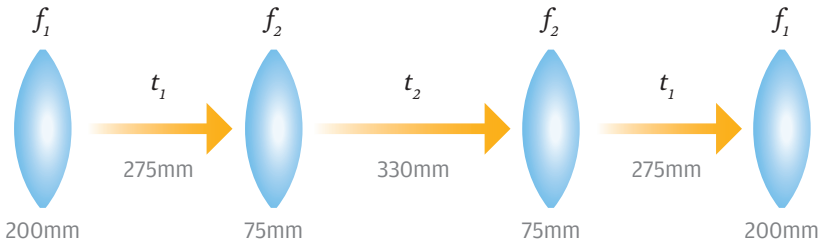
—Kathleen McGarvey



**IN ACTION: The four-lens Rochester Cloak hides a hand while showing grids on the wall behind it.**

## Do-It-Yourself Cloak

The cloak "satisfies all your deep intuitions about how light should behave, except that light's not behaving that way," says John Howell, a professor of physics and codeveloper of the device.




**To build your own Rochester Cloak, follow these steps:**

1. Purchase two sets of lenses: two with focal length $f_1$, and two with focal length $f_2$.
2. Separate the first two lenses by the sum of their focal lengths ($f_1 + f_2$).
3. Repeat step 2 for the other two lenses.
4. Separate the two sets by $t_2 = 2f_2(f_1 + f_2)/(f_1 - f_2)$.

In the example shown here, the focal lengths of the lenses are 200mm and 75mm.

SOURCE: JOHN HOWELL

ADAM FENSTER

# Data Science Initiative Receives $3 Million

A $3 million commitment from University Trustee Tim Wentworth and his wife, Robin, will endow the directorship of the Institute for Data Science, part of a strategic priority to greatly expand the University's work in the burgeoning field of data science. As a centerpiece of the University's current five-year strategic plan and a top priority of the $1.2 billion goal of *The Meliora Challenge*, the data science initiative features the construction of a new building to house the institute, as well as support for new faculty members with expertise in the field.

The parents of a current Rochester student and an alumna, the Wentworths have also been key supporters of Raymond F. LeChase Hall, the new home of the Warner School of Education. The Wentworth Atrium in LeChase Hall is named in recognition of their support.

**LEADING SUPPORTERS: Robin and Tim Wentworth**

## University Earns Reaccreditation

The University has earned reaccreditation from the Middle States Commission on Higher Education. One of six regional accrediting associations in the country, the commission every 10 years reviews member institutions to ensure compliance with standards of accreditation and characteristics of excellence in higher education.

As part of the process, the University completed an extensive institutional self-study, and members of the accreditation team interviewed trustees, University leaders, faculty, staff, and students.

A steering committee cochaired by Richard Feldman, dean of the College, and Donna Brink Fox, senior associate dean of academic and student affairs at the Eastman School, guided the effort.

The commission's report is available here: http://www.rochester.edu/provost/middlestates/index.html. The self-study can be read here: http://internal.rochester.edu/provost/middlestates/SelfStudy.pdf.

## Business Incubator Moves Downtown

A University-affiliated program designed to help foster the growth of high-tech start-up companies is moving to the Sibley Building in downtown Rochester. The new $24 million facility for High Tech Rochester (HTR)—the region's only state- and federally designated incubator—will serve as the cornerstone of the city's new innovation zone.

The new facility is possible due to support from New York State. In December, Gov. Andrew Cuomo's Regional Economic Development Council initiative awarded HTR $5 million, for a total of more than $10 million over the last four years.

The funding will support the creation of the Finger Lakes Business Accelerator Cooperative, which is led by HTR in partnership with RIT, Excell Partners, and the region's Small Business Development Centers and Industrial Development Agencies. The Center for Governmental Research projects the accelerator could create 1,000 jobs over the next five years. HTR will relocate to the facility when construction is completed next year.

**INCUBATION: High Tech Rochester, a University-affiliated start-up incubator, will move to new space (shown here in an architect's rendering) in the former Sibley building in downtown Rochester.**



UNIVERSITY ADVANCEMENT (WENTWORTHS); COURTESY OF HTR/TAT ARCHITECTURAL TEAM (HTR RENDERING)

## College Access Innovator to Deliver Commencement Address

The founder of one of the country's most comprehensive college access and readiness programs for urban high school students is scheduled to deliver the 165th commencement address this spring.

Deborah Bial, the president of the Posse Foundation, will address the members of the College Class of 2015 during the Arts, Sciences & Engineering ceremony on May 17.

Founded in 1989 in New York City, the foundation sends cohorts of 10 high-achieving students together as a group to selective colleges and universities, including Rochester, where this year's freshman class included a cohort from the Washington, D.C., area.

**Deborah Bial**

Rochester committed full-tuition, merit scholarships to the students as part of the program.

An expert in education and leadership development, Bial has earned national recognition, including a MacArthur "Genius" Fellowship from the John D. and Catherine T. MacArthur Foundation in 2007. Additional information about commencement activities is available at http://www.rochester.edu/commencement. The May ceremony will be webstreamed live.

**GUEST: MLK speaker Khalil Gibran Muhammad meets with student leaders before the annual address.**

## MLK Speaker: History Is a 'Matter of Life and Death'

The nation should guard against turning the "unconventional" Martin Luther King Jr. into "a conventional legacy." That was a message from Khalil Gibran Muhammad, the director of the Schomburg Center for Research in Black Culture, who delivered this year's Martin Luther King Jr. Commemorative Address.

A former member of the history faculty at Indiana University, Muhammad since 2011 has directed the Schomburg Center, an archive repository for information on people of African descent worldwide. The author of *The Condemnation of Blackness: Race, Crime, and the Making of Modern Urban America*, in which he explores the roots of the popular conception of black criminality in America, he has been widely called upon to discuss the lives of African-American men, including Trayvon Martin in Florida, Michael Brown in Ferguson, Missouri, Eric Garner in New York City, and Tamir Rice in Cleveland, and others whose deaths have made national headlines.

In his speech, Muhammad said that King's legacy is in danger of becoming "family-friendly programming of our history." He went on to ask, "Are Michael Brown and Eric Garner and Tamir Rice the harvest of our collective unwillingness to confront the past?" History, he noted, "is an essential tool of empowerment. It is a matter of life and death."

The culmination of a weeklong celebration of King's life and the kick-off for Black History Month, the address is cosponsored by the Office of Minority Student Affairs and the Office of the President.

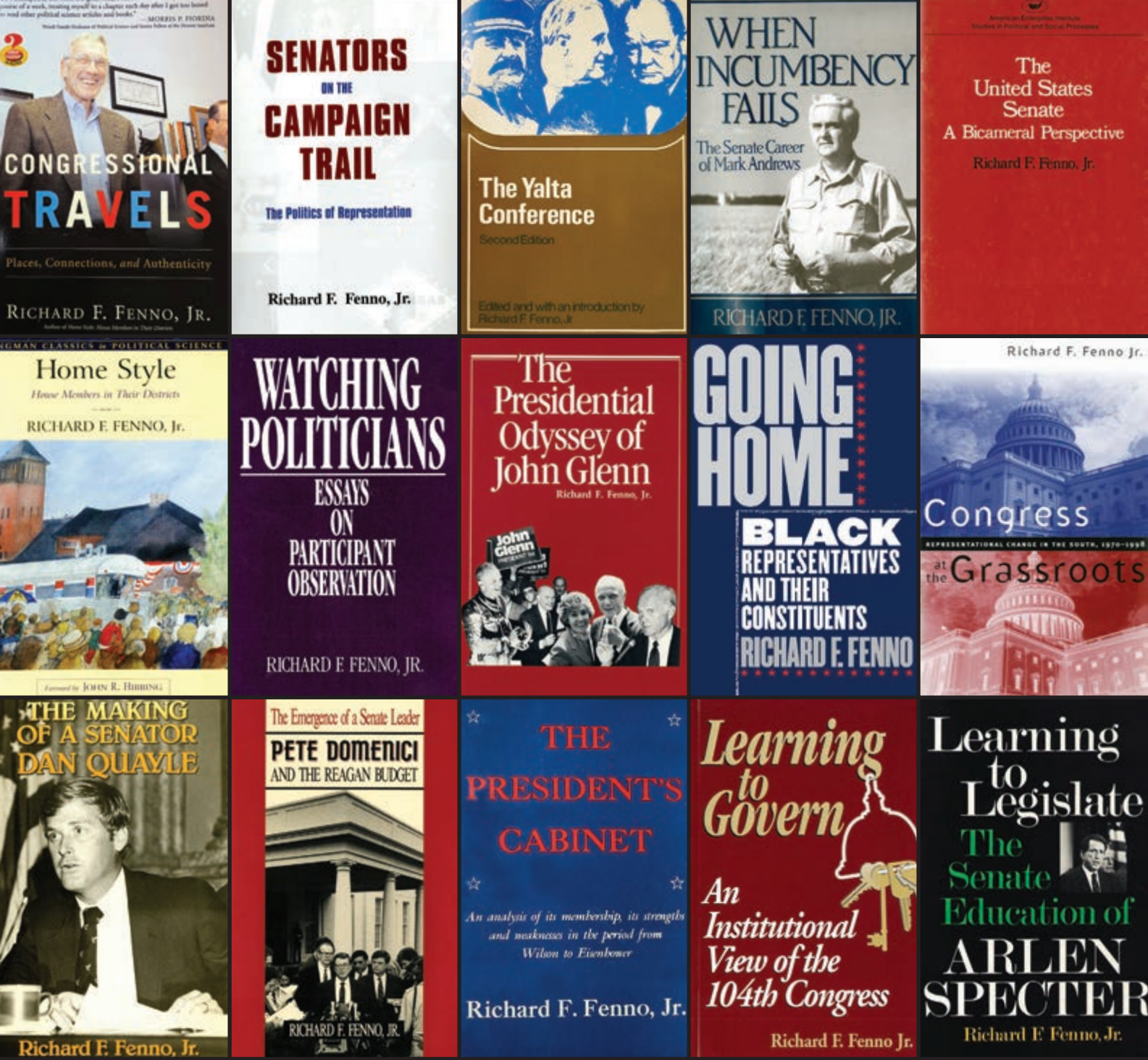
## Medical Center Names New Chief Financial Officer

A financial manager with more than three decades of experience in academic medicine is the new chief financial officer at the Medical Center.

David Kirshner, who is credited with engineering a financial turnaround at Boston's Children's Hospital, succeeds Michael Goonan, who retired in December. During a 15-year tenure at the primary pediatric teaching affiliate of the Harvard Medical School, Kirshner worked to improve credit ratings and implement financial information systems to improve forecasting and productivity and to reduce operating costs.

Most recently a vice president at the health care company Valence Health, he also was the founding director of an Atlanta-based consultancy specializing in academic medical centers.

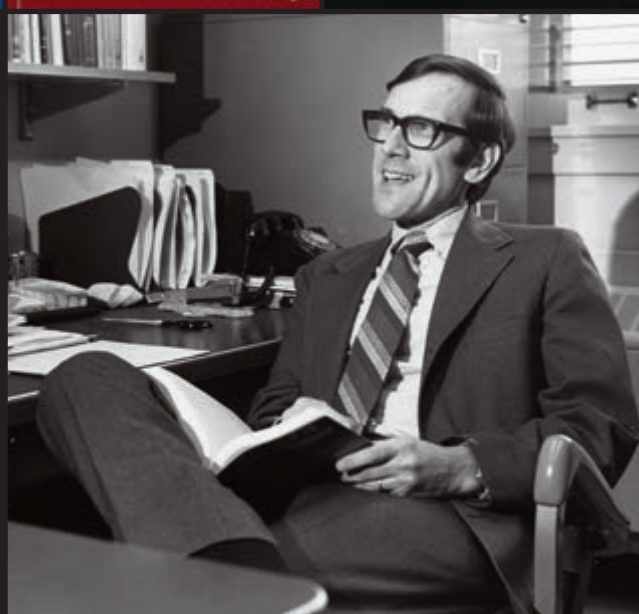
**David Kirshner**




**RIVER CAMPUS LIBRARIES**

## Cataloging a Congressional Career

'SOAKING & POKING': Scholars and political junkies interested in the U.S. Congress, congressional elections, and the personalities behind them have access to the work of Richard Fenno Jr., one of the nation's leading political scientists. Working with a web-design firm founded by Steve Bennett '73 and with Robert Sachs '70, who with Fenno started the University's Washington Semester Program in 1968, River Campus Libraries has launched a website, www.richardfenno.com, that showcases Fenno's national stature in political science as well as his 50-plus-year tenure on Rochester's faculty. Known for what he called his "soak and poke" approach, Fenno was regularly given behind-the-scenes access to candidates and elected officials, drawing on those experiences to explore the lives of politicians and the nation's political institutions in more than a dozen books and other publications. Now holding the rank of Distinguished University Professor Emeritus, Fenno marked 50 years of teaching in 2007.



# Global Rochester: Peru

## *An engineer takes part in a 'cultural project of the highest kind.'*


In northern Peru stands a monument at the core of the vanished Moche civilization. Huaca de la Luna—or Temple of the Moon—is a vast pyramid built alongside a volcanic mountain, Cerro Blanco. It is part of a complex of ruins near Trujillo that forms what Renato Perucchio calls "the Rome of the Moche civilization."

Since 2010, the professor of mechanical engineering and biomedical engineering has been part of a team of engineers who are working with archaeologists and architectural conservationists to protect the structures. The pyramids are made of adobe, which "can be very easily damaged by the torrential rains produced by El Niño and by earthquakes," Perucchio says. Huaca de la Luna "is a very fragile monument—it's essentially just mud."

The Moche civilization developed approximately at the time of the beginning of the Christian era, and ended around 850 CE. Since 1992, the site has been the focus of an extensive archaeological project sponsored by the Peruvian government. The project has three components: archaeological study, conservation, and involving the local population in maintaining its cultural heritage.

In the field, Perucchio and fellow engineers have carried out studies to model the pyramid's response in case of an earthquake. It is multidisciplinary research. Cynthia Ebinger, professor of earth and environmental sciences, has visited the site to do geophysical prospection of the area. Spaniards cut slices through the structure in their hunt for treasure, and those cuts, too, affect how the structure will respond to seismic activity. Working with Benjamin Castañeda '09 (PhD), a specialist in image processing and now associate professor of electronic and electrical engineering at Pontificia Universidad Católica del Perú, or PUCP, the team has created models that accurately reflect the current state of the structure.

Rochester has a collaboration agreement with PUCP that provides for Peruvian faculty to visit Rochester each fall, teaching courses in the Archaeology, Technology and Historical Structures program. There is also a student exchange that runs in both directions. Such collaborations, Perucchio says, have stimulated research projects, including another project near Cuzco, where Perucchio and other team members are studying "baroque Andean" churches built by the Spaniards atop Incan temples. Their interiors are filled with paintings and frescoes—and, like the pyramids, they're built close to an active seismic area. Much of the restoration of the churches has been aimed at the artistic surfaces. About two years ago, Perucchio and his Peruvian colleague Rafael Aguilar, associate professor of civil engineering at PUCP, began to analyze one of the churches following a procedure virtually identical to what they've used at Huaca de la Luna. Based on their preliminary results, PUCP has granted them funds to continue their studies.

An irony of archaeological work is that as it exposes lost structures to study—for example, at Huaca de la Luna, bas-relief carvings, once covered by sand, that tell the creation story of a culture that left no written record—their very exposure begins their deterioration. "In order to acquire knowledge we risk the destruction of the structure," he says.

But the work of the engineers aims toward preservation. Says Perucchio, "I feel particularly satisfied that I'm giving my contribution to the conservation of a spectacular example of a culture that flourished in Peru and could easily vanish."

—Kathleen McGarvey

**AT WORK: Perucchio (second from left) and Peruvian colleagues measure the dynamic response of adobe walls in Huaca de la Luna.**

### ROCHESTER AND PERU

### People

**23** alumni living in Peru
**11** current students from Peru
**1** student Fulbright recipient
**44** study abroad students since 2001
**3** exchange students from Peru in 2014, part of an exchange agreement begun in 2000

**Curt Cadorette,** the John Henry Newman Associate Professor of Catholic Studies, is an expert on religion in Peru and created a long-standing program for students to visit the country.

**Carmala Garzione,** professor and chair of earth and environmental sciences, works in the central Andes of Peru and Bolivia to study the geodynamic processes involved in raising the Andean plateau.

**Lynne Massaro,** assistant professor of clinical nursing, takes nursing students to Peru for a capstone project.

ATHLETICS

# The International Flavor of Squash

With 11 players from seven different countries, Rochester's squash team boasts student-athletes from around the world.

By Ben Shapiro '16

The racquet sport of squash—played by two or four players in a four-walled court with a small, hollow rubber ball—was invented in 1830 at a British prep school. From there, squash expanded throughout the British Empire and to the rest of the world.

Today, the sport's world rankings feature players from Egypt to Germany, Colombia to Malaysia. Rochester's current squash team also reflects the sport's global status. Here's a look at a few of their stories:

## United by a Common Sport

An upstate New York university may seem like an unusual choice for a native of Great Britain, but world travels are nothing new to Neil Cordell '15.

At 13, Cordell left England for his first international event, an under-15 tournament in Belgium. Over the next several years, he traveled throughout Europe and to places as far as California, Israel, and Qatar.

Such travel proved necessary. As one of England's best players, there were few area competitors to challenge Cordell.

He eventually transitioned from international junior tournaments to professional events. After experiencing life on the road as a squash player, the idea of continuing his career at an American university appealed to Cordell. He contacted fellow squash players who had attended Rochester. They put him in touch with head coach Martin Heath.

Heath was so enthusiastic about Cordell coming to Rochester that Cordell says he didn't look at other universities. Now in his third year as a Yellowjacket, Cordell continues his success on the court. He earned All-American honors as a freshman and sophomore, and ranked seventh nationally last year after notching 14 wins during the season.

## Opening Doors at Home and Abroad

Formerly the top-ranked junior player in his native Mexico, Mario Yanez-Tapia '16 credits squash with enabling him to see the world and meet new people. At a tournament in Canada, he met Heath.

Yanez-Tapia had not considered attending college in the U.S. He reconsidered

**WORLD COURT: All-Americans Ryosei Kobayashi '16 (top), Mario Yanez-Tapia '16 (above), and Neil Cordell '15 have helped lead a squash team whose roster includes Yellowjackets from seven countries.**

after learning about the academic and athletic opportunities. While top squash teams—including traditional powerhouses like Harvard and Trinity—actively recruited him, Rochester was the best fit.

Now Yanez-Tapia is part of the Yellowjacket team, an adjustment for him since squash is largely an individual sport. Overall, it's been a positive change. "I think it's better to train as a team," he says, noting that practicing with a tight-knit group creates extra motivation to work hard.

That practice is paying off. Yanez-Tapia is an All-American and Rochester's current top player. He amassed a record of 28–4 and earned a top 10 national ranking in his first year and a half as a Yellowjacket.

### All in the Family

More than a decade ago, the racquetball-playing father of Ryosei Kobayashi '16 wanted to familiarize his then seven-year-old son with racquet sports. Instead of racquetball, the two played a game of squash.

That was the first step in a successful athletic career for the sophomore All-American who is currently ranked 11th nationally by the College Squash Association.

Rather than seeing squash as a niche sport, "my dad thought squash had more opportunities to go higher," says Kobayashi.

Since racquetball is not a collegiate varsity sport—and high-level competitions are few and far between—Kobayashi knew he would have to work hard, something he was more than willing to do. After school, he traveled an hour by train to a squash club, where he practiced for five hours a day.

Kobayashi supplemented his training with competitions throughout Asia, in places such as Hong Kong and Malaysia. One of his most important trips came at age 17. He traveled to the U.S. for the first time to participate in a tournament at Harvard.

It was there that college squash in the States became an option. Coaches from the top squash programs in the country, including Heath, spoke with Kobayashi.

Several schools vied for the top-ranked Japanese junior, but Rochester proved the right fit. "I was interested in business, and at the same time I wanted to play squash seriously. Rochester was the best option for me."

In many ways, Kobayashi's rationale for choosing Rochester echoes his father's thinking about squash all those years ago: "I thought coming here would give me an advantage for the future." ®

*Ben Shapiro '16 is an athletic communications assistant for the Department of Athletics and Recreation.*

PACESETTER: With a time of 1:14.92, Becky Galasso '15 (T5) had recorded the fastest 500-meter run in Division III as of mid-February.

HIGHLIGHTS

## A Winter Roundup…

The **women's swimming and diving** team produced six NCAA provisional qualifying times and three school records at the UAA championships at Emory. Rochester finished sixth out of eight teams.

**Men's swimming and diving** rewrote some records as well. The Yellowjackets had six NCAA provisional qualifying results and broke five school records at UAAs. UR finished seventh out of eight teams.

**Women's basketball** produced one of its biggest wins of the season, a 76–75 decision over Washington University in the Palestra. The Bears were ranked No. 7 nationally entering the game and were tied for first place in the UAA. The win assured Rochester of a winning season (13–9 with three games left). Two freshmen combined for 42 points and 26 rebounds to lead the way.

Over a three-week stretch in mid-winter, the **men's basketball** team won five of six games to climb within one game of first place in the UAA standings. With two weeks left in the season, Rochester was the only UAA men's team to sweep both games in a UAA road trip.

In the Boston area, the **men's indoor track & field** team's distance medley relay broke a 36-year-old record running at the Boston University Valentine Invitational.

The **women's track and field** team broke four school records. Between them, the men and women had more than eight ECAC qualifying performances. Becky Galasso '15 (T5) finished 12th among collegians in the 500-meter run at Boston. Her time was the fastest in all of Division III when the meet ended.

**Squash** finished 12–5 and fifth overall at the College Squash Association championships. The Yellowjackets lost an opening match to Harvard, 5–4, but bounced back to defeat Franklin & Marshall and Yale, both of whom defeated Rochester in the regular season. The Yellowjackets defeated two top-ranked teams during the season—Harvard and Trinity—both by scores of 5–4.

### …and a Spring Preview

The spring holds promise for a number of athletic teams. **Softball** is ranked No. 10 in a preseason poll by the National Fastpitch Coaches Association … The **baseball** team is touted by D3baseball.com as a strong contender for the Liberty League title and an NCAA bid … **Lacrosse** has a strong cast of veterans returning from a team that was ranked highly in Division III in turnovers caused and fewest goals allowed per game … The **golf** team has a chance to secure its second straight NCAA bid when the Yellowjackets host the Liberty League championships at Locust Hill Country Club … **Rowing** will compete in the Liberty League championships as part of an ambitious spring schedule … **Men's and women's tennis** will each play four UAA opponents before competing in the UAA championships in Florida in late April … The **men's and women's outdoor track and field** teams will look to carry over success from the winter season, hosting the Alumni Invitational on April 4 and the New York State Collegiate Track Conference's multi-event championship, April 26–27. ®

—DENNIS O'DONNELL