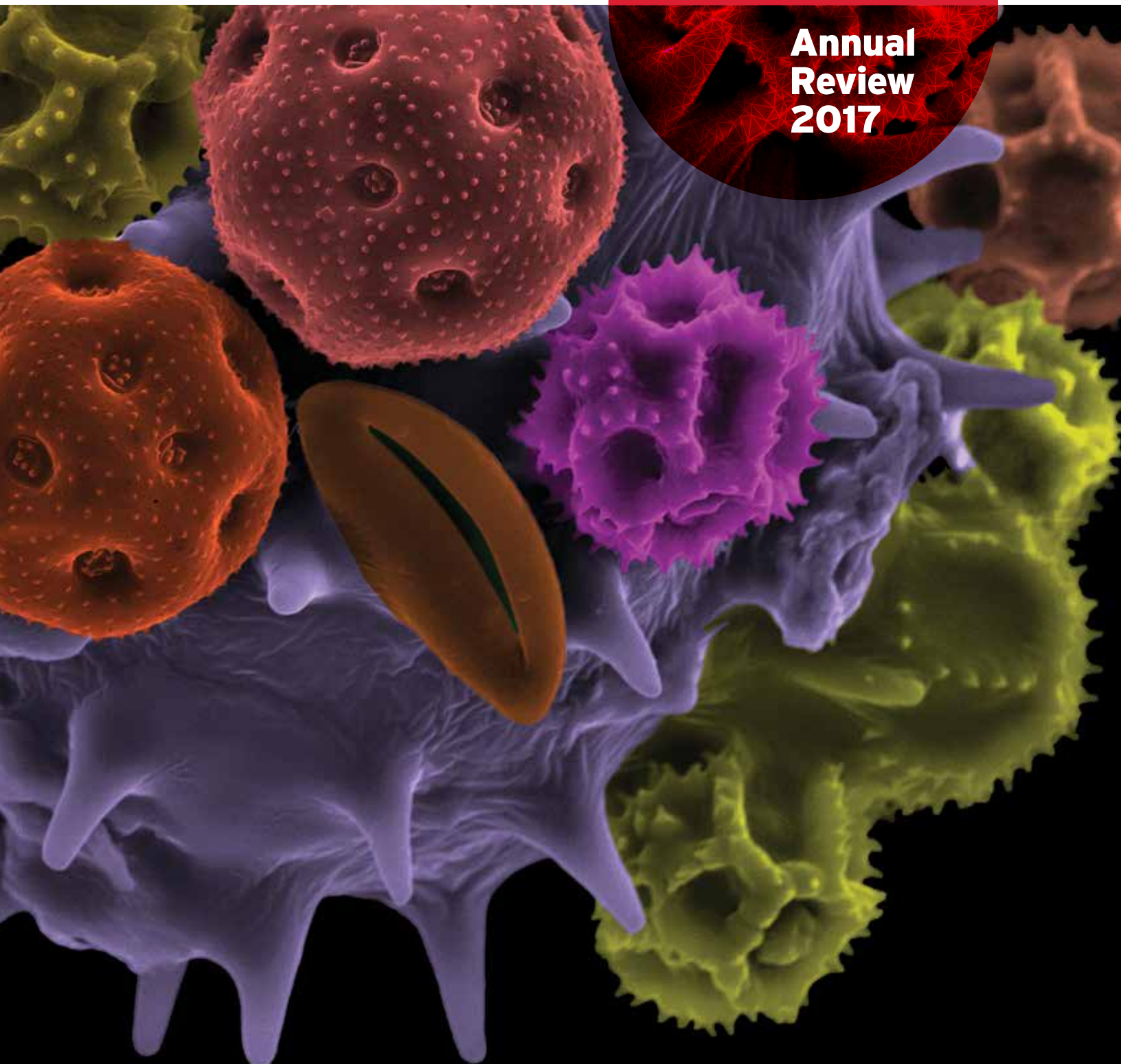


Faculty  
of Science

**Annual  
Review  
2017**





# Dean's round-up of 2017

## January

John McDermott (Biology) was renewed for a second five-year term as McLaughlin Research Chair. The Chair, funded by a \$1-million donation from the McLaughlin Foundation, supports life sciences research in the Faculty of Science.

## February

York University and the Governments of Canada and Ontario announced an infusion of \$113 million in funding to enhance infrastructure at the University, including the modernization of labs in the Faculty of Science.

## March

The Faculty announced the inaugural recipients of the York Science Fellowships. These premier post-doctoral fellowships were made possible with the generous support of James and Marilyn Simons.

Students, parents and faculty members attended the Faculty's Annual Honours and Awards Ceremony, which featured alumnus and filmmaker Ian Harnarine as the keynote speaker.



## April

The Faculty of Science granted 19 Dean's Undergraduate Research Awards for the summer, tripling the number of awards offered last year.

## May

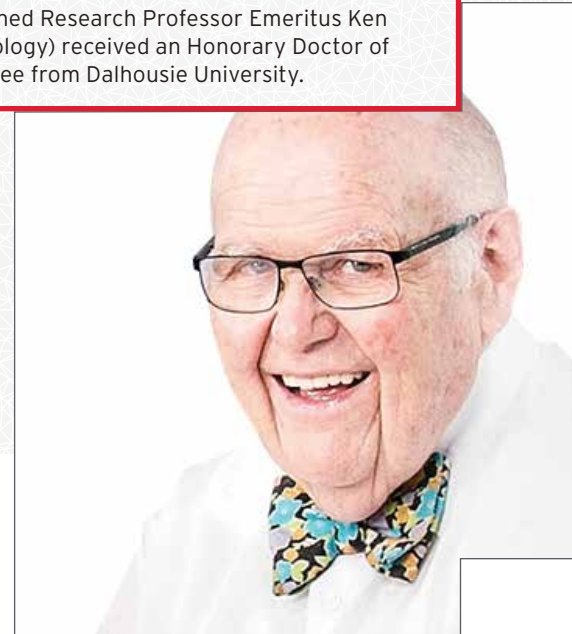
The Faculty of Science and Mainstreet Markham BIA hosted a successful Science Rendezvous at the Markham Farmers' Market.

The Science Exploration Camps received a grant from the Toronto Star Fresh Air Fund to subsidize camp fees for the summer.

## June

Dawn Bazely (Biology) was named a University Professor at convocation. This is the second consecutive year that a Science faculty member has received this high honour.

Distinguished Research Professor Emeritus Ken Davey (Biology) received an Honorary Doctor of Laws degree from Dalhousie University.



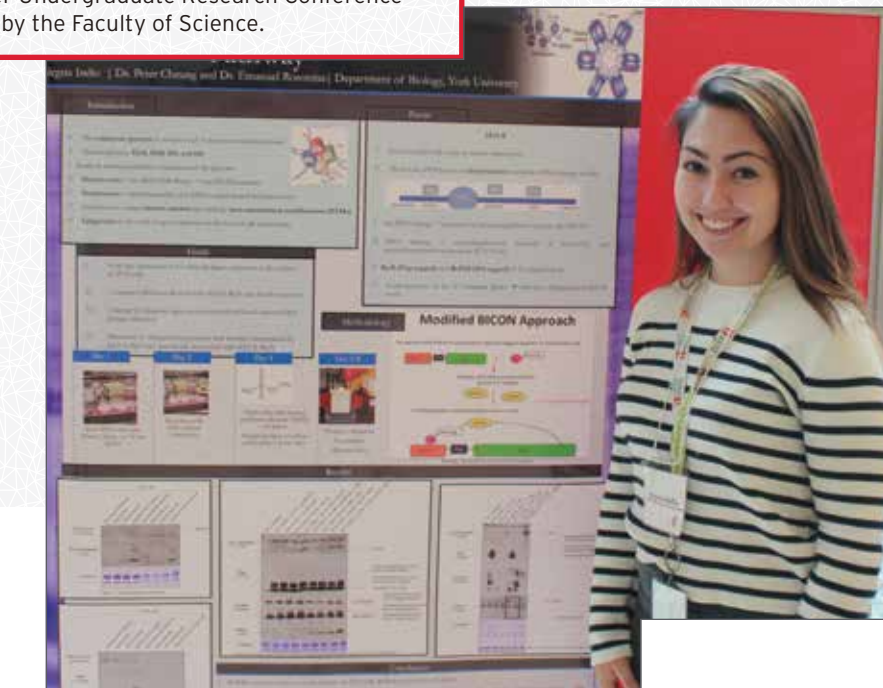
## July

Paul Delaney (Physics & Astronomy) received the 2017 Klumpke-Roberts Award from the Astronomical Society of the Pacific. He joins an illustrious group of past recipients, including Carl Sagan, Isaac Asimov and Helen Sawyer Hogg.

## August

The Observatory and Let's Talk Science at York University hosted Solar Fair, a public event that attracted about 2,000 people from the community to view the solar eclipse.

More than 30 students in Science and Health showcased their summer research to fellow students, faculty members and staff at the 2017 Summer Undergraduate Research Conference hosted by the Faculty of Science.



## September

The Faculty celebrated a \$500,000 gift from the Carswell Family Foundation, matched by York for a total of \$1 million, towards a new one-metre custom telescope at the Observatory.

## October

The Faculty of Science and Fermilab announced an agreement to jointly appoint the first Canadian scientist to participate in the Deep Underground Neutrino Experiment.

York Science revealed its first-ever Science Communicators in Residence: Kate Allen, science and technology reporter at the *Toronto Star*, and Matt McGrath, environment correspondent at the *BBC*.

## November

The Faculty announced its new York Science Scholars Award (YSSA) program, which will hand out \$10,000 awards, including research placements, to exceptional first-year students in fall 2018.

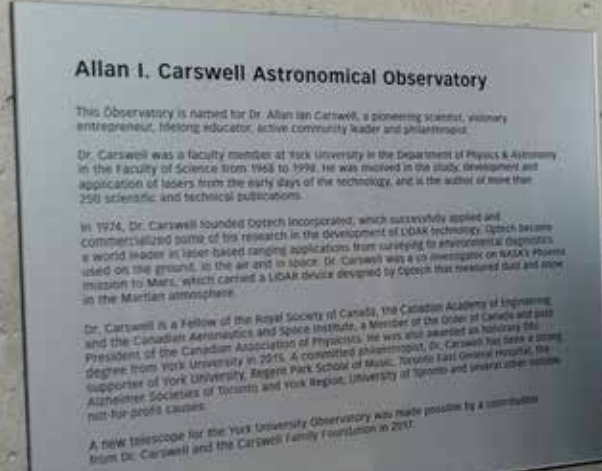
York Science wrapped up its public lecture series *Chronicles of a Peculiar Universe* at the Toronto Public Library, attracting a total of about 200 attendees.

## December

The Faculty hosted its annual holiday reception for faculty members and staff to celebrate the year's achievements and recognize long-standing service.



## Major gift for new telescope opens universe to students and the community



### The Allan I. Carswell Astronomical Observatory

The Observatory at York is already home to a fleet of telescopes, including 60-centimetre and 40-centimetre Cassegrains and five 20-centimetre telescopes, which were used for the 2017 solar eclipse viewing event at York. The facility has been a prominent hub for science outreach to the broader community since 1969.

About 5,000 members of the public visit the Observatory annually for tours and viewings on Wednesday nights, and there are online viewing opportunities for many more on Monday nights when York students and faculty host the popular radio show *York Universe*. In recent years, the Observatory has also become a popular venue for marriage proposals.

Ever wanted to take a closer peek at the Great Red Spot on Jupiter, Saturn's magnificent rings or brilliant newborn stars in the Orion Nebula? A donation of \$500,000 from Professor Emeritus Allan Carswell (Physics & Astronomy) and the Carswell Family Foundation, matched by the Faculty of Science and York University for a total of \$1 million, toward a new one-metre custom telescope will bring such celestial sights within reach.

When installed at the Observatory at York, the new telescope is expected to be the largest situated on a university campus in Canada. The telescope's larger aperture, along with a new imaging instrument and automated operations, will enhance hands-on learning experiences and undergraduate research opportunities for students and better reveal wonders of the night sky to the public.

In honour of Carswell's gift and his long-time contributions to science and the University, the Observatory was also renamed the Allan I. Carswell Astronomical Observatory.

"Allan continues to be a great champion of teaching and learning that crosses boundaries and benefits the broadest range of people. His gift will create a galactic legacy – literally and figuratively – that will have a lasting benefit for York University and beyond."  
– Rhonda Lenton, president and vice-chancellor at York University

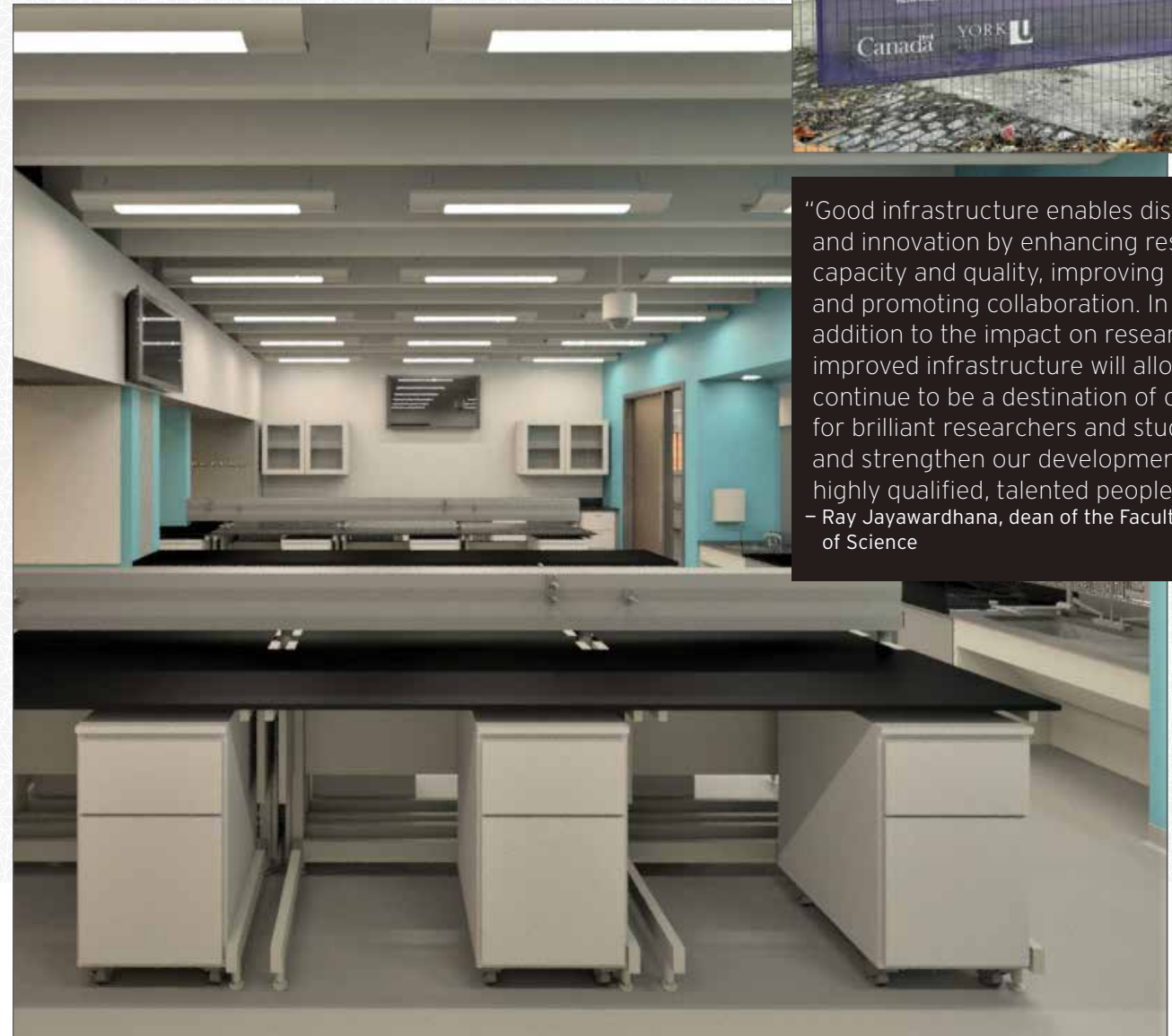
"Astronomy is all around us; it excites and stretches the imagination. The Observatory at York has played a unique role in 'hands-on' student education and outreach to the public since the science faculty was established in 1968. The Carswell Family Foundation is extremely pleased to support the expansion of this very special facility and its increasing impact in the future."  
– Professor Emeritus Allan Carswell (Physics & Astronomy)



## Investments to modernize lab spaces

In 2017, York University and the Governments of Canada and Ontario announced an infusion of \$113 million towards new and improved research and learning infrastructure at the Keele and Glendon campuses. Construction is now underway and will be completed in 2018.

A major focus of the new investment is to transform the 48-year-old Farquharson Life Sciences Building into a modern, world-class research and academic hub. In the labs scheduled for renovation, our researchers are studying fundamental questions related to cell biology and genetics, such as how cells regulate normal cell growth and suppress cancer, and the basic mechanisms behind diseases like diabetes and cardiovascular disease. This work is improving our understanding of life and human disease and leading to innovative therapies. A refresh of this facility will enhance the extraordinary research and teaching already being done there.



"Good infrastructure enables discovery and innovation by enhancing research capacity and quality, improving efficiency and promoting collaboration. In addition to the impact on research, the improved infrastructure will allow us to continue to be a destination of choice for brilliant researchers and students, and strengthen our development of highly qualified, talented people."  
– Ray Jayawardhana, dean of the Faculty of Science



## Joining the neutrino hunt with Fermilab

York University took a significant step to strengthen its involvement in the next great neutrino physics experiment.

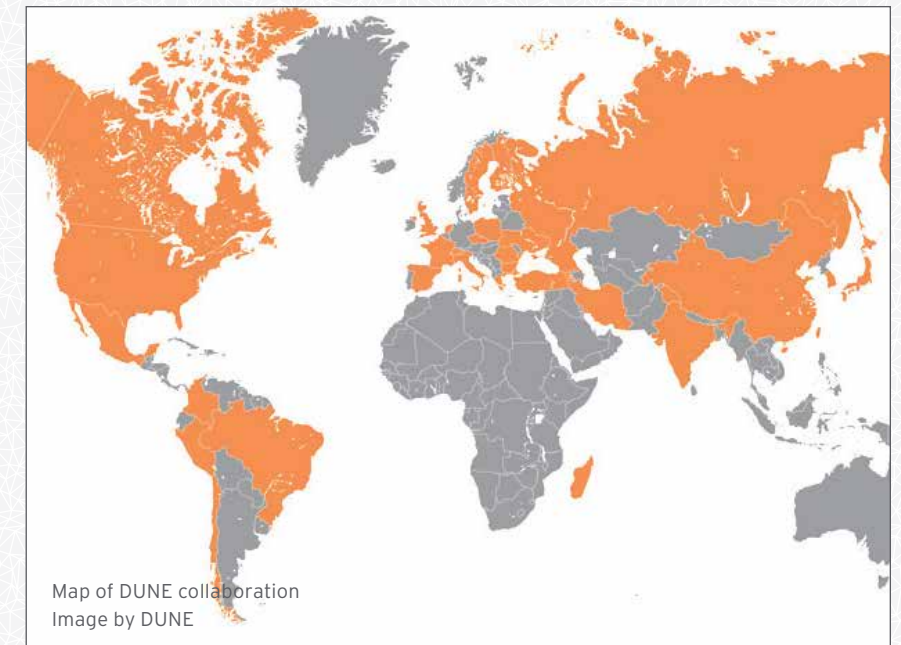
In 2017, the Faculty of Science and the Fermi National Accelerator Laboratory (Fermilab) announced an agreement to jointly appoint a scientist to participate in the Deep Underground Neutrino Experiment (DUNE).

It is the first such agreement Fermilab has signed for the experiment with a university outside of the United States, and York is the only Canadian university currently involved in the international DUNE collaboration, which includes 31 countries.

"We are delighted to partner with Fermilab and to have York scientists involved in one of the most exciting and ambitious new ventures in the world of physics," said Ray Jayawardhana, dean of the Faculty of Science. "Neutrinos play a starring role from the subatomic realm to the cosmic scale, so pinning down their characteristics will help scientists address fundamental questions."



Ray Jayawardhana, dean of the Faculty of Science; Rhonda Lenton, president and vice-chancellor of York University; Nigel Lockyer, director of Fermilab



Map of DUNE collaboration  
Image by DUNE

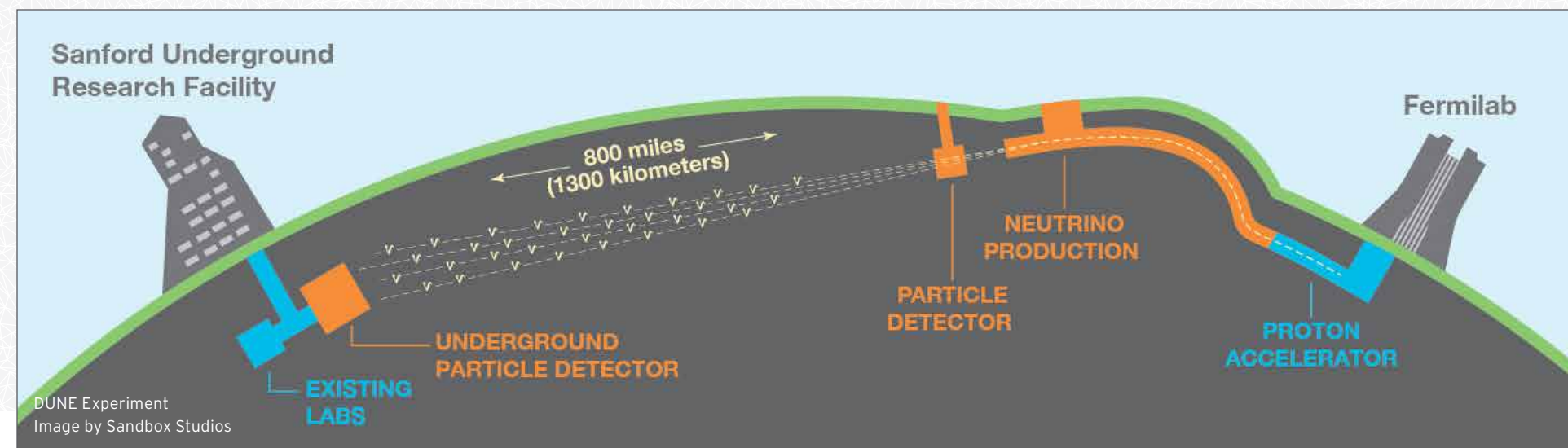
Nigel Lockyer, director of Fermilab, said "Fermilab is pleased that York U and Canada are joining the international community to build the world's most ambitious neutrino detector and to measure the properties of this enigmatic particle."

The newly recruited researcher will be based in the Department of Physics and Astronomy in the Faculty of Science at York University, where scientists already collaborate on large, multi-national particle physics projects like the T2K neutrino experiment in Japan and the ATLAS and the ALPHA experiments at the European Organization for Nuclear Research (CERN) in Switzerland.

DUNE is expected to make transformative discoveries that will deepen scientific

understanding of neutrinos and their role in the universe, the dynamics of the supernovae that produced the heavy elements necessary for life, and the possibility of proton decay.

The experiment involves more than 1,000 scientists and the excavation of 800,000 tons of rock to build the Long-Baseline Neutrino Facility (LBNF) required for the experiment. LBNF will comprise the world's most intense neutrino beam and include two detectors installed 1,300 km away from one another (one at Fermilab near Chicago, Illinois, and the other at the Sanford Underground Research Facility in Lead, South Dakota). Groundbreaking for the experiment started in summer 2017, and prototype detectors are now under construction at CERN.



DUNE Experiment  
Image by Sandbox Studios



## In the media spotlight

### Buzzworthy news

In the summer, bee researcher Amro Zayed (Biology) and his team published a study in the journal *Science* that showed that honeybees exposed to real-world levels of neonicotinoid pesticides die sooner. The findings received global media coverage, including by *The Economist*, the *Los Angeles Times*, *The Washington Post*, *CBC News*, the *Toronto Star*, the *National Post*, and many more outlets around the world. The research also informed a policy debate in Europe about banning neonicotinoid pesticides.



### Colourless fall

Toronto's wet summer and extremely warm start to fall in 2017 delayed, and even subdued, the leaf colours we typically see during the fall. Dawn Bazely (Biology) spoke to *Metro News* and *CBC News* to explain how temperature, sunlight and precipitation impact the chemical process that transforms leaf colours from green to yellow and red, and how unseasonable weather in 2017 knocked that process off course.



### Tick habitat expansion

Climate change is shifting the boundaries of where species can survive. Jianhong Wu (Mathematics & Statistics) has been using mathematical modelling to understand how climate change is impacting the expansion of tick populations in Canada. His research has noted that suitable habitats for these insects are expanding northward, increasing the risk for Lyme disease in some areas. Wu spoke to *The Globe and Mail*, *The Star*, and *CTV News* about his work to map the expansion.



Black-legged tick  
Image by CDC

### Innovations in bird science

Bridget Stutchbury (Biology) was the one of first scientists to start using geolocators to track the long distance migration movements of songbirds to their wintering grounds in Central and South America. Geolocators reveal the birds' routes and how they depend on specific regions. *The Atlantic* and the *Ottawa Citizen* covered Stutchbury's innovative use of the devices and how the technology is filling in fundamental gaps in the natural histories of entire songbird species.





## Global response to Science Communicator in Residence Program

In 2017, the Faculty of Science launched the York Science Communicator in Residence program. After advertising a call for applications, the one-of-a-kind program in Canada received an overwhelming global response and two outstanding journalists were selected as the first two residents: Kate Allen, science and technology reporter at the *Toronto Star*, and Matt McGrath, environment correspondent at the *BBC* in the UK.

"We were astonished by the caliber of the applications, which came from writers, photographers, documentary makers, scientists and more from all over the world," said Ray Jayawardhana, dean of the Faculty of Science. "The response revealed a strong global demand for opportunities that build excellence in science communication and foster links between researchers and communicators."

The program aims to recognize outstanding science journalists and communicators and to promote excellence in science-related communications.

The residents are immersed with researchers, students and staff at York's Faculty of Science, where they have the opportunity delve into the minds of eminent researchers and dig for rich, undiscovered science stories. Researchers at the Faculty also have a rare opportunity to learn from the residents about how to elevate their communication skills.



Kate Allen

"I'm excited and honoured to be given the opportunity to immerse myself in York's Faculty of Science. Science journalism is a precious and increasingly scarce resource, and I plan to spend my time at York deepening my expertise, broadening my contacts, and most of all hunting for the type of stories that will help the public better understand their world."  
 – Kate Allen, science and technology reporter at the *Toronto Star*



Matt McGrath

"I love meeting scientists and hearing about their work, and the diverse range of subjects being studied at York means I am in for a very busy time. I believe that my experience as a journalist can be of some use to researchers keen to understand the workings of the modern media. While at York, I'm hoping to experiment with new digital forms of communication and to build links and connections with the science community that will last long into the future."  
 – Matt McGrath, environment correspondent at the *BBC*

## Notable recognitions

### Dawn Bazely: University Professor and Sustainability Leader

Dawn Bazely (Biology) racked up two major honours in 2017 for her excellence in research, teaching and outreach.

She received the title of University Professor – one of the highest accolades given to an academic by the University – at spring convocation and a President's Sustainability Leadership Award at a special Earth Day event.

Bazely is an award-winning teacher and a valued mentor, many of whose graduate students have moved on to prestigious fellowships and academic careers. She inspires and educates students in outreach initiatives, speaks regularly at conferences and events, engages with the media and on social media, and continues to raise the awareness of women in STEM.



Dawn Bazely

Bazely has also made impressive contributions to sustainability research, teaching and outreach at York University. For example, she championed and led the application process to certify York University as an official "civil society observer" of the United Nations Framework Convention on Climate Change process, making it possible for York representatives to attend as delegates at the annual Conferences of the Parties.

### Amro Zayed: Emerging Research Leader

Bee researcher Amro Zayed (Biology) received the York University President's Emerging Research Leadership Award in 2017.

Zayed has already made a major impact and developed an international reputation in his field. He is a productive scholar whose genomic research on honeybees has important applications in the beekeeping industry. He attracts large amounts of funding and talented graduate students and postdoctoral fellows to York. Zayed is very active in translating and mobilizing his knowledge to improve the health of Canadian honeybees.



Amro Zayed



# Faculty and staff awards and honours

## Select faculty awards

FSc Early Career Research Award	Derek Wilson
FSc Established Research Award	Gary Sweeney
FSc Excellence in Graduate Mentorship	Arturo Orellana
FSc Excellence in Teaching Award	James Elwick Daniela Monaldi

## Select undergraduate awards

York University President's Scholarships	Nicholas Chrobok Katerina Disimino Joel Johnson George Greta Raffoul
York University President's Honour Roll	Khaldon Fadhel Abbas Danica Chaharlangi Nicholas Chrobok Tina Darvazehban Laura Fallico Leslie Amber Fournier Nadav Hillel Gasner Joel Johnson George Ali Jafri Michael Liang Anna Lan Anh Nguyen Sabrina Lien-Huong Ngoc Nguyen Parth Patel Monica Pizzardi Jennifer Gali Porat Karin Masha Saltou Claudia Tran Chi Zhang
Alumni Award of Distinction	Julieta Rybnik
Dr. Robert Lundell Achievement Award	Olga Andriyevska
Gillian E. Wu Award in Biochemistry	Yi Wen Yanrui Zhu
Governors' Awards of Distinction – Proctor	Laura Fallico
The Ogram Scholarship	Stanislav Balchev

York International Mobility Award	Umaimah Chudawala Nicole Gallagher Gabrielle Mastrodonardo Shlok Naik Sharda Persaud Abhiramy Vasanthakumar
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## Select graduate student awards

Richard Jarrell Award of Excellence for Teaching Assistants	Harjot Singh Deol Mohamed Salem
Carswell Scholarship Fund in SC	Dova Brenman Kerene Brown Matthew Burns John Campbell Michael Engstrom Nguyen Le Amanda Liczner Pourya Memarpanahi Angie Raad Richard Thai C.D Fowle Graduate Scholarship in Ecology
CIHR Doctoral Frederick Banting & Charles Best CGS	Won Suk Jahng
Dalton Pharma Services/ Dr. Douglas Butler Award	Andrei Nikolaev
Enbridge Graduate Student Award	Bailey Hewitt Alyssa Murdoch
Nestmann Scholarship	Camille Diaz Alexander Klenov
NSERC Alexander Graham Bell Canada Graduate Scholarship CGS-D – Doctoral	Tamari Chkuaseli
NSERC Vanier Canada Graduate Scholarship	Alexandra Terrana
Ontario Trillium Scholarship Program	Yana Boeva Soma Tripathi



## New research chair appointments

### Canada Research Chairs (CRCs)

The CRC program was created by the Government of Canada to attract and retain some of the world's most accomplished and promising minds. In 2017, the Faculty of Science welcomed the appointment of three new CRCs, bringing the total number of CRCs in the Faculty to seven:

- Thomas Baumgartner (Chemistry) - CRC in Sustainable Organomaterials (Tier 1)
- Christopher Caputo (Chemistry) - CRC in Metal-Free Materials for Catalysis (Tier 2)
- Raymond Kwong (Biology) - CRC in Environmental Toxicology (Tier 2)



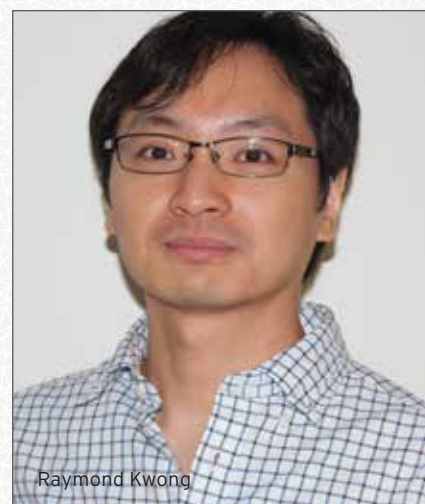
Thomas Baumgartner



Christopher Caputo



Eric Hessels



Raymond Kwong



Sapna Sharma

### Guy Warwick Rogers Chair in Chemistry

The Guy Warwick Rogers Chair was created as an endowment fund with a donation from Mary Rogers in 1988, in memory of her late husband, Guy Warwick Rogers, to support research in the Department of Chemistry. Cora Young (Chemistry) was appointed as the new chair in 2017. Young conducts research on environmental chemistry, using innovative analytical techniques to characterize chemicals and their sources and fates in the environment.



Cora Young

### NSERC/Sanofi Industrial Research Chair

Jianhong Wu (Mathematics & Statistics) was appointed as the NSERC/Sanofi Industrial Research Chair in Vaccine Mathematics, Modelling and Manufacturing. The goal of the chair appointment is to develop cutting-edge mathematical technologies and train the next generation of mathematical modelling experts to meet the significant challenges faced by Canadian vaccine manufacturers.



Jianhong Wu

## Research funding

**\$17.1 million**

Total new research funding for the Faculty of Science

**\$4.9 million**

New funds from the Natural Sciences and Engineering Research Council of Canada (NSERC)

**\$5.0 million**

New funds from the Canadian Foundation for Innovation (CFI)

**\$1.6 million**

New funds from the Canadian Institutes of Health Research (CIHR)

**\$2.4 million**

New funds from industry

**\$1.3 million**

New funds from private foundations and non-profit organizations



# Research funding highlights

## CFI - Innovation Fund

Thilo Womelsdorf (Biology) and Wendy Taylor (Physics & Astronomy) received a total of \$4 million from the CFI Innovation Fund. Womelsdorf's grant will establish a Centre for Neuro-Behavioral Monitoring. Taylor's grant will support the project "Upgrades to the ATLAS Detector at the Large Hadron Collider." Her funding was part of a \$29-million grant awarded to various Canadian institutions working on the CERN ATLAS Experiment.



Wendy Taylor

## CFI - John R. Evans Leaders Fund

Canada Research Chairs Thomas Baumgartner (Chemistry), Chris Caputo (Chemistry), and Raymond Kwong (Biology) received a total of \$575,000 from the CFI John R. Evans Leaders Fund for their projects on "Sustainable organomaterials," "Tools for synthesis and characterization of metal-free materials," and "Infrastructure for advanced research in aquatic toxicology and functional genetics," respectively.



Thilo Womelsdorf

## CIHR

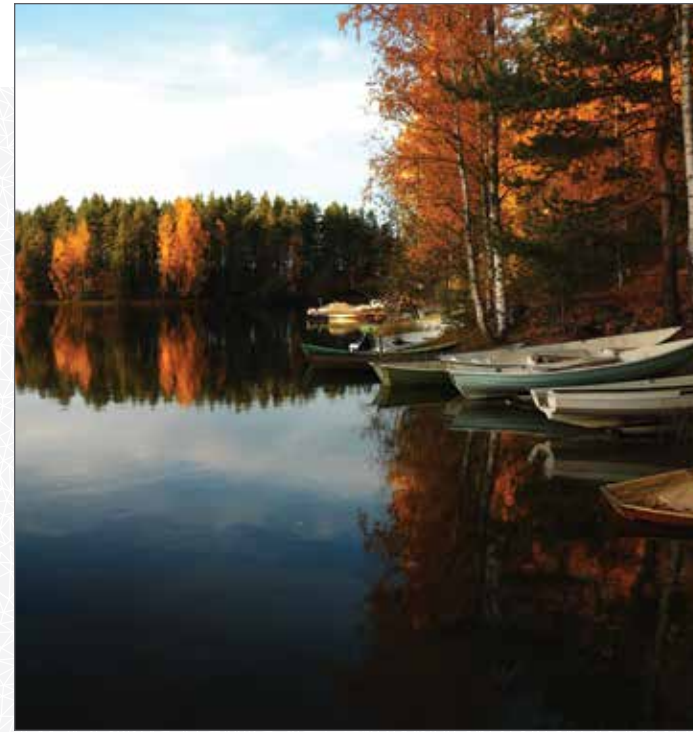
Biology Professors Peter Backx and Chung Peng received a total of \$1.5 million in project grants from CIHR for the projects "Uncovering the mechanisms of atrial fibrillation using lessons from the adverse atrial remodeling induced by intense exercise" and "MicroRNA-218s and their regulated signaling networks in placental development and preeclampsia," respectively.

## Heart and Stroke Foundation

Gary Sweeney (Biology) received a Mid-Career Investigator Award, valued at \$320,000, from the Heart and Stroke Foundation of Ontario for his project "Understanding mechanisms of heart failure in obesity and diabetes."



Gary Sweeney



## Ministry of the Environment and Climate Change

Sapna Sharma (Biology) received a Best in Science Grant, valued at \$1 million, from the Ministry of the Environment and Climate Change for her project "Does climate change and extreme climatic events contribute to water quality degradation on Ontario inland lakes."

## NSERC - Discovery Grants Program

Two dozen researchers in the Faculty of Science received more than \$3 million in NSERC Discovery Grants to pursue promising ideas and breakthrough discoveries.

## NSERC - Research Tools and Instruments Grants Program

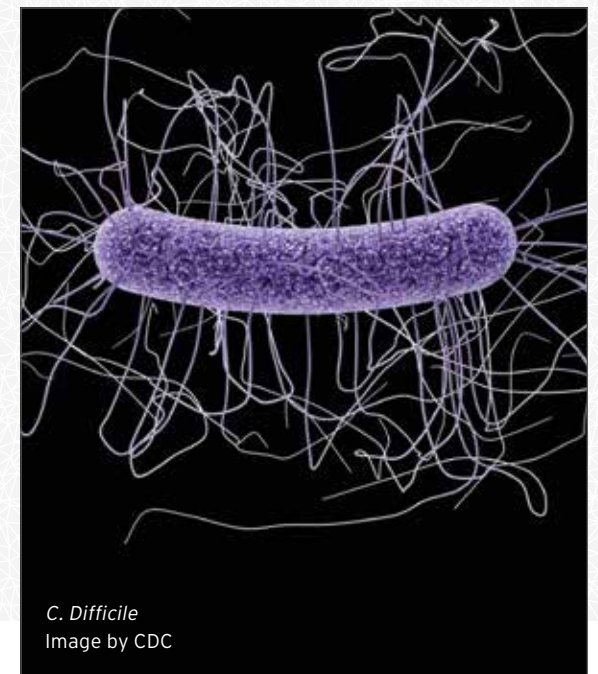
Sergey Krylov (Chemistry), Bridget Stutchbury (Biology), and Cora Young (Chemistry) received a total of more than \$350,000 in NSERC Research Tools and Instruments Grants for their projects "Disruptive technology for kinetic studies of protein-small molecule binding," "Tracking equipment to test the effects of pesticides on migration movements of wild birds and butterflies," and "Optical instrumentation to understand the chemistry of the atmospheric chlorine budget," respectively.



Sergey Krylov

## Pfizer Inc.

Seyed Moghadas (Mathematics & Statistics) received \$87,000 from Pfizer Inc. for the project "Evaluation of measures to control and prevent *Clostridium Difficile*."



*C. Difficile*  
Image by CDC



## How do living things tell time?



### Patricia Lakin-Thomas

Do you ever wonder how plants, animals and humans know when to “wake up” and start their day (or night)?

Patricia Lakin-Thomas (Biology) has dedicated her research career to understanding how living things do this. Almost all organisms have biological clocks, called circadian rhythms, which help them coordinate with their environment, telling them when it is best to eat, rest, grow and so on. And since these rhythms seem to work similarly in all living things, scientists are able to study them in the lab with easy-to-use model organisms, like fungus or fruit flies.

“In fact the 2017 Nobel Prize in Medicine was awarded to researchers who used

fruit flies to isolate a gene that controls the circadian rhythm as part of a feedback loop,” said Lakin-Thomas.

She has taken a slightly different approach to studying these rhythms though. She and her team of students (mostly undergraduates in the Biology program) work with a type of bread mold called *Neurospora crassa*, a fungus that makes spores at the same time, every day.

“Our fungus is easy to grow and genetically engineer, and it has similar genes to humans and other organisms,

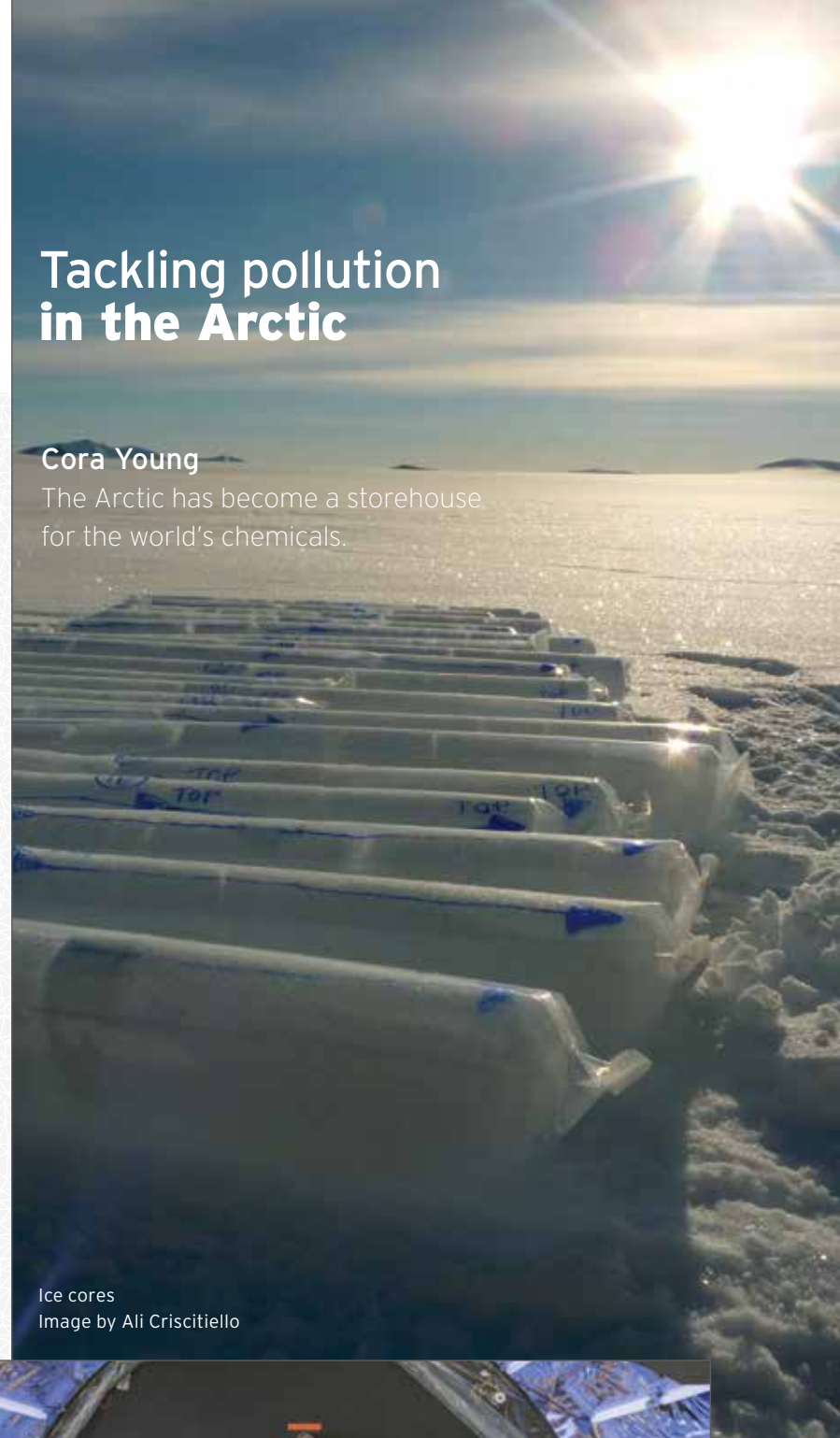
allowing us to apply our findings broadly,” she explained.

Lakin-Thomas has gone off the beaten path in this field of research by also looking for clock genes beyond the feedback loop central to the Nobel Prize discovery. Her team recently found two genes that disrupt timekeeping in the fungus when mutated. Now her lab is focused on understanding how those two genes function as part of the clock system.

## Tackling pollution in the Arctic

### Cora Young

The Arctic has become a storehouse for the world’s chemicals.



Ice cores  
Image by Ali Criscitiello

For instance, compounds in some consumer products, like flame retardants or the non-stick agents in Teflon, are making their way up north, even though they aren’t produced in that region. How is this happening?

That’s a question Cora Young, Guy Warwick Rogers Chair in Chemistry, wants to get to the bottom of, and it turns out Arctic ice samples can reveal a big piece of the story. Ice preserves the deposition of chemicals over time, with newly arrived chemicals layering on top of older ones. A 15-metre ice core goes back to the 1970s.

“We can actually look at how the deposition of chemicals has changed over time and after government regulations, like the ban of the pesticide DDT in many countries in the ‘70s and ‘80s, for instance,” said Young.

She works with a glaciologist who collects the ice cores, which she then sections and analyzes at Environment and Climate Change Canada with state-of-the-art techniques.

“We are looking for very small amounts of chemicals, like parts per quadrillion, which is comparable to the size of one postage stamp on a letter the size of Alberta,” she explained.

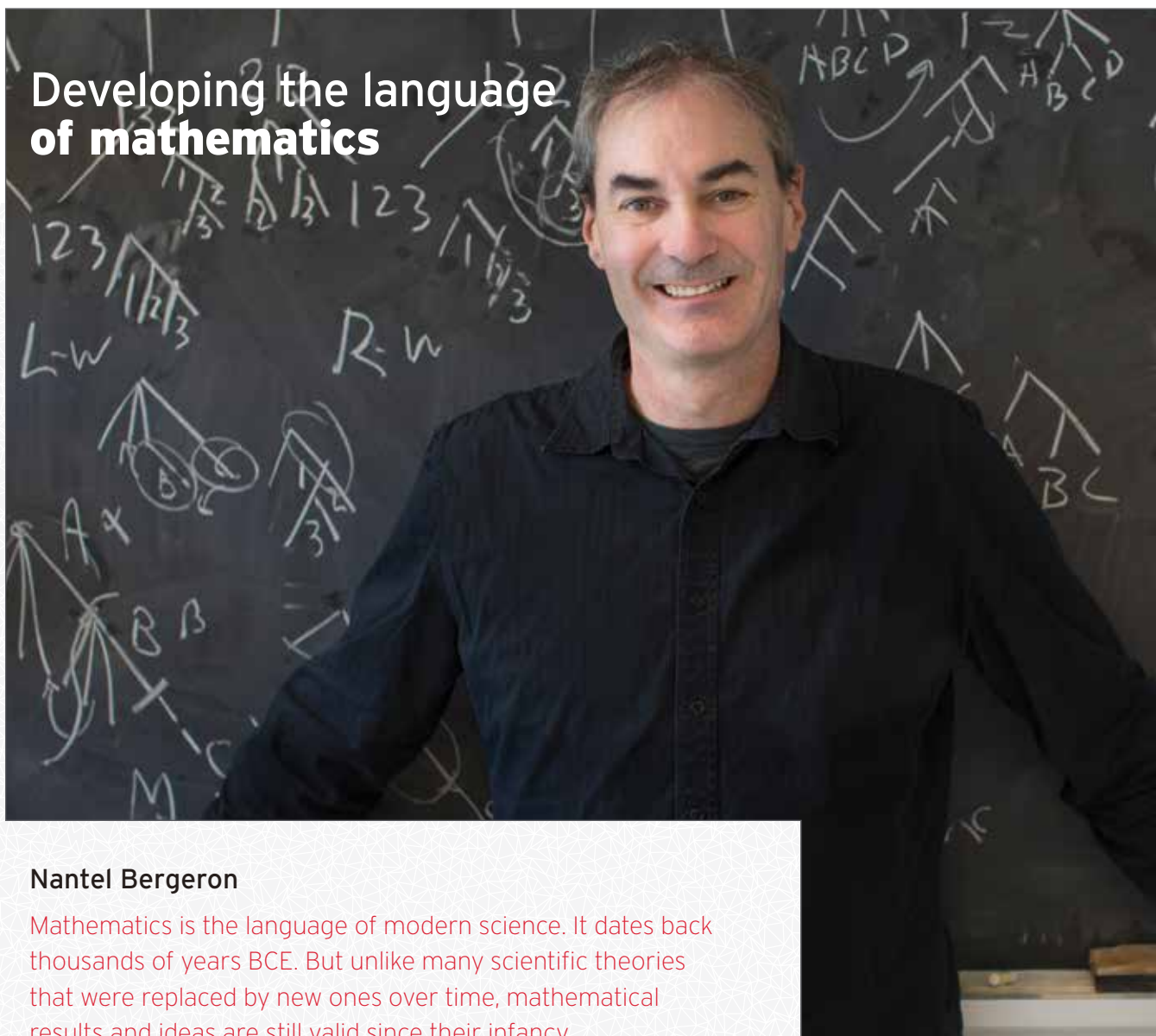
Once it’s clearer what chemicals are present in the Arctic, Young will use the smog chamber in her lab at York to simulate the transport process and figure out how the chemicals are getting up there.

“The idea behind our work is to help inform better regulations to prevent that long-range transport of chemicals to the Arctic and to better protect the environment and the animals and people that live there,” says Young.





## Developing the language of mathematics



### Nantel Bergeron

Mathematics is the language of modern science. It dates back thousands of years BCE. But unlike many scientific theories that were replaced by new ones over time, mathematical results and ideas are still valid since their infancy.

"What the Ancient Greeks devised in math is still taught in schools," points out York Research Chair Nantel Bergeron (Mathematics & Statistics). "And over time, we have kept accumulating and accumulating knowledge."

Algebra is the study of structure within mathematics and has also evolved over centuries. It deals with symbols and the rules for manipulating those symbols. In the early 20th century, however, algebra took on a new complexity by entering the abstract realm, creating

a new world of mathematics to explore. This is the world that Bergeron finds himself in.

"I see myself as an artist in a way, developing a language that allows us to better understand the world," he says.

He studies the structures in algebra, combining objects and breaking them in various ways to understand how different operations on the objects relate to each other.

"It's about learning what properties I can expect and deduce when I manipulate these objects," he explains. "And when we have a system of operations that are compatible, we call it algebra, and we can start developing algorithms."

His work has applications for computer science, where there is a demand for better computational processes. But still, it takes many years to apply mathematical solutions. Bergeron points out that Google algorithms were in fact developed hundreds of years ago.

## Highlights from Science & Technology Studies

Science & Technology Studies (STS) is an interdisciplinary department housed in the Faculty of Science but with membership by scholars and researchers from across York University. The department explores the social, cultural, philosophical, and material dimensions of science and technology. This year, we highlight some of the graduate student research taking place in STS.

### Dorian Deshauer

#### The shifting view on mental health

Dr. Dorian Deshauer is a psychiatrist at St. Michael's Hospital and at a homeless shelter in downtown Toronto. He is also a PhD student in STS completing his dissertation under the supervision of Kenton Kroker (Faculty of Science) and Eric Mykhalovskiy (Faculty of Liberal Arts & Professional Studies) at York University and Ted Porter at the University of California, Los Angeles.

Dr. Deshauer's PhD research is tracing the emergence and development throughout the mid- to late-20th century of the modern concept that mental health can be maintained long term with psychiatric drugs.

"By the 1960s, doctors and regulators began to see mental health as a lifelong process, and that the goal was to achieve and maintain mental health pharmaceutically in patients," said Dr. Deshauer.

There were societal concerns about this new view, however. Some sectors, such as insurance companies and employers, perceived mental health maintenance with drugs to be fragile and a financial and reputational risk. Dr. Deshauer is delving into archives that go as far back as the 1950s, including medical journals and regulatory and insurance documents, to better understand these different perceptions and how they changed over time.



Dorian Deshauer



Peggy Chiappetta

### Peggy Chiappetta

#### To patent or not to patent?

Biomedical research and innovation have become increasingly dependent on open access data. For example, scientists developing gene therapies for cancer rely on DNA and protein sequence data made available by other researchers. At the same time, there has been a shift towards commercializing science through tools like public-private contracts and patents.

"Commercialization encourages industry collaboration and research investment, but it can also restrict access to knowledge and information," explained Peggy Chiappetta, a PhD student in STS working under the supervision of Kean Birch (Faculty of Liberal Arts & Professional Studies). "As a result, there has been an even greater push towards releasing project data into the public domain and ensuring broad user access."

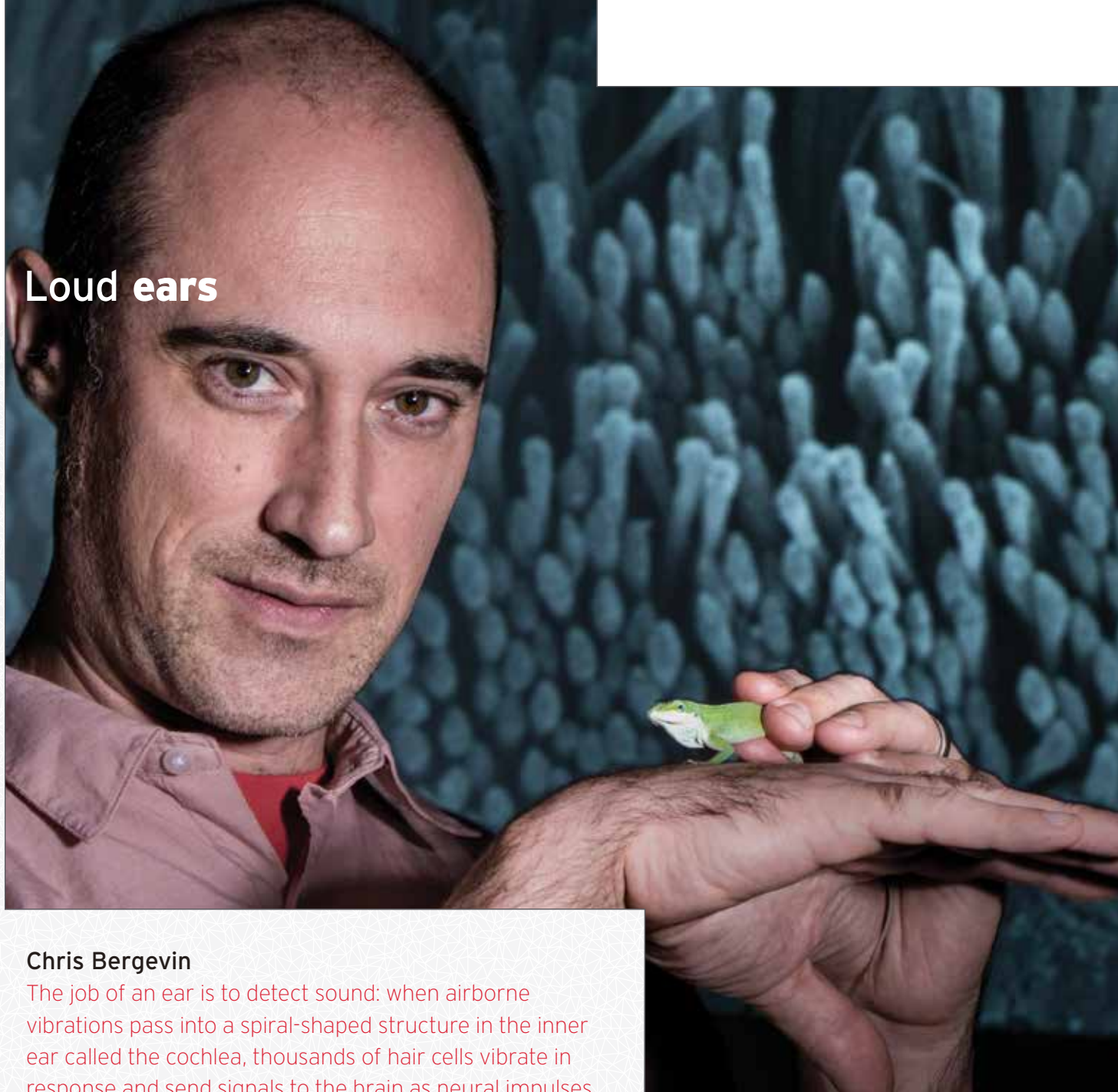
For her dissertation, Chiappetta is interested in understanding how this open and proprietary dynamic plays out in the development of cancer therapeutics in Ontario.

"Given the growing demand for novel therapies, but also the high costs and slow pace of developing and testing drugs, I think it's worth examining where and when openness and proprietary intellectual property protection hinder and facilitate innovation," she explained.

Her goal is to unpack Ontario's research and innovation ecosystem, with the aim to foster a more efficient environment for collaboration in bi-pharmaceutical research.



## Loud ears



### Chris Bergevin

The job of an ear is to detect sound: when airborne vibrations pass into a spiral-shaped structure in the inner ear called the cochlea, thousands of hair cells vibrate in response and send signals to the brain as neural impulses.

Many people might be surprised to know that healthy ears emit sounds too. These sounds, called otoacoustic emissions (OAEs), are believed to be generated by healthy ears from within the cochlea and can be measured using a sensitive microphone placed in the ear canal. In fact, OAE tests are used routinely in clinical settings, such as for testing the hearing of newborn babies.

"Scientists have assumed that OAEs are produced by cellular vibrations in the cochlea, which then propagate

back out through the middle ear," said Chris Bergevin (Physics & Astronomy). "But empirical evidence is weak and the biophysical principles underlying OAEs are not well understood, thereby limiting their potential use."

Bergevin is taking a comparative approach to understanding how OAEs are generated and why animals, including people, also have a unique spectrum of emissions, like an acoustic fingerprint. He has studied the ears of humans, owls and tigers and is now

focused on a type of lizard called the green anole.

"Lizards have remarkable OAEs and their ears are relatively simple, making them easier to study," explained Bergevin.

He is collaborating with a team at SickKids to relate the unique morphology of lizard ears to their OAE characteristics. He hopes to fill a major gap in understanding of how OAEs are created.

## The surprising genetics behind a heart drug

### John McDermott

Beta blockers are used worldwide to treat a variety of cardiovascular conditions, such as arrhythmias and heart failure. Scientists have known for decades that the medications work by slowing the heart rate and reducing the force of contraction, lessening the burden of work carried out by the heart.

But research by McLaughlin Research Chair John McDermott (Biology) has now revealed that these drugs also reverse a number of genetic changes associated with heart disease. He and his team used an experimental model of heart failure and next generation sequencing technology to study how gene expression changes with heart failure and how beta blocker treatment impacts this expression. To their surprise, they found that the treatment largely reversed the pathological pattern of gene expression in heart failure.

"This could mean that the reversal or suppression of pathological gene expression by beta blockers somehow protects against heart failure," said McDermott. "But it's something we would need to look into further to understand how individual genes and also their interactions function in the heart."

He is now collaborating with a cardiac surgery team at Southlake Hospital (Newmarket, ON) to assess these genes in human heart disease.

McDermott's study also found that some genes associated with the immune system were profoundly dysregulated in heart failure, supporting recent research that suggests the immune system and inflammation are intrinsically involved in heart disease. McDermott and his team have now earmarked genes for further exploration to better understand their role in heart failure and their potential use in diagnosis and treatment.





## Click chemistry

### Muhammad Yousaf

Matters of the heart can be complicated, but Muhammad Yousaf (Chemistry) has found a way to create 3D heart tissue in the lab that beats in synchronized harmony. He and his team of graduate students were able to do this by sticking three different types of cardiac cells together with a substance they created themselves, called ViaGlue.

"ViaGlue rapidly installs molecules on the surfaces of cells that click together, kind of like Velcro," explained Yousaf.

ViaGlue also eliminates the need for a scaffold - a material for the cells to hold onto and grow on but which usually prevents the cells from binding tightly. Until now, 2D and 3D tissues grown in the lab have relied on scaffolding.

"Making 3D cardiac tissue *in vitro* has long presented a challenge to scientists because of the muscularity and high density of cells in the heart," said Yousaf. "For cardiac tissue to be functional it needs the same high cellular density and the cells must be in contact to facilitate synchronized beating."

Yousaf and his team were the first to create 3D cardiac tissue in the lab with all three cell types, without a scaffold, that can beat together as one entity. They have also recently created a 3D liver tissue using ViaGlue.

Yousaf has launched the company OrganoLinX to commercialize ViaGlue and to provide custom 3D tissues on demand. ViaGlue will provide researchers with tools to create 3D tissues in their own labs to study diseases and issues with transplantation, as well as to test drugs.



## Training artificial intelligence

### Xin Gao

Xin Gao (Mathematics & Statistics) loves building and training statistical models. She is a statistician after all, and having big data at her fingertips means that there is a plethora of hidden information waiting to be discovered. When analyzed, large data sets can reveal information about online behaviour, business and market trends, causes of diseases, and so on.

"100 years ago, scientists started their experiments with a theory and then made sense of their research results in the context of their theory," said Gao. "But now there is a new trend in scientific exploration: we can build and also train algorithms to analyze data and uncover patterns and trends through artificial intelligence."

Gao's work is focused on developing algorithms and training them to learn.

One of her interests is in data fusion - that is, finding ways to connect data from different sources to produce more detailed and reliable information than that provided by any individual source. For instance, companies like Amazon and Netflix are able to make personal recommendations to you by combining data about your online behaviour.

Gao and her graduate students are currently developing software that can do fusion learning better than current techniques. In fact, her research team recently launched a new release of their fusion learning software.





## Designing labs for tomorrow's physicists and engineers

### Matthew George, Stan Jerzak and Gloria Orchard

If you drop by the physics lab for courses PHYS1800/1801 on any weekday afternoon, you will find groups of first-year students huddled over experimental setups and laptops, working together to explore concepts in physics. One week the students are manipulating a crane model to measure reaction forces; in another, they are building and testing a circuit. They all use a software program called LabVIEW to control their instruments and collect data.

The masterminds behind this innovative learning scene are teaching stream Professors Stan Jerzak and Matthew George (Physics & Astronomy), who designed the physical lab space, course manual and curriculum from scratch a

few years ago. At the time, George was a lab technologist.

"Every detail had to be verified for the experiments we wanted to do in the lab, especially because some of our approaches were original," said Jerzak. "We also wanted to make the course as practical as possible, so we incorporated LabVIEW, which at the time was being used in industry but not so much in teaching labs."

The space, located in Norman Bethune College, is organized into tables of four, each equipped with experimental gadgets, four laptops and a TV screen to share and collaborate. Every time students come into the lab, they are assigned to sit at different tables,

obliging them to collaborate. The lab course is administered by the Faculty of Science but it is targeted towards engineering students.

Jerzak now runs the lab with lab technologist Gloria Orchard, while Matthew George is applying the same design to create new labs in the Petrie Building for Science students.



## Bridging biology with virtual labs

### Tanya Da Sylva

For five years, lecturer Tanya Da Sylva (Biology; Division of Natural Science) has been teaching BIOL1500, an in-class bridging course for first-year students missing grade 12 biology. The course doesn't have a traditional lab component, but Da Sylva plans on stirring things up in 2018.

She received a grant from eCampusOntario to test out virtual lab simulations in her class with the software Labster. The grant was part of the agency's EdTech Sandbox initiative, which provides researchers an opportunity to explore new tools that support technology-enabled learning and report back.

"I think Labster has the potential to offer a unique experiential learning opportunity for my students."

Labster provides real-life scenarios that allow students to visualize life science down to the molecular level. Students work through situations like solving a crime scene, investigating a massive fish death, or identifying the medicinal compound in a rare plant. Thanks to her grant from eCampusOntario, Da Sylva and her students will have free access to the software.

Da Sylva plans to integrate the virtual labs into her course in a way that supports flexibility and self-paced study. BIOL1500 students come from a range of backgrounds and skill sets, requiring different levels of support and structure. She will continuously assess her students' progress with Labster and make adjustments as needed to enhance their learning experience.

The plan is to pilot the virtual labs in one semester and assess their effectiveness. If successful, using Labster in the classroom could be a model for other courses.



"Concepts are easier to understand when you have hands-on experience," said Da Sylva, who is also the Academic Life Coordinator at Bethune College.



## Expanding summer research opportunities for undergrads

In summer 2017, the Faculty of Science offered 19 Dean's Undergraduate Research Awards (DURAs) to high-performing York Science students, tripling the number of awards given the previous year. Five of the DURAs were generously funded by long-time donors Berna and Earle Nestmann, who committed \$100,000 over four years through a tax-smart gift of stocks that will fund a total of 22 DURAs.

"Earle and I are delighted to be able to make a contribution to support this undergraduate research program," said Berna Nestmann. "As researchers, we have experienced and witnessed the far-reaching impact of research awards for undergraduate students, and for graduate students and post-docs who get the opportunity to become mentors and team leaders. We are also convinced that an appreciation of the trials, failures, uncertainties, as well as successes of research promotes more questioning and critical evaluation of headlines and news stories that impact everyday decision making."

DURAs are 16-week positions (paid, full-time) for undergraduate students to work in a York University research lab over the summer. The awards in 2017 were offered in addition to 20 NSERC Undergraduate Student Research Awards to deserving students. All students were invited to participate in the Summer Undergraduate Research Conference hosted by the Faculty at the end of the summer.

For more details about the DURAs, visit [science.yorku.ca/DURA](http://science.yorku.ca/DURA)

### New scholarship program for incoming students

The Faculty launched the York Science Scholars Award (YSSA) program for students of exceptional promise. The YSSA program will hand out \$10,000 awards to as many as 25 first-year students for fall 2018.

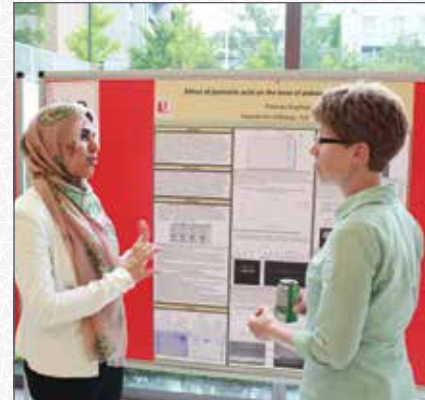


Berna and Earle Nestmann

"The goal is to recruit and nurture the most promising students so that they can go on to make a remarkable impact through exciting discoveries, creative innovations and meaningful engagement," said Ray Jayawardhana, dean of the Faculty of Science.

Each York Science Scholar will receive the first \$5,000 as an entrance scholarship and the second half to support a summer research placement with a faculty mentor after their first year. The research placement will provide students with an opportunity to put that first year of learning into practice, get a sense of front-line research, and consider academic and career options for the future.

For more information, visit [science.yorku.ca/scholarsaward](http://science.yorku.ca/scholarsaward)



## Leadership program for Integrated Science students

Over a weekend during the first month of school in 2017, 40 students in the Integrated Science program, including last year's cohort, were at York University learning how to become better science citizens.

The Faculty of Science was hosting the first part of a new leadership program called ISInvolved, exclusively for Integrated Science students. The symposium was a modified version of Bethune College's Basic Peer Leadership Training and included sessions on leadership, resilience, science communication, and education and campus resources.

"The symposium gave us an opportunity to meet last year's Integrated Science students and hear about their own experiences and tips in many aspects, such as balancing academics and

personal life," said student Matthew Lim. "Moreover, I was able to learn how to communicate effectively through the scope of science and how to become a leader and an educator to the community through various STEM outreach programs. I feel much more confident and educated about my university life as a whole."

The second part of ISInvolved will take place in the winter term when teams of students are paired with a faculty member or staff adviser engaged in science outreach to complete a small leadership project.



### What is Integrated Science?

Integrated Science is an interdisciplinary first-year program that integrates biology, chemistry, physics and math in the context of current scientific frontiers and real-world issues. The program is limited to 50 students who have demonstrated consistent excellence in grade 12 sciences and math.





## Celebrating our Carswell Scholars

In the spring, the inaugural Carswell Scholars gathered in the Life Sciences Building for a special opportunity to present their research to Professor Emeritus Allan Carswell (Physics & Astronomy), who funded the scholarship program with a \$1-million gift in 2016.

The recipients – six graduate students from the Faculty of Science and six from the Lassonde School of Engineering – engage in a breadth of research initiatives. The scholarships further their research by alleviating financial loads and enlarging the scope of their projects.

“My research involves travelling to sites across the province, which is expensive,” said Amanda Liczner, PhD student (Biology). “This scholarship expands my options, enabling me to increase my site visits, address more questions and conduct more exciting research.”

At the event, Carswell offered the recipients words of wisdom and advice for the future.

“Education is a life-long experience,” he said. “In your careers, you will need to be creative and flexible. You need creativity because life sends you a continuing set of challenges that are opportunities to do new and better things, and flexibility because it’s not so much what happens in life that matters, but how you deal with what happens.”

### Meet the inaugural Carswell Scholars in the Faculty of Science



**Kerene Brown** (PhD candidate, Chemistry) is characterizing the structure and dynamics of the interaction between human La protein and its RNA targets.



**Matthew Burns** (PhD candidate, Science & Technology Studies) is exploring underdetermination – the idea that the evidence available to us at a given time may be insufficient to determine what beliefs we should hold in response to it.



**John Campbell** (PhD candidate, Mathematics & Statistics) is focused on introducing new Hopf algebra structures and revealing new combinatorial properties concerning known Hopf algebras.



**Amanda Liczner** (PhD candidate, Biology) is focused on the conservation of at-risk bumble bee species. She is identifying areas that are important habitats for these species and those that are in need of conservation or restoration.



**Angie Raad** (PhD candidate, Mathematics & Statistics) is focused on the mathematical modelling of in-host HIV infection.



**Richard Thai** (PhD candidate, Physics & Astronomy) is leading an experiment to determine if the energy levels of positronium atoms are consistent with the theory of quantum electrodynamics.

## York Science Fellows program attracts top international talent

Thanks to a generous grant from Jim and Marilyn Simons, the Faculty of Science recruited five impressive emerging researchers from around the world as the inaugural recipients of York Science Fellowships.

These premier post-doctoral fellowships (each valued at \$72,000 per year) offer talented early-career scientists the opportunity to pursue their research in collaboration with outstanding scientists in the Faculty of Science. The inaugural recipients are highlighted below.



**Amy Botta** is working with Gary Sweeney (Biology) to investigate how iron excess leads to heart failure. Having high levels of iron in the body increases a person’s risk for a range of diseases, including liver disease, cardiovascular disease, and diabetes. Botta will study how iron overload affects cellular mechanisms and leads to cardiac dysfunction. New knowledge from this research could pave the way for improved therapeutic strategies.



**Bruno de Mendonça Braga** is interested in functional analysis and will complete his fellowship with Ilijas Farah (Mathematics & Statistics). The main focus of his research will be Banach space theory – the theory of infinite-dimensional vector spaces. He will be exploring the nonlinear geometry of Banach spaces and the descriptive set theory of separable Banach spaces.



**Zehra Cemile Marsan** is focused on understanding the properties and evolution of galaxies. As a York Science Fellow working under the supervision of Adam Muzzin (Physics & Astronomy), Marsan will use the deepest and largest astronomical surveys to study galaxies in the early universe and fully characterize their stellar population, dust and gas content. This work will guide efforts to explain the assembly of today’s most massive galaxies.



**Alba María Jorge Palacios** is interested in understanding how hadron therapy causes cell damage in tumours. Hadron therapy uses targeted beams of ions that cause biomolecules, including water, to lose electrons, which then attack the DNA of tumor cells. Water molecules can also fragment and induce further cell damage. Under the supervision of Tom Kirchner (Physics and Astronomy), Jorge Palacios will investigate how ions collide with water, the behaviour of electrons, and the mechanism of water fragmentation for different impact ion beams.



**Yue Zhao** is focused on developing and analyzing math models and computations to understand how light, sound, electromagnetic and elastic waves travel and scatter through materials. This work has important applications in engineering and mathematics, such as for radar and sonar, geophysical exploration, investigating earthquakes, and biomedical imaging. Zhao will complete his fellowship with Peter Gibson (Mathematics & Statistics).



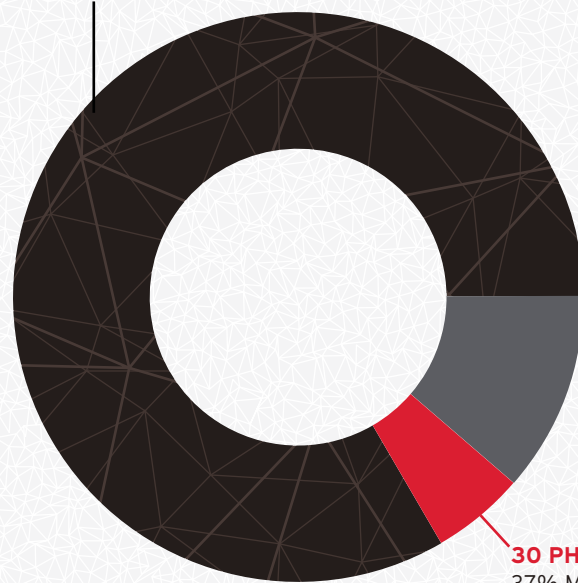
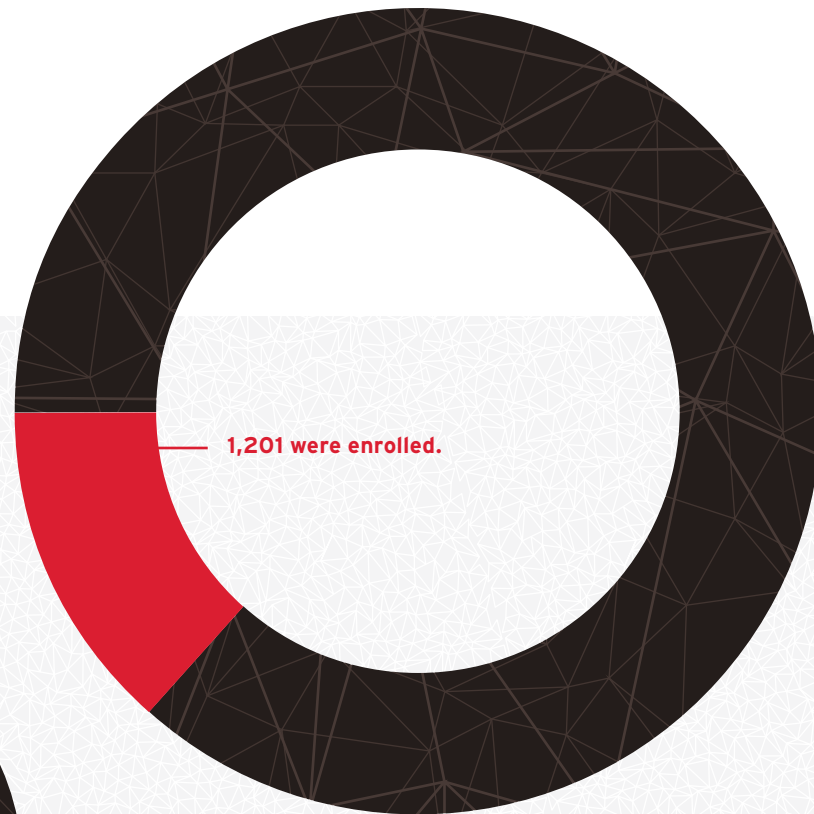
## By the numbers<sup>1</sup>

### APPLICATIONS & ENROLMENTS

Of 9,059 Undergraduate applicants...

585 total degrees granted

489 Undergraduate (BA, BSc, BScT)



#### 66 Master's

42% Mathematics & Statistics  
29% Biology  
17% Chemistry  
8% Physics & Astronomy  
4% Science & Technology Studies

#### 30 PHD

37% Mathematics & Statistics  
26% Biology  
17% Chemistry  
10% Physics & Astronomy  
10% Science & Technology Studies

### Enrolments by major/program<sup>2</sup>

#### UNDERGRADUATES

62% Biology  
17% Mathematics & Statistics  
11% Chemistry  
5% Physics & Astronomy  
2% Environmental Science & Geography  
2% Undeclared  
1% Science & Technology Studies

#### MASTER'S

35% Biology  
31% Mathematics & Statistics,  
17% Chemistry  
11% Physics & Astronomy  
6% Science & Technology Studies

#### PHD

34% Mathematics & Statistics  
29% Biology  
14% Science & Technology Studies  
12% Physics & Astronomy  
11% Chemistry

## Notable grad: Governor General's Silver Medallist leaves behind legacy of kindness at York

As recent York University graduate Yaakov Green embarked on his journey to Yale School of Medicine in fall 2017, his parting words for his fellow students were about lifelong learning and growing: "Keep an open mind to advice and to new opportunities; you never know where they will take you."

Green, who majored in biology, graduated at spring convocation with a Governor General's Silver Medal for having one of the three highest averages among graduating undergraduate students at York. He was also awarded the Faculty of Science Gold Medal.

"I had the pleasure to witness Yaakov's exceptional academic performance and research aptitude and compassionate engagement with the York community," said Robert Tsushima (Biology), who supervised Green as a research student over two summers.

During his studies, Green developed a passion for learning about genetics, evolution and statistics. Some of his favorite science courses included Processes of Evolution with Jan Sapp (Biology), Cellular and Molecular Basis of Muscle Physiology with Tsushima (Biology), and Population Genetics with Amro Zayed (Biology).

But for Green, York University was always more than just academics and preparing for medical school. He also fell in love with the diversity, community and culture of the University.

"I can't imagine a more diverse place, and I have learned so much by interacting with the different people here," said Green, who commenced his studies at York with a prestigious Schulich Leader Scholarship. "The opportunities are endless at York; if you want to make a difference, you have the ability to do so."

As a testament to those sentiments, he co-founded the Random Acts of Kindness (RAK) Project with his peer Ben Shachar in his second year. The basis of RAK was to surprise people at York with random acts of kindness. For instance, the club would hand out hot chocolate at bus stops on cold winter days, surprise lecture halls with candy on Halloween or give out roses on Valentine's Day.

"Our goal was to create an overall positive university experience for York students and to generate an atmosphere of happiness and wellness on campus," said Green.



The club's work has also included community outreach and digital campaigns. RAK at York University has now grown to more than 1,000 members, and new chapters have also popped up at other universities.

<sup>1</sup> Data reflects statistics for the 2017 calendar year

<sup>2</sup> Data reflects statistics as of November 1, 2017



# Community Outreach and Science Engagement

## Expanding science engagement opportunities for high schoolers

Do you know any high school students who want to escape the traditional classroom and learn science by doing science?

In 2017, the Faculty expanded its high school science camps with Spark Lab, a new open enrolment program offering week-long sessions designed for students who want more hands-on science. Using experiment-based learning, students explore physics, biology and chemistry through lab work. In summer 2017, the program offered courses in Animal Anatomy, Forensic Science, Astronomical Society, Catalytic Chemistry, and Animal Anatomy and Physiology.

Spark Lab runs in addition to the Helix Summer Science Institute, an application-only summer enrichment program for high-performing high school students.



The Faculty of Science also offers the following science camps for kids in grades three to eight:

- Science Explorations Summer Camps
- March Break Camps
- York Science Saturdays

For more details about these programs, visit [science-explorations.info.yorku.ca](http://science-explorations.info.yorku.ca)



## Science Rendezvous

In May 2017, the Faculty of Science took science out of the lab and onto the streets of Markham for Science Rendezvous, Canada's largest annual science festival. In partnership with Main Street Markham, York Science put on a terrific show of more than 30 creative and engaging science activities, including discovering the jenga food web, getting a constellation tattoo, and navigating a maze through your mind. Attendees of all ages also marveled at science demonstrations, with themes like Fantastic Flames and Crazy Chemistry, conducted on the main stage by York researchers.



## Science outreach for refugee families

A few years ago, Sapna Sharma (Biology) founded SEEDs at YorkU, a program to engage Syrian and other refugee children new to Canada with additional educational opportunities in science and math. Since then, Sharma and her colleagues have provided science outreach activities for more than 350 refugees from Asia and Africa.

Sharma and her team have partnered with students in the Faculty of Science and others across the University to organize engaging and fun science outreach activities. For instance, refugee families have fed giraffes and petted camels while learning about conservation at the Toronto Zoo; encountered sharks, rays, and turtles and learned about marine biology at Ripley's Aquarium; learned about evolution at the Royal Ontario Museum; and participated in science experiments at Science Rendezvous.

## Solar Fair brings thousands to campus

On August 21, 2017, the world was treated to a solar eclipse. While a total eclipse could not be seen from Canada, the view from Toronto was still predicted to be stellar, with about 70 percent of the Sun's surface covered by the Moon. So, the Faculty of Science hosted Solar Fair – a public event to view the solar eclipse – and more than 2,000 people attended.



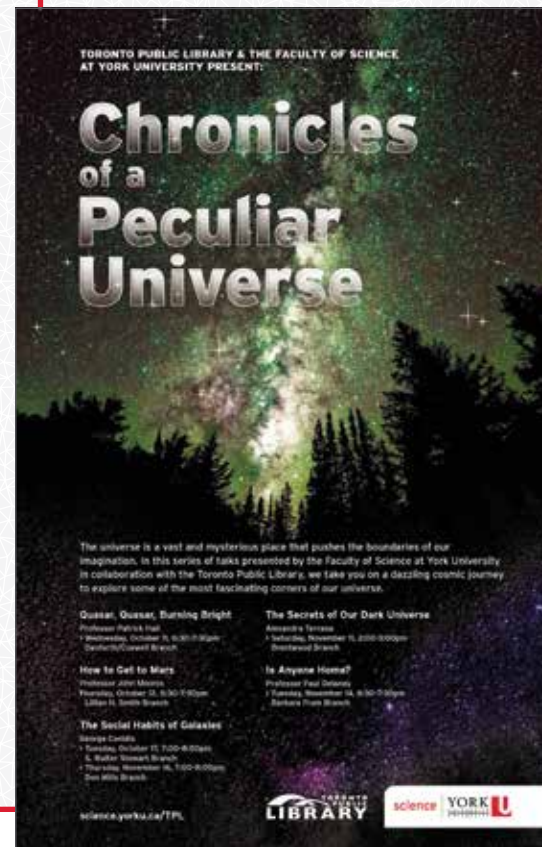
At the event, the York University Observatory Team distributed solar glasses and set up several solar telescopes to make the viewing experience safe for enthusiasts. Let's Talk Science at York University organized interactive science stations, including a booth where guests could build their own pinhole camera to watch the eclipse. Students in the York Science Explorations Summer Camps also attended the event and received special training on viewing the eclipse.



## Speaker series unravels the mysteries of the universe

The Faculty of Science hosted its fifth public lecture series in partnership with the Toronto Public Library in fall 2017. The new series, Chronicles of a Peculiar Universe, took nearly 200 people on a dazzling cosmic journey to explore some of the most fascinating corners of our universe. The talks were free and presented by our researchers over five weeks at library branches across the city.

Our scientists spoke about supermassive black holes, galaxies, dark matter and energy, planetary exploration missions and the search for life. The speakers included Patrick Hall, Paul Delaney and PhD students George Conidis and Alexandra Terrana from the Department of Physics & Astronomy, and John Moores from the Lassonde School of Engineering.





## Carol Weldon: recipient of the Ronald Kent Medal



Every year, York University honours and celebrates the achievements of its dedicated employees with the President's Staff Recognition Awards. The Faculty of Science is proud that staff member Carol Weldon received the 2016 Ronald Kent Medal (awarded in 2017).

Weldon was an administrative assistant for the Centre for Atmospheric Chemistry (CAC) in the Department of Chemistry. She worked at York University for 35 years and retired at the end of 2017. She received the Ronald Kent Medal for her contributions in promoting and strengthening collegiality and the values and goals of York University.

"To Carol this would be a lifetime achievement award," said Rob McLaren (Chemistry), who nominated her for the medal. "She has done a lot of service for us at the CAC and Department of Chemistry over the years. Quite frankly, she has been the face of the CAC for

all these years, and we wouldn't have been able to do things we have done and have all the success we have had without Carol."

Weldon was also recognized for her dedication to students and making them feel part of a community.

"She's such a caring, warm person," said PhD student Zoe Davis, who conducts research in the CAC. "She's so organized and she brings this level of rare personality to that whole combination that has enabled us, as grad students in the Centre, to not just get a good educational experience, but also feel like we belong to a community."

## Nina Bui: making history

In November, Nina Bui headed to Australia to do what had never been done before: play for the first-ever Canadian women's Rugby League team at the World Cup. She was among a group of two dozen talented, strong women from across the country who were excited to make history.

Bui is a marketing and communications officer for the Science Academic Services team. She has played rugby since high school, when she fell into the sport, and in love with it, by chance.

"Softball was actually my sport, but when our team didn't have a coach one year, my gym teacher encouraged me to try out for the rugby team" said Bui. "And I never looked back."

She continued to play throughout university and then joined the Ontario Rugby League, which she still plays in. But becoming one of Canada's first women to join the national team was not exactly in her plans.

"To my surprise I was approached in the summer by the recruiter for the team, and I thought there was nothing to lose, it was such a great opportunity," said Bui.

Bui trained with the new team throughout the fall and put a pause on her life in Toronto for a month to compete at the World Cup. And it all paid off. The team put on a stellar performance against some of the world's top rugby powerhouses and



Images by NRL Imagery (nrlphotos.com.au)

made it to the semifinals. Bui was also named "Player of the Match" in the team's first game at the tournament.

"We are so proud of Nina's accomplishments," said Bui's manager, Almira Mun, assistant dean of strategic enrolment management and science engagement programs. "She approached earning her spot on the national team with the same determination and positive spirit that she approaches everything."





## Alumni spotlights: Pamela Ohashi

Pamela Ohashi (York BSc Hons 1982) was inspired early in her academic career to pursue research in the fight against cancer after witnessing her grandmother's difficult battle with the disease. Now, she is developing new therapies against cancer at the Princess Margaret Cancer Centre as a senior scientist, co-director of the Campbell Family Institute for Breast Cancer Research and director of the Tumor Immunotherapy Program. She is also a Canada Research Chair in Tumor Immunity and Immunotherapy (Tier 1) at the University of Toronto.

Her rewarding career in biomedical research was launched from the platform of a BSc from York University. At York, Ohashi had the opportunity to work in several biology labs as a summer research student. She then pursued research in immunology, which at that time was undergoing rapid transformation due to the recent

discovery of the T cell antigen receptor. Working in this new area, she received her PhD from the University of Toronto and completed post-doctoral training with Nobel Laureate Rolf Zinkernagel at the University of Zurich.

Her current work is focused on understanding how to manipulate and improve the function of cytotoxic T cells of the immune system, with the

goal to design new treatments that enhance immune responses against cancer. T cells are a population of white blood cells that protect our bodies against infection, but they also have the potential to protect us against tumour cell growth. Ohashi's research team was among the first to deliver T cell immunotherapy to cancer patients in Canada.

York University is proud to count Pamela Ohashi among its Science graduates. She is pursuing a lifelong dream and making outstanding contributions to science and medicine, with the potential to impact millions of cancer patients in the years to come.



## Paul Sanberg

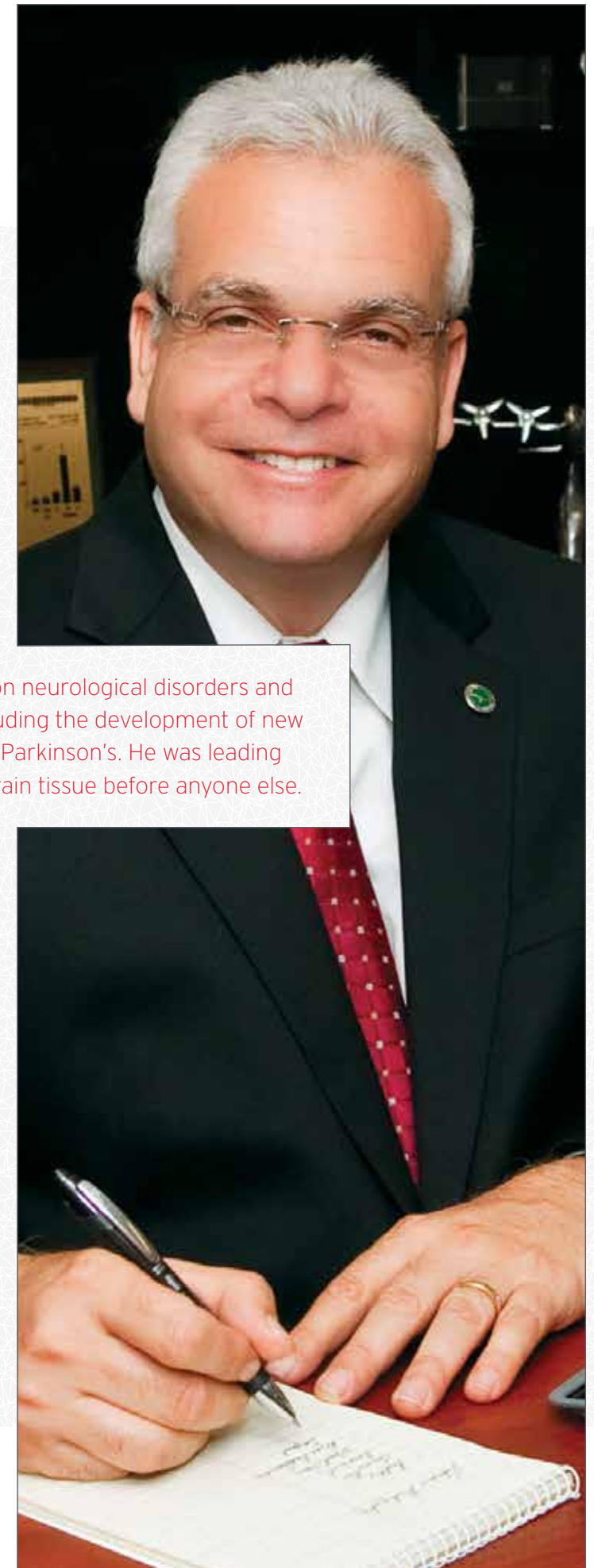
Paul Sanberg (York BSc Hons 1976) is a distinguished neuroscientist and entrepreneur whose success goes all the way back to the 1970s at York University, when he was the first member of his family to obtain a bachelor's degree.

After completing a BSc Hons in psychology and biology at York, he pursued further training in neuroscience by receiving an MSc from the University of British Columbia and a PhD and DSc from the Australian National University. He is now based at the University of South Florida in Tampa, where he is a Distinguished University Professor and serves as Senior Vice-President for Research, Innovation & Knowledge Enterprise, President of the Research Foundation and Executive Director of the Center of Excellence for Aging and Brain Repair.

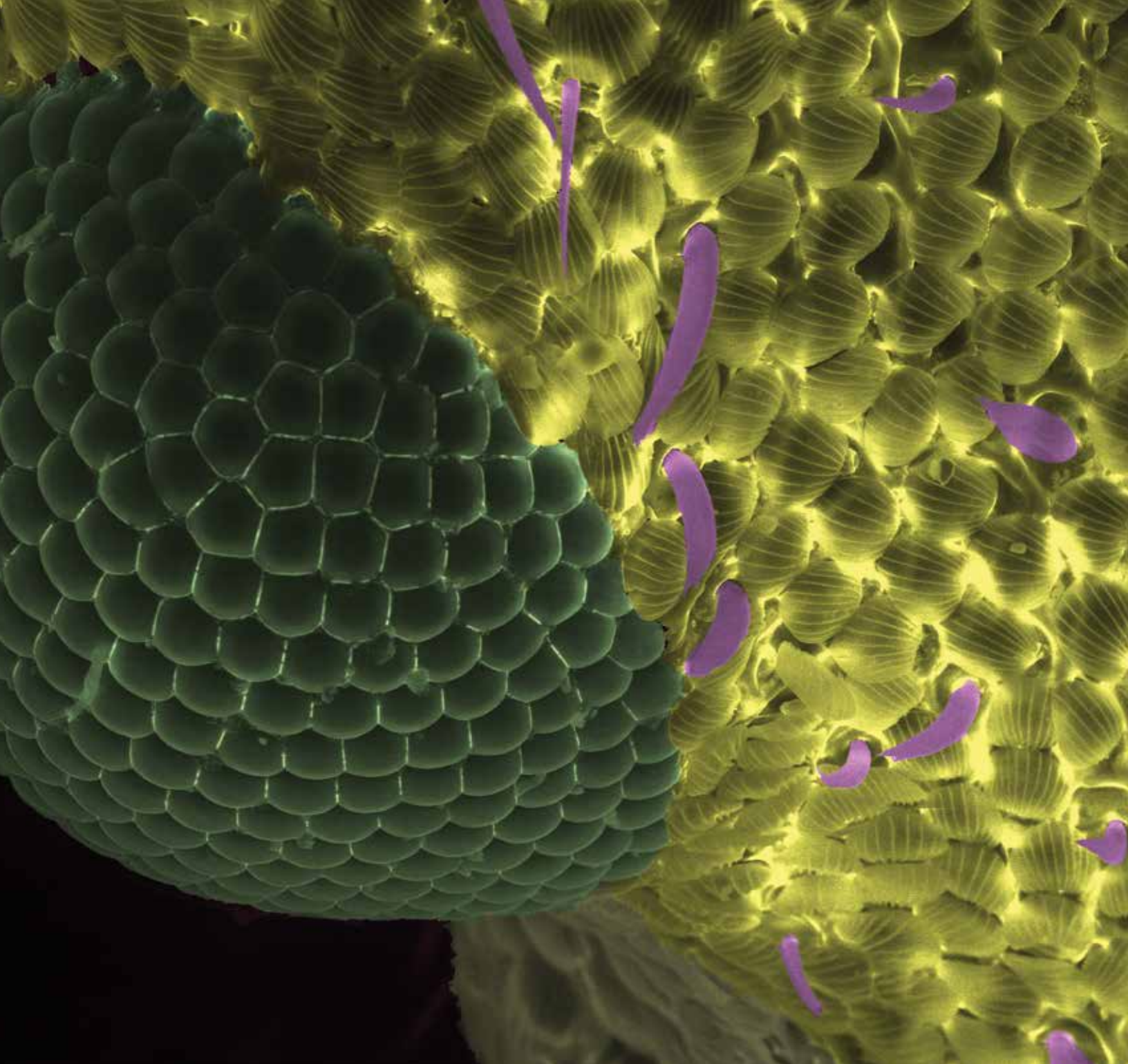
Sanberg has become a pioneer in research on neurological disorders and innovative ways to repair brain damage, including the development of new pharmaceuticals for diseases like stroke and Parkinson's. He was leading research on the use of stem cells to repair brain tissue before anyone else.

He is the author of more than 650 articles and 14 books that have been cited 30,000 times - an astronomical citation number that demonstrates his enormous contribution to neuroscience.

Sanberg is not only an exceptional scientist who carved out a new field of research in brain tissue repair, but also led the way in establishing an entrepreneurial culture in academia across the US. He is a highly acclaimed inventor with more than 150 patents, and his passion for creating a stronger culture of academic entrepreneurship led to his founding the National Academy of Inventors in 2010. The Academy supports and honours academic inventors around the world and has grown to over 4,000 members and Fellows. He was inducted into the Florida Inventors Hall of Fame in 2015.







Images on cover were taken at the Imaging Facility at York University by Microscopy Specialist Magdalena Jaklewicz. Both images were taken with a Thermofisher Quanta 3D scanning electron microscope, and colours were added with Digital Surf Mountains 7 software. Front cover displays Malvaceae pollen grain adorned with *Taraxicum Officinale*, *Rosa* and *Lilium* grains; back cover displays the eye of a *Polydrusus* weevil.

Photos (pages 18-27) by Paola Scattolon

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