Structural Biology Facility Helping Reveal Life’s Building Blocks

Every flu-like bug already has the keys to its next home.

Relying on proteins that envelope its outer membrane, the virus can enter an unprotected cell without much effort. But how do these protein keys work? That’s a question Robert Lamb, molecular biosciences and microbiology-immunology, has been exploring for decades with influenza and paramyxoviruses — the viruses responsible for mumps, measles, and other serious diseases.

“If we can figure out how fusion proteins work, we can design a small molecule to stop viruses from infecting host cells in the first place,” says Lamb, an affiliate of the Howard Hughes Medical Institute and past president of the American Society for Virology. “By investigating the molecular structure of influenza and other viruses, we hope to make their resulting illnesses a thing of the past.”

The aspiration is a longstanding one with broad implications: if researchers can understand the structure of a protein, they may then unlock secrets to its function.

Another Milestone for Northwestern Research as Funding Nears $650M

Northwestern’s sponsored research awards grew to $649.7 million last fiscal year, the largest amount in the University’s history and a 5 percent increase over last year’s record-breaking $621 million.

The 2015-16 fiscal year marks the seventh consecutive year that annual research grants and contracts exceeded a half-billion dollars.

“Research funding is one important indicator of the strength of Northwestern’s overall research enterprise,” says Jay Walsh, vice president for research. “This annual support is instrumental in the University’s high-impact contributions across many disciplines. Not only does Northwestern have world-class faculty who make breakthrough discoveries, but the University also has talented administrators whose dedication continues to advance our research.”

Northwestern | RESEARCH

From left: Jonathan Remis, an expert in electron microscopy; Pamela Focia, an expert in macromolecular crystallography; Alfonso Mondragón, director of the Structural Biology Facility; Jason Pattie, a senior computer systems administrator; and Valerie Tokars, an expert in macromolecular crystallography, stand next to Northwestern’s cryo-electron microscope on the Evanston campus.
Throughout his 42-year career, Lamb and research collaborator Theodore Jardetzky, formerly of Northwestern and now at Stanford University, have revealed the architecture of 14 proteins, many with the help of state-of-the-art instrumentation at Northwestern’s Structural Biology Facility.

“The facility provides a 25-mile bridge to Argonne National Laboratory and the Advanced Photon Source (APS),” says Lamb. “The amount of data transferred back to my lab from Lemont, Illinois, is remarkable, and the suite of programs managed at Northwestern by Jason Pattie is invaluable.”

The Structural Biology Facility — located in the Ward and Searle Buildings on the Chicago campus and Cook Hall in Evanston — is one of 57 Core or shared facilities at Northwestern that provide cutting-edge tools and expert staff to further scientific progress. The Core remains an essential resource for research teams studying the relationship between macromolecular structure and function or for those using protein structure as a starting point for drug design. Managed by the Office for Research, this Core also provides access to the APS through the Life Sciences Collaborative Access Team (LS-CAT).

“One of the fastest ways to determine the structure of a molecule is by using the x-ray beamlines at Argonne,” says Alfonso Mondragón, scientific director of LS-CAT.

Mondragón, who uses the facility in his own investigations of biological macromolecules, is joined at the Structural Biology Core by Pamela Focia, an expert in macromolecular crystallography; Pattie, a senior computer systems administrator; Jonathan Remis, an expert in electron microscopy; and Valerie Tokars, an expert in macromolecular crystallography, including drug design.

In January, the facility added cryo-electron microscopy (cryo-EM) to its suite of services, which also includes x-ray crystallography at the APS and on a smaller scale on both Northwestern campuses.

“We have the instrumentation, expertise, and computational support to help principal investigators pursue the frontiers of structural biology,” says Mondragón.

“Cryo-EM allows researchers to study samples using a multi-million dollar microscope located in Evanston.”

Mondragón expects future breakthroughs in structural biology to rely heavily on cryo-EM, as the technique allows for the study of large proteins that are frozen in their natural state.

“X-ray crystallography has always had a hard time with very large complexes, meaning that researchers would get to a certain point and discover how difficult it was to purify, crystallize, and solve the structures,” he says. “In electron microscopy, however, the larger the sample, the better. It’s changing the way we look at things and I think some combination of crystallography and cryo-EM will be the approach that most researchers rely on moving forward.”

As a University research Core, the Structural Biology Facility is accessible to the region’s scientific community on a pay-per-service platform. More than a dozen Northwestern laboratories regularly use the facility and researchers from the University of Chicago and other higher-education institutions frequently rely on its instrumentation and computational capabilities to collect data.

“It’s an exciting time in structural biology and with support from the University and entities like the Chicago Biomedical Consortium we will continue to grow,” says Mondragón, referencing the effort launched by the Searle Funds at the Chicago Community Trust to spur collaboration among scientists at Northwestern, the University of Chicago, and the University of Illinois at Chicago.

“Both EM and crystallography generate enormous amounts of raw data and Northwestern’s ability to process that information will keep us at the forefront of the field for years to come.”
Research Note: ‘Blue Sky’ Basic Science Leads to Breakthrough Innovation — and a Nobel Prize

The entire Northwestern community felt an enormous sense of pride on October 5 when we learned that one of our own, Sir Fraser Stoddart, had won the 2016 Nobel Prize for Chemistry. The announcement heralded a triumph for scientific ingenuity and also provided a powerful reminder of basic science’s importance.

Sir Fraser, the Board of Trustees Professor of Chemistry, earned this magnificent distinction for his breakthroughs in molecular science, in particular his development of a “rotaxane.” This is a structure with a molecular ring threaded onto a molecular axle. Stoddart demonstrated that the ring could be made to move along the axle, an achievement that resulted in further advances, such as molecular lifts, muscles, and computer chips.

Anyone who pursues science as a profession won’t be surprised to learn that the Nobel didn’t arrive overnight. For decades, Stoddart has dedicated himself to exploring new possibilities in chemistry, including cultivating a greater understanding of molecular self-assembly and molecular recognition processes. His work on the rotaxane, for example, dates to 1991.

In Stoddart’s words, research is a “long haul.”

Foundational Principles

That journey begins at the lab bench where we perform the kind of basic, or “blue sky,” research that is vital to pathbreaking discovery. But basic science does not concern itself with specific applications; the applications that arise from this kind of science are often completely unanticipated. Instead, this inquiry explores possibilities and probes foundational principles that, one day, may lead to transformative technologies. Today, publicly traded companies rarely pursue basic research, since the financial return to stockholders is tenuous, uncertain, and would often be delayed by years if not decades.

But this science thrives at research universities like Northwestern, thanks to thought leaders like Stoddart and thanks to the collaborative ecosystem we have designed and implemented. I thought it was gracious, and illuminating, of Stoddart to underscore this point in his public remarks after winning the Nobel: “I also share this recognition with my students, postdoctoral fellows, and colleagues,” he said. “Northwestern is a special place, where everyone does science in a collaborative way. It happens seamlessly here.”

Stoddart’s discoveries have led to the manufacture of artificial molecular switches and motors and offer enormous potential promise for the field of molecular nanotechnology. He is well aware of this commercial potential: he holds 13 patents, with an additional 33 other patent application, and is the founder of two startups. One of these, PanaceaNano, develops environmentally friendly technology with broad range of applications. The other, Cycladex, aims to pioneer nanotechnology to isolate gold in an economic and “green” way, which would provide a major advantage over the current conventional use of sodium cyanide in the gold mining process. But these considerations did not serve as the engine for his discoveries, nor for his 1,000+ scientific papers, or the mentorship that he’s provided to hundreds of graduate and postdoctoral students over his career. Even as he looks now to translate his ideas into practical applications for social benefit, Stoddart has spent his entire professional life seeking to spark new knowledge and produce well-educated students.

This vision and mission are also at the core of everything that Northwestern does, which is why we are so privileged to be Stoddart’s academic home. Congratulations once again to him for his Nobel victory and for shining a light on the value of blue sky science! Read more about Stoddart’s Nobel Prize on page 7.

This edition of Research News also highlights Northwestern’s record-breaking annual sponsored funding (see cover). That funding increased to nearly $650 million in fiscal year 2016. Such continued investment in the University’s research enterprise is one measure of our success in pursuing high-impact discovery across a broad number of disciplines and research domains.

Vice President for Research
Origins: Exploring the Journey of Discovery
Rachel Beatty Riedl, political science, combines social awareness and comparative outlook to examine African politics

Start counting the factors that affect governmental policies across Africa and one quickly realizes what a monumental job it is to understand how even one country operates. Yet Rachel Beatty Riedl, political science, has developed expertise that spans several sub-Saharan nations, a region that includes considerable volatility.

Riedl’s core focus is on democracy and institutions, looking at subjects such as term limits and contested elections, and how to develop political systems that work well on behalf of citizens. A related research area is public policies in local governance and decentralization. Theories suggest that a government close to the people is optimal, since citizens can participate more vigorously in public life and hold the government accountable for its actions. Yet, the reality is more complicated. Issues such as capacity to manage effectively at the local level, and whether or not budgets are transferred from the national to regional government, can make or break policy implementation, she finds.

Religion and politics is a relatively new direction in Riedl’s research. She studies the ways that religious actors and groups engage to advance an agenda and seek representation. To explore that complex subject, she employs a historical and comparative perspective across African countries.

“I focus on factors like political parties, party-system competition, and democratic rules because human development is directly impacted by how political systems operate and by the choices they give to citizens,” says Riedl, a faculty fellow at Northwestern’s Institute for Policy Research and author of the award-winning book Authoritarian Origins of Democratic Party Systems in Africa. “These factors impact the ability of people to live in peace and security, and that’s what matters to me.”

To develop her expertise in international politics, one might assume Riedl was raised in a cosmopolitan environment. Yet her roots in a rural Wisconsin farm town tell a different story. Research News sat down with Riedl to discuss that transition and her professional path.

As a kid, did you dream of becoming a political scientist?
Growing up in a rural area, I was not exposed to many of the ideas and places I now engage with daily. My childhood was really shaped by living in the countryside, surrounded by farmland. In some ways, there was not a lot of diversity; in other ways, there was a great deal of socioeconomic diversity. Some classmates were in precarious economic and family situations, but I was less aware of it at that time. As I moved from our small-town elementary school to high school in Madison, and then to university and internationally, the sphere of what I was exposed to became broader.

Were you especially curious as a child?
More than curious, I would say observant. I was always aware of what people around me were doing in order to learn from that world and take out of it what I wanted to. For example, when I went to Madison for high school, I had to adapt to fit into that new environment. While Madison may not be the most cosmopolitan city, it was not my world. I’ve used that social awareness at different stages of adaptation. That’s what I enjoy about my work: I’m continually exposed to different ways of thinking and I enjoy connecting on a human level to people living different lives.

Do you recall an early “global” experience that proved influential?
The first time I traveled abroad was in high school, when a science teacher led a summer course to Belize, where we studied different ecosystems. For me, that was a formative moment.

The summer after my freshman year in college, I wanted to go to France but needed to pay my own way. So I got a job as an au pair in Normandy. I quickly realized I didn’t understand much French, even after taking it for five years — and I needed to keep three children alive. I would fall asleep with the dictionary on my chest, thinking what phrases I wished I had known that day, like, “Stay on the sidewalk.”
How did you develop your interest in Africa?

In college, I spent a year studying abroad in Senegal in 1998–99. I selected Senegal because I wanted to engage more deeply with questions surrounding human development, and I could continue to work on my French there. For an independent research study, I chose the topic: What is the value of an opposition political party in a system where the opposition has never won? I was influenced by conversations among students and the people in Dakar, which were about what the political party could and could not do, and what the opposition could and could not offer. The hope for change was really palpable.

That question played out in my dissertation research and my first book, *Authoritarian Origins of Democratic Party Systems in Africa*. So those questions have always motivated me. Yet even when I visited universities to apply to a PhD program, and I was introduced as “the Africanist,” I didn’t self-identify with that term at all. I was just interested in these thematic questions about democracy and development, and I happened to have spent time in Africa.

Is an interdisciplinary focus important to your work?

Yes. I’m really fortunate to be the faculty coordinator of Afrisem, the interdisciplinary graduate student colloquium. It’s amazing: students from all across campus who have an interest in Africa come together to present their research in progress. So I get to see students in performance studies, comparative literature, history, anthropology, sociology. They all learn so much from each other. It’s a testament to what the University can be when the students are able to communicate their findings and receive meaningful feedback that advances their education and inspires a new way of thinking about the problem they’re exploring. It’s often your peers that define your experience, and this program is doing that for our graduate students.

How does your IPR research influence your teaching?

Being a faculty fellow at Northwestern’s Institute for Policy Research is something I take very seriously. This inspiring intellectual community shapes my research questions and approaches as I engage with and learn from colleagues who are also interested in making a difference in the world. Additionally, my interest in policy is one way I can relate to my undergraduate students. Many of them are taking political science courses and I hope to be able to guide that interest in ways that are useful for their career trajectories. I keep in touch with many of my former students, and I love to see how their experiences here shape their future successes.

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Cores Named Gold Star Facilities

Three cores were honored as Gold Star facilities during this year’s Core Facilities Colloquium and Awards Luncheon on September 23. The Center for Advanced Microscopy and Nikon Imaging Center, Northwestern University Atomic and Nanoscale Characterization Experimental Center, and Integrated Molecular Structure Education and Research Center have each placed in the top 10 percent of annual core rankings four times or more. [See more photos.](#)
Northwestern Welcomes New Faculty Talent

As of the 2016-17 academic year, the Office of the Provost has indicated that the following faculty members have joined Northwestern. Please join us in welcoming these new full-time, tenure-track members of the Northwestern community!

**Bienen School of Music**
Helen Callus  
Milan ‘Alex’ Mincek

**Feinberg School of Medicine**
Atique Ahmed  
Irina Balyasnikova  
Gabriela Caraveo Piso  
Matthew Davis  
Paul DeCaen  
Ryan Drenan  
Elizabeth Hibler  
Charles Hogue  
Daniel Kim  
Maciej (Matt) Lesniak  
Daniela Matei  
Jason Ong  
Pablo Penaloza-MacMaster  
Minoli Perera  
Edward Schaeffer  
Deborah Winter

**McCormick School of Engineering and Applied Science**
James Hambleton  
Erica Hartmann  
Julius Lucky  
Eleanor O'Rourke  
John Rogers  
Danielle Tullman Ercek  
Marcelo Worsley

**School of Communication**
Andrew Boyce  
Larissa Buchholz  
Leslie DeChurch  
Brent Hecht  
Bonnie Martin-Harris  
Neil Verma

**Weinberg College of Arts and Sciences**
Xiaomin Bao  
Jennifer Cole  
William Dichtel  
Annette D'Onofrio  
Loubna El Amine  
Thomas Gaubatz  
Bennett Goldberg  
Leslie Harris  
Gaston Illanes  
Julia Kalow  
Doug Kiel  
Gang Liu  
Raffaella Margutti  
Kimberley Marion Suisseya  
Mary McGrath  
Emmy Murphy  
Jennifer Nash  
Sylvia Perry  
Beth Red Bird  
Onnie Rogers  
Michael Rodriguez  
Lauren Stokes  
Emrah Yildiz  
Sera Young

Kanatzidis Wins Million-Dollar Samson Prize

Mercouri Kanatzidis, chemistry, has been awarded the prestigious Eric and Sheila Samson Prize for his innovative scientific contributions to alternative fuel development. He will split the $1 million award with co-winner Gregory Stephanopoulos from the Massachusetts Institute of Technology.

Kanatzidis was honored for his seminal contributions in the design of nanostructured thermoelectric materials, which convert heat to electricity. Thermoelectrics are semiconductors that convert waste heat into electricity. By harvesting waste heat, thermoelectric materials can save energy in many thermal processes — including in automobiles — significantly increasing vehicle mileage and reducing carbon dioxide emissions. Kanatzidis’ research has contributed to a deeper fundamental understanding of the thermoelectric process and opened paths to further breakthroughs.

Stephanopoulos is a pioneer in metabolic engineering and has made seminal contributions to the engineering of microbes for biofuels production.

The Samson Prize — awarded by Israel’s Prime Minister’s Office, the Ministry of Science, Technology and Space, and Keren Hayesod, the official fundraising organization for Israel — is the world’s largest monetary honor in the field of alternative fuels. Annual winners are selected from a long list of worthy candidates recommended by university presidents and CEOs from around the world.

Kanatzidis and Stephanopoulos will be honored on November 2 during the Fuel Choices Conference in Tel Aviv.

Learn more.
Molecular Machines Bring Nobel Prize to Northwestern’s Stoddart

It’s the 4 a.m. wakeup call most scientists only dream of.

“I thought it was a hoax,” recounted Sir Fraser Stoddart, chemistry. “Then I recognized the Swedish-accented English and realized it was for real.”

Stoddart had won the 2016 Nobel Prize in chemistry for his seminal work on “molecular machines” — molecules that are 1,000 times thinner than a human hair and equipped with motors that allow them to move and perform tasks. Stoddart shared the distinction with Nobel co-winners Jean-Pierre Sauvage of the University of Strasbourg in France and Bernard L. Feringa of the University of Groningen, in the Netherlands.

By introducing the mechanical bond into chemical compounds, Stoddart is recognized as one of the few chemists to have opened up a new field of chemistry in the past 25 years. His work on molecular recognition and self-assembly and his subsequent introduction of template-directed routes to mechanically interlocked molecules has changed dramatically the way chemists go about making soft materials.

“New bonds are few and far between — they really are blue moons,” Stoddart said, “So I think that is what’s being recognized more than anything.”

The Royal Swedish Academy of Sciences cited the researchers’ work in developing “molecules with controllable movements, which can perform a task when energy is added.”

During a morning press conference, six and a half hours after his memorable phone call, Stoddart declared passionately and repeatedly that the award underscored the importance of “fundamental science” and the research grants that keep it robust.

“You must keep supporting it,” he said of research funders around the world. “None of us can actually forecast discovery. It comes with working for many years. In my case, in this area, I reckon it started in 1980. It’s 35 years; it’s not overnight.”

By the time Stoddart sat down to talk with Evan Garcia of “Chicago Tonight,” the chemist had conducted dozens of interviews and received hundreds of emails. He used the newfound spotlight to emphasize the global nature of modern research and the importance of rewarding the basic science that leads to big discoveries down the road.

“I share this recognition with my students, postdoctoral fellows, and colleagues,” he said. “Northwestern is a special place, where everyone does science in a collaborative way. It happens seamlessly here. If you don’t have the expertise, you can find it, and people step forward without being asked. It is well known that we hunt in packs at Northwestern.”

McDonald joins Buffett Institute

The Buffett Institute has named Meg McDonald as its new senior director of operations and strategic planning, a position she will begin in November.

“I’m so excited to be joining the Buffett Institute. Buffett’s faculty, staff, fellows and students all display such passion about their work and they are making a positive impact on the world around us,” McDonald says. “Such work is crucial to the future of an increasingly global, yet often divided, society.”

McDonald has spent more than a decade in the Office for Research, leading operations and strategic planning initiatives for the University Research Centers. The Office for Research Planning, Administration and Finance, the Office for Research Communication, and the Office for Research Information Systems have also reported to her.

“Meg McDonald is an outstanding addition to the Buffett team,” says Bruce Carruthers, Buffett Institute director. “Her leadership skills and administrative experience make her superbly well qualified to guide the Buffett Institute as it grows and as we continue to expand our research, teaching, and engagement activities. I am truly delighted she will be joining us.”

Learn more.
IACUC Chair Brings Research and Policy Acumen to Committee Service

CJ Heckman is a researcher in motion. An expert on the complex motor neurons connecting the brain with movement, the neuroscientist finds himself speaking at a symposium in Istanbul one day and at his lab in Chicago the next.

“Our work could help individuals with spinal injury, Parkinson’s disease, or amyotrophic lateral sclerosis,” says Heckman, physiology. “It’s extremely translational, meaning we frequently apply the things we learn in basic science to fundamental gains in human health.”

It was this range of investigation — from cells in a petri dish to clinical trials and the use of animal models — that led Heckman to serve on the Institutional Animal Care and Use Committee (IACUC) some 15 years ago. IACUC is the group responsible for the humane care of animals involved in University research.

Heckman’s is one of more than 100 Northwestern labs engaged in animal research. IACUC is currently involved in more than 700 ongoing protocols.

Every project involving animals must be reviewed and approved by the IACUC. The committee is also tasked with inspecting animal facilities and investigator laboratories, and making recommendations regarding aspects of the University’s animal program, facilities, and personnel training.

Northwestern’s IACUC typically consists of 25 members that include scientific colleagues, University professors, technicians, veterinarians, and community members with no affiliation to the school. The committee meets once per month, with protocol review — which can take two to three hours a week — completed beforehand. Every submitted protocol is appraised by smaller groups of committee members, each including a veterinarian, community member, and representative from the Office for Research Safety.

“Being an IACUC committee member allows individuals to contribute to Northwestern’s research enterprise while also helping shape future regulation,” says Heckman, IACUC president. “Researchers need to be involved in policy because they have critical insights on minimizing the regulatory burden.”

As chair, Heckman has helped IACUC usher in several strategic changes, including the move to an online review process, an improved inspection protocol, and enhanced post-approval monitoring. He emphasizes that the hard work and effectiveness of IACUC members and IACUC staff have been essential in maintaining the extremely high standards of animal care at Northwestern.

“Our efforts are meant to support pathbreaking research by insuring that animals are treated humanely,” says Heckman. “The University’s commitment to this endeavor is exceptional and continues to make Northwestern an extraordinary place to work.”

Wolter to lead OSR-Chicago

Northwestern has named Lynda Wolter as the new executive director for the Office of Sponsored Research-Chicago (OSR-C).

“I am very excited to join the Office of Sponsored Research,” says Wolter. “I am honored to have been selected for this position and am looking forward to collaborating with and providing excellent support to Northwestern’s faculty and research community.”

Wolter joins Northwestern from the University of Chicago, where she served as Deputy Director of University Research Administration since 2012. In that capacity, she managed the office’s daily operations, including oversight of proposal review and endorsement of all grant, cooperative agreements, and contracts, which totaled some $1.5 billion.

She also oversaw award negotiation and acceptance, totaling $460 million and 2,300 awards, and institutional reporting.

“We’re delighted that Lynda has agreed to join OSR-Chicago in this important leadership role,” says Rex Chisholm, associate vice president for research. “Her exceptional experience, commitment, and personality will lead the office to even greater levels of excellence and will provide an invaluable resource to Northwestern’s research enterprise.”

As executive director for OSR-C, Wolter is responsible for providing overall leadership for the office, serving as the institutional official for sponsored research awards on the Chicago campus, and fostering a culture of service to the research community.
Food for Thought: Plant Biologists Discover New Chanterelle Species

Gregory Mueller has a nose for fungi.

Over his career, the chief scientist at the Chicago Botanic Garden has gathered samples from China to Costa Rica, but he made his most recent discovery a little closer to home.

“*Cantharellus chicagoensis* — or the Chicago chanterelle — is evidence that researchers don’t have to work in the tropics to discover new and interesting biodiversity,” says Mueller, a member of Northwestern’s Program in Plant Biology and Conservation (PBC) and the Negaunee Foundation Vice President of Science at the Botanic Garden.

“The Chicago region is home to an incredible array of animals, fungi, and plants that provide essential ecological roles to the benefit of millions of people.”

The PBC is an educational collaboration between Northwestern and the Chicago Botanic Garden that has resulted in more than 50 masters’ degrees and two PhDs. More than a dozen students are currently pursuing their doctorate as part of the program.

Among other places, Mueller found the bright yellow chanterelle growing amidst the decomposing leaves lining the garden’s woods.

Researchers decided to explore the genetic roots of the mushroom after noticing it matured a little differently than most.

“When it’s young, the Chicago Chanterelle often has a pale, greenish tint around the margin, which very few chanterelles have,” said Patrick Leacock, Field Museum adjunct curator, in a September 22 interview with local PBS affiliate WTTW. “In the Chicago area, that’s the only one that would have any green on the edge. It also tends to get grey and scaly around the center of the cap, which the other ones don’t.”

Leacock described the Chicago chanterelle as having a sweet and savory flavor, juicy texture, and traces of light fruitiness that make it ideal for cooking.

Until recently, researchers considered yellow chanterelles to be a single species, but the work of Mueller and others have proven that is not the case.

“Rather than one highly variable nearly cosmopolitan species, the yellow chanterelle is really a complex of species, each with its own distribution and habitat requirements,” he says. “The more we study it, the more we document new players and more complexity in biodiversity.”

Mueller; Leacock; Jill Riddell, a School of the Art Institute of Chicago adjunct assistant professor; Andrew Wilson, a PBC postdoctoral fellow; and Rui Zhang and Chen Ning, PBC graduate students, published their findings in the July-August issue of *Mycologia*.

After gathering samples of the fungus, the research team extracted and sequenced its DNA. Analyzing the data and comparing it to already documented chanterelles confirmed the new species.

This discovery has important conservation implications. “If a species grows in multiple continents within a great diversity of habitats, loosing it here or there is no big deal as there are so many other populations,” says Mueller. “But, as has been shown for the yellow chanterelle and many other complexes, there are many species, each with a distinct distribution, habitat, and interactions with plants and animals.” As a result, Mueller says these species need to be included in conservation assessments and management plans.
Research Summit Brings Global Experts Together for Three-Day Workshop

What if a healthy heart were just a mouse click away?

Tal Dvir, biotechnology and materials science and engineering at Tel Aviv University (TAU), believes such progress is only a matter of time. The scientist joined more than three-dozen researchers presenting their work during this year’s collaborative workshop between TAU and Northwestern.

“Right now, the only solution for end-stage patients with congestive heart failure is a heart transplant,” says Dvir, who discussed his efforts to 3D print heart muscles. “Because there is a shortage of donors, we need to find new strategies.”

Harnessing diverse thought leadership to achieve such goals is part of the inspiration for the workshop, which occurred September 20 to 22 on the Evanston campus. Participants explored new developments in energy, sustainability, and biomaterials. Last year’s workshop, hosted in Tel Aviv, focused on semiconductors, electronic materials, thin films, and photonic materials.

David Seidman, the Walter P. Murphy Professor of Materials Science and Engineering at Northwestern’s McCormick School of Engineering, and Noam Eliaz, professor and founding chair of the department of materials science and engineering at TAU, served as co-chairs of the three-day event.

“The long-term goal of this international workshop series is to translate strong intellectual foundation to sustainable collaborations, team science excellence, and development of new and innovative research avenues,” says Fruma Yehiely, Northwestern associate vice president for research. “As an alumna of Tel Aviv University, I find special, personal value in the close cooperation between the two institutions, and I will continue to support the joint efforts to see it flourish.”

Among the renowned researchers who presented at the workshop, Northwestern’s John A. Rogers discussed his work on biomaterials. Rogers’ laboratory is developing bioreabsorbable electronics in one-dimensional, two-dimensional, and three-dimensional architectures. He believes that these electronics could be used for temporary monitors placed inside the body, which would dissolve and reabsorb in a matter of days or weeks.

“Breakthrough science today often involves collaboration across disciplines and among institutions,” says Jay Walsh, Northwestern’s vice president for research. “Opportunities such as the Northwestern-Tel Aviv University Workshop provide another forum for domain experts to share ideas that contribute to advances in many fields. This kind of engagement is integral to Northwestern’s research ecosystem, an environment in which our faculty pursue discoveries that have the potential to solve humanity’s most important problems.” Learn more.

Economic Discontent Subject of IPR Distinguished Lecture

Renowned sociologist and author Andrew Cherlin, the Benjamin H. Griswold III Professor of Public Policy at Johns Hopkins University, will deliver the Institute for Policy Research (IPR) Distinguished Public Policy Lecture on October 26. Cherlin’s 90-minute presentation, “The Economy, the Family, and Working-Class Discontent,” begins at 4 p.m. in Scott Hall’s Guild Lounge, 601 University Place on the Evanston campus. A reception will follow.

Cherlin’s research has focused on the social demographic and sociological characteristics of families and households. His publications have explored welfare policy, family policy, children’s wellbeing, marriage and divorce, and intergenerational relations during a transformational period in family life worldwide. Among his pathbreaking discoveries is the seminal “Three-City Study” (1999–2005), an interdisciplinary survey of low-income children and their caregivers in the postwelfare-reform era.

Cherlin has also demonstrated the ability to communicate his scholarly insights to non-academic audiences, which promises to make this IPR event broadly engaging.

Register here.
Northwestern Researchers Use Big Data to Offer Insights on Healthcare Fragmentation

Medical marvels come with complexities, including logistical ones with important implications for patient outcomes. Now, a new Northwestern Medicine research project aims to improve the hospital discharge process to increase safety and satisfaction.

The researchers surveyed healthcare providers intimate with the steps involved in releasing cardiac patients and discovered that they could only identify personnel and their exact role in the process less than 50 percent of the time.

“Our results speak to some of the fragmentation within the healthcare system,” says Gayle Kricke, a fourth-year student in Northwestern’s Health Sciences Integrated PhD Program. She is lead author of the study published on September 1 in the Journal of the American Medical Informatics Association. “The fact that providers were not entirely accurate at identifying others involved in the discharge process makes trying to change the process without unintended consequences very difficult.”

Kricke and principal investigator Nicholas Soulakis, preventive medicine: health and biomedical informatics, explored the possibility that data from electronic health records (EHR) could enhance the accuracy of the process maps currently used to guide improvement. EHRs provide a patient’s medical history as well as critical administrative data relevant to that person’s care. Practitioners often use process maps to define responsibilities and best practices for tasks.

Data extracted from EHRs showed that 35 percent of all discharge activities were completed by unexpected providers, including individuals from 12 categories not identified as part of the established workflow.

“When an unexpected provider is involved in care, we either need to fix our process or fix our mental model of how that process works,” says Kricke. “We must ask, is it okay that the unexpected provider delivered care? If so, then we need to make sure the care team’s members understand that provider’s involvement in care and, thus, their need to be part of the team.”

EHRs have become a crucial informatics tool for healthcare research, but data gleaned from them has to be considered in light of their limitations. Experts typically collect EHR data for clinical use, not investigations.

“The data can give us a really good glimpse of what’s happening in the clinical setting,” says Kricke. “But real life is messy, and EHRs still leave out a critical component of care: the patient’s voice.”

Northwestern Medicine’s Enterprise Data Warehouse (NMEDW) contains more than 6 million EHRs. A joint project between the Feinberg School of Medicine and Northwestern Memorial HealthCare, the NMEDW supports analytics for both clinical research and healthcare operations. This shared platform allows researchers to convert findings quickly into healthcare operations, increasing the potential for new discoveries to impact patient care sooner.

“Organizations with access to EHR data can better leverage clinical documentation to enhance process maps used for quality improvement,” says Soulakis. “Although fragmentation adds to the potential for harmful outcomes, that same environment allows clinicians to focus on their specific roles and deliver care amidst a symphony of skilled professionals, often times organically with no prompts.”

Kricke and Soulakis collaborated on this research project with Northwestern colleagues Matthew B. Carson, Corrine Benacka, R. Kannan Mutharasan, Faraz Ahmad, Preeti Kansal, Clyde W Yancy, and Allen S. Anderson, as well as Young Ji Lee from the University of Pittsburgh.

The Research was supported, in part, by the National Institutes of Health’s National Center for Advancing Translational Sciences and the National Library of Medicine.

Learn more.
Astrophysics Researcher Honored With Prestigious Fellowship

Center for Interdisciplinary Exploration and Research in Astrophysics (CIERA) postdoctoral fellow Laura Sampson has been named a 2016 L’Oréal USA “For Women in Science” Fellow.

Last year, Sampson contributed to the historic detections of gravitational waves, one of the biggest discoveries in modern science. Her postdoctoral research develops data analysis algorithms to examine the physical systems that produce gravitational waves.

The L’Oréal program recognizes exemplary female scientists for their contributions in science, technology, engineering, and mathematics fields and for their commitment to being role models for younger generations. Sampson will receive a $60,000 grant to advance her postdoctoral research.

“Laura represents the future of astrophysics, as her research bridges data science methods and gravitational-wave studies,” says Vicky Kalogera, CIERA director.

Sampson, like Kalogera, is a member of the Laser Interferometer Gravitational-Wave Observatory (LIGO) Scientific Collaboration, the team of international scientists and engineers that first observed gravitational waves. Gravitational waves, tiny ripples in the fabric of spacetime, were first predicted by Albert Einstein in 1916 and now offer a new way of observing the universe. LIGO detected gravitational waves for the first time on September 14, 2015, and again on December 25. In both instances, the waves were generated by colliding black holes.

Learn more.

SiS Launches Partnerships with Evanston/Skokie School District 65

Science in Society, Northwestern’s science education and public engagement center, has hired Jennifer Lewin to be a liaison with Evanston/Skokie School District 65.

As a Northwestern staff member based in District 65, Lewin will oversee a newly created partnership and align University resources with the school district’s educational needs. She will be responsible for strengthening in-school and afterschool STEM learning while also providing teaching, mentoring, and service learning opportunities for Northwestern students, faculty, and staff.

“We are thrilled to have Jen aboard,” says Paul Goren, superintendent of schools in District 65. “We look forward to creating new and engaging learning opportunities for children across the district in the exciting world of STEM. Northwestern continues to be a valued partner and has opened so many doors for our students and staff in the area of STEM teaching and learning. We are grateful for their continued partnership and for giving us this opportunity to connect the expertise of their students and faculty with our strategic needs here in District 65.”

Lewin will directly support the district’s strategic goal to foster student learning and provide additional opportunities for its most underserved students, focusing on STEM-related areas.

“We are deeply committed to working side-by-side with D65 and its many community partners to improve access to high-quality STEM learning opportunities both in-school and out-of-school,” says Michael Kennedy, neurobiology, physiology, and director of Science in Society. “Through EvanSTEM, we’ve made significant progress in identifying key district and community partner needs. Jen will be at the center of our joint efforts to address these.”

Learn more.

New Funds Available to Northwestern Entrepreneurs

Northwestern’s entrepreneurial culture continues to thrive, thanks to ongoing investment in University innovation. One example: aspiring entrepreneurs can once again apply for N.XT Fund grants.

The N.XT Fund’s goal is to support faculty and student entrepreneurs using Northwestern-owned technologies so that these innovations can advance to the next stage of commercial development. Selected by external experts and investors, awardees must use their funding to achieve clear milestones, such as product validation, prototyping, or market identification, within one year.

To be considered for the second N.XT funding cycle, faculty and students should apply by December 1. Applications from the first funding cycle remain on file, but should be resubmitted with updated information. Individual award amounts will range from $50,000 to $200,000. For additional information, contact Nicholas Mauil, assistant director of new ventures at the Innovation and New Ventures Office.
Northwestern Day Kicks Off Chicago Humanities Fest

Three Northwestern faculty members are featured presenters during the first day of the Chicago Humanities Festival (CHF), which runs October 29 through November 12.

Lydia Barnett, history, will explain how a wide range of Enlightenment thinkers sought to use environmental catastrophe to describe the Earth and its history on a global scale.

Through clips, conversation, and live performances by featured artists, AJ Christian, communication studies, will take present and future queer TV fans on a behind-the-scenes journey through the production process. Christian leads Open TV beta, a television platform by queer, trans, and cis-women and artists of color.

Saul Morson, Slavic languages, a leading expert in narrative form and Russian literature, will discuss why “slow reading” is as important as ever. Morson points out that War and Peace is more than 1,400 pages not just because Tolstoy had a lot to say, but because he believed taking a long time to read it made you see the world differently. Note: this program is sold out.

Begun in 1990, CHF is an annual series of lectures, concerts, and films. This year’s festival takes place at various Chicago-area locations and opens with the Morris and Dolores Kohl Kaplan Northwestern Day on October 29. Learn more.

Odom to Lead Revamped Research Shop

Cutting-edge instrumentation is vital to modern discovery, which is why Northwestern continues to invest in this key part of its ecosystem — both in terms of equipment and administrative expertise. A recent example of such investment is the University’s naming Brian Odom, physics and astronomy, as faculty director of its new Research Shop.

The Research Shop, located in the Technological Institute, will provide expanded space and personnel where researchers can consult with professional staff to design and build new instruments, create parts, make repairs, or outsource their machining needs. The modernized facility will be completed in summer 2017. It will include a partnership with the Ford Shops to enable greater integration among the shops, affording access to unique capabilities that support innovation and offer a better training environment for students and postdocs.

“Having state-of-the-art professional and student machining facilities is critical for conducting leading research in many science and engineering disciplines,” says Odom. “By launching this initiative, Northwestern is making an important investment to strengthen our international research profile.”

Odom will lead strategic efforts to implement increased coordination with the Ford Shops, a plan spearheaded by a faculty-driven task force. The Ford Shops recently expanded their services to include training for graduate students and postdocs. This revamped mission allows each shop to develop coordinated training modules for researchers and enables access to specialty instruments, such as 3D printers and the water jet, a tool that uses high-pressured water to cut a wide variety of materials.

“The Research Shop is a critical part of the Office for Research portfolio of Core facilities, and Brian’s leadership will be crucial in ensuring it meets the current and future needs of our research community,” says Phil Hockberger, assistant vice president for research. “These modernization efforts will enable our researchers to accelerate the process of moving ideas from design to implementation.”

Carthew to Explore History of Cancer Research at Tonight’s Science Café

In January, President Obama put cancer research back into the national spotlight with a new “moonshot” initiative. Researchers took note.

That effort — led by Vice President Biden — aims to make more therapies available to more patients, while also improving the ability to prevent cancer and detect it at an early stage. But this isn’t the first time that a sitting leader has proposed conquering one of humanity’s most formidable diseases.

At the October 19 Science Café event, Richard Carthew, molecular biosciences, will tell part of that ongoing story, beginning with Richard Nixon’s 1971 “War on Cancer.”

The discussion’s highlights will include how a collection of some of the smallest living things — from roundworms and fruit flies to viruses that infect chickens and cats — played a central role in helping scientists understand cancer’s origins.

Hear Carthew’s presentation this evening from 6:30 to 8 p.m. at the Firehouse Grill, 750 Chicago Ave., Evanston. Learn more.
Honors

Katherine Amato, anthropology, has been named a member of the new Canadian Institute for Advanced Research Azrieli Global Scholars Program. Membership recognizes exceptional early-career investigators and provides $100,000 in research support as well as specialized leadership development programs.

The following students and postdoctoral fellows received a 2016 Outstanding International Institute for Nanotechnology Researchers Award for their contributions to nanotechnology: Jeffrey D. Brodin, chemistry; Jeffrey D. Cain, materials science and engineering; Pengcheng Chen, materials science and engineering; Chuyang Cheng, chemistry; Naihao Chiang, applied physics; Abbas Haddadi, Center for Quantum Devices; Jarad A. Mason, chemistry; Ethan B. Secor, materials science and engineering; Joseph M. Zadrozny, chemistry; Ha-Kyung Kwon, materials science and engineering; Won-Kyu Lee, materials science and engineering; and Che-Ning Yeh, materials science and engineering.

Zayd Dohrn, radio, television and film, won the prestigious Horton Foote Prize for excellence in American theater for his work “The Profane.” The biennial award, which includes $20,000, recognizes two American playwrights for exceptional new plays.

Aruna Ganju, neurological surgery, was named a “Female Spine Surgeon Leader to Know” by the Becker Spine Review. Ganju investigates surgical outcomes of patients with conditions spanning post-traumatic syringomyelia to lumbar spondylolisthesis.

Yonggang Huang, civil and environmental engineering, mechanical engineering, and materials science and engineering, won the prestigious William Prager Medal from the Society of Engineering Science. The medal is bestowed annually to a researcher for “outstanding contributions in theoretical or experimental solid mechanics.” Notably, the medal’s namesake was adviser to John Hutchinson who was Huang’s doctoral adviser at Harvard University.

Three Northwestern faculty from McCormick School of Engineering received the school’s annual awards for outstanding teaching and advising. Yonggang Huang and Ilya Mikheelson, electrical engineering and computer science lecturer; received the 2016 Cole-Higgins Awards for Excellence in Teaching. Alex Birdwell, former mechanical engineering lecturer, received the Cole-Higgins Award for Excellence in Advising.

Northwestern’s Dimitri Krainc, chair of Neurology, has received the Javits Neuroscience Investigator Award from the National Institute of Neurological Disorders and Stroke. The prestigious award, presented to investigators who make significant achievements in neurological science, will support Krainc’s ongoing work to uncover the pathogenesis of neurodegeneration, with the goal of developing new therapies for Parkinson’s disease and related conditions.

Aldon Morris, sociology and African American studies, was selected as co-winner for the Association for Humanist Sociology 2016 Betty and Alfred McClung Lee Book Award for his book, The Scholar Denied: W.E.B. Du Bois and the Birth of Modern Sociology (University of California Press, 2015). Supported by more than a decade of his research, the text argues that power, money, politics, and white supremacy ideology led to the marginalization of W.E.B. Du Bois’ prominent role in the development of sociology.

Adilson Motter, physics and astronomy, has been awarded a Scialog Collaborative Innovation Award. Motter will work with systems biologist Kimberly Reynolds at the University of Texas-Southwestern to determine if the order in which genes are “knocked out” (deleted) from an organism has any influence on its resulting condition. Current thinking is that knockout order does not play a role in an organism’s resulting characteristics.

The National Institutes of Health has named Tiffany Schmidt and Catherine S. Woolley, both neurobiology, recipients of the 2016 New Innovator Awards. The award recognizes outstanding new investigators who propose innovative projects with potential for unusually high impact.

The American Chemical Society (ACS) has given Richard Silverman, molecular biosciences, the 2017 Award for Creative Invention. Silverman pioneered the blockbuster drug Lyrica used for treating fibromyalgia, epilepsy, and other conditions.

Learning and computer scientist Uri Wilensky has received the 2016 Excellence in Educational Design Award for the design and development of NetLogo, a computer-based modeling system that allows users to construct simulations of natural and social phenomena and evaluate “what if” scenarios.

Teresa Woodruff, obstetrics and gynecology and director of Northwestern’s Center for Reproductive Science, received the 2017 Outstanding Leadership in Endocrinology Award from Endocrine Society. The award annually recognizes exceptional leadership in fundamental or clinical endocrinology. Woodruff is an internationally recognized expert in ovarian biology.
Spotlight: Research in the News

Northwestern economist Agustin Casas discovered that newspaper endorsements may have more influence than previously thought — but only when the recommendation comes as a surprise. If the endorsement runs contrary to the newspaper’s historical track record, yet in line with the usual tone, it may have a potentially decisive effect when the polls are otherwise tied. The research findings were featured in the New York Magazine and the Washington Post.

A new study by Joseph Ferrie, economics, and collaborators from the University of Michigan and the Census Bureau, has revealed that social mobility in America is more static than previously thought. The research drew from a new dataset of American families dating back to 1910. Unlike previous studies, this survey included grandparents and great-grandparents in addition to children and parents. The study’s findings were detailed in the Washington Post.

New research from Northwestern’s Kellogg School of Management has concluded that promise of reward for improved performance is counterproductive. The study, led by Loran Nordgren, management and organizations, found that the primary outcome of promising monetary reward for a particular task is excitement about the money — rather than actually improving the execution of the task. The research was featured in Huffington Post and Washington Post.

Northwestern scientists continue to be featured for their discovery of a group of people whose memory stays remarkably intact despite their advanced age. Emily Rogalski, cognitive neurology and Alzheimer’s disease, and her team coined the term “superagers” to describe this unique group that seemingly defies certain laws of senescence. While the study revealed some commonalities in super agers, such as slower brain shrinkage, striking differences in diet, health and IQ point to a need for further research. BBC News and Huffington Post reported the findings.

A new Northwestern study warns that memory loss is only one of numerous possible symptoms of Alzheimer’s disease. The research conducted by Emily Rogalski, cognitive neurology and Alzheimer’s disease, and colleagues, found that presentation of unusual confidence, language issues, and reading and writing difficulties, could also be manifestations of the disease. This discovery, featured in the Daily Mail, may lead to improved disease diagnostics that are critical to early intervention.

Northwestern researchers have developed 3D printable ink that can produce synthetic bone material for treating bone defects and injuries, as well as other applications. Lead scientist Ramille Shah, materials science, engineering and surgery, and her co-author, postdoctoral fellow Adam Jakus, are optimistic that the highly porous and absorbent material can be easily and inexpensively produced, creating the future possibility for personalized bone transplants. The groundbreaking discovery was highlighted in numerous publications including Los Angeles Times, Fox News, and Reuters.

Northwestern’s Jonathan Silverberg, dermatology, and collaborators have developed a new drug for treating eczema, a skin condition that produces a painful, itchy, and sometimes oozy, red rash. For those with a severe form of the disease, little has been available in the market to soothe the disfiguring and painful symptoms. After two successful clinical trials, however, the new drug, dupilumab, showed a promising indications of both efficacy and safety, as reported in the New York Times.

Karen Smilowitz, industrial engineering and management sciences, and a team of Northwestern students developed a data visualization system to monitor the more than 40,000 runners at the Chicago Marathon on October 9. The simulation program devised by Smilowitz and her students displayed a detailed breakdown of the race in real-time by analyzing data derived from previous Chicago Marathons and various checkpoints along the race route, which, in turn, provided Marathon personnel critical information regarding particular points where runners would likely need assistance. Newsweek reported on the innovative program.

Teresa Woodruff, obstetrics and gynecology, reviewed new research from the Erasmus University Medical Center in Rotterdam, the Netherlands, which found that women are more likely to have cardiovascular problems and die younger if they enter menopause before age 45, compared to women who become menopausal later in life. Although more research is needed to better understand the association, Woodruff, an expert in reproductive science, acknowledged that the findings signal an important opportunity for early intervention to protect bone and vascular health in women with early menopause. The editorial was featured in Reuters, Fox News and Chicago Tribune.
Discoveries

Northwestern’s Vadim Backman, biomedical engineering, has developed a potentially life-saving technology dubbed “nanocytology” for detecting early stage throat, lung, or mouth cancers. The noninvasive tool uses light to examine cells taken from accessible areas of the body, such as the cheek, for malignancies in a nearby organ. Backman’s bio-optic techniques hold the potential to pinpoint abnormal cells at the earliest possible stage, something currently unattainable with conventional microscopes. This technology’s implementation could lead to significantly fewer cancer deaths based on early detection and treatment. Learn more.

Northwestern Medicine scientists have discovered that genetic material works with a signaling pathway to regulate the behavior of glioblastomas, a common and highly malignant type of brain tumor. By profiling the proneural and mesenchymal glioblastoma subtypes and studying the role of microRNAs in the tumor’s growth and response to therapy, Shi-Yuan Cheng, neurology: neuro-oncology, and his team concluded that two microRNA are key modulators of a signaling pathway responsible for the tumor’s specific behavior. The discovery could impact the development of therapies. Learn more.

Depressed people are more prone to relapse when trying to quit smoking, but Northwestern Medicine research may have found an effective new treatment for this population. Senior author Brian Hitsman, preventive medicine, psychiatry and behavioral sciences, and colleagues have developed the first targeted approach for smoking cessation that combines medication and behavioral activation therapy to help patients develop coping skills to elicit improved mental health. Learn more.

Research conducted by Northwestern’s Lifang Hou, preventive medicine, and collaborators from Columbia University has revealed the annual health and economic impact of Volkswagen’s emission-cheating scheme in the United States: 50 premature deaths, 3,000 lost workdays, and $423 million in associated economic costs. Moreover, the study’s authors conclude that the effect of VW noncompliant emissions is likely far worse than the reported estimate. Learn more.

New research by Charles Manski, an economist with Northwestern’s Institute for Policy Research (IPR), and Aleksey Tetenov, a former IPR graduate student, found that a randomized clinical trial could be informative even when the sample size was as small as one per treatment. The researchers concluded that the use of near-optimal treatment rules to set the sample size could yield an effective treatment choice without the drawbacks associated with hypothesis tests in medical decision-making. Learn more.

Atrial fibrillation, the most common form of cardiac arrhythmia, affects more than 30 million people worldwide and is associated with increased risk of stroke. Despite the link, it is difficult to determine which patients will suffer a stroke, but a new imaging technique developed by Northwestern’s Michael Markl, biomedical engineering and radiology, may have delivered the breakthrough needed to make such predictions in the future. Learn more.

Amy Paller, dermatology, co-authored a recent study that may have identified information critical to developing a treatment for ichthyosis, a rare but severe genetic skin disease which covers the body in redness and dark scales. To date, no effective treatments exist for the disease, but Paller plans to launch a clinical trial to test a new biologic she developed with the aim of regulating the Th17 pathway, part of the immune system found to be hyperactive in patients with ichthyosis. Learn more.

Kelsey O’Neill, a graduate student in Northwestern’s School of Professional Studies, conducted a three-month data-driven analysis of Twitter posts from the leading 2016 presidential candidates, finding that the Trump campaign appeared more focused on rivals while the Clinton campaign was more issue-based. By using topic modeling, O’Neill was able to group the data to reveal areas of focus and repetition between the candidates. Learn more.

A recent study co-authored by Brian Mustanski, medical social sciences, psychiatry, behavioral sciences, and the director of Northwestern’s Institute for Sexual and Gender Minority Health and Wellbeing, found that bisexual teenage girls often miss out on crucial sexual health information and services when providers presume they are heterosexual or present judgmental attitudes. The research further noted that fear of disclosure of confidential information and stigma prevented some adolescent girls from sharing information about sexual activity in a healthcare setting. Learn more.
helps enable those discoveries to advance — including by managing funding grants and proposals."

Strong proposal activity from the Feinberg School of Medicine continues to pace this research growth, with more than $440 million dollars of sponsored awards invested in principle investigators at the medical school. Funding from the Department of Health and Human Services — which includes the National Institutes of Health — rose to a record $362 million.

With construction continuing on the Simpson Querrey Biomedical Research Center — a 14-story science hub to be connected to the Robert H. Lurie Medical Research Center in Chicago — the breadth of investigation at Feinberg will continue to grow. The new facility will provide laboratories and support space for significant new biomedical research to improve human health through the recruitment of approximately 200 new tenure-track faculty.

The increased volume of research funding in 2016 was largely attributable to a 9 percent increase at the medical school. The dollar volume of awards to the McCormick School of Engineering and University Research Centers and Institutes were even with the previous year, while awards to the Weinberg College of Arts and Sciences were 6 percent lower.

The dollar volume of awards from federal agencies increased 11 percent ($50 million). Awards from industrial sponsors declined about 6 percent ($5.6 million). Foundation funding was down 39 percent ($14 million), while voluntary health organization funding decreased 17 percent ($3.4 million).

The dollar volume of proposals submitted in fiscal year 2016 was $2.5 billion, an increase of 2 percent compared to the previous year. The number of proposals submitted (3,482) was a 3 percent increase.

The dollar volume of proposals submitted to federal agencies increased 6 percent ($122.4 million), while proposals to industrial sponsors were down 24 percent ($25.9 million). Proposal activity to voluntary health organizations was up 12 percent ($8.4 million) and foundation proposals declined by 38 percent ($31.5 million).