Excellence, Innovation, Leadership

RESEARCH AT THE UNIVERSITY OF TORONTO

IN PROFILE

The discovery of insulin

Frederick Banting and J.J.R. MacLeod, Nobel Prize, 1923

The molecular basis for chemical reaction

John Polanyi, Nobel Prize, 1986

"The medium is the message."

Marshall McLuhan, 1964

Pablum

Frederick Tisdall, Theodore Drake, Alan Brown, 1930

Anatomy of Criticism

Northrop Frye, 1957

These monumental works and discoveries – and many others – have helped make the University of Toronto one of North America's research powerhouses.

Today, U of T continues to define research innovation. This publication showcases some of our current innovators and presents a statistical portrait of our research enterprise.

The information in this package tells our story: the University of Toronto has a robust research agenda carried out by thousands of brilliant scholars and students.

This remarkable community contributes significantly to providing Canada's answers to the world's big questions. We are committed to continuing this pursuit of excellence, as new challenges face society.

Let me extend a sincere thanks to our partners in the Government of Canada and Province of Ontario, the private sector, the Toronto hospital community and throughout U of T for their investment, innovation and support. We look forward to further collaboration.

PROFESSOR R. PAUL YOUNG, PhD, FRSC
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Can we beat AIDS? How do we define ourselves? What do cancer cells say to each other? Is our health care system fair? How did our universe begin? Why can't I stick to my diet? How far can we go with solar power? Can all kids play the piano? Who are tomorrow's research leaders? What's with this crazy weather? How can we share the land? Is our soil dirty? What's life like for new Canadians? Can computer graphics improve the bottom line? Can we make auto parts out of vegetables? Does aging have to be so hard? What's behind the beat?

KELLY S. MacDONALD

With research based in her lab in Toronto and in Nairobi, Kenya, Kelly MacDonald races to develop an HIV vaccine based on information in part gleaned from her work with Kenyan sex workers and HIV-exposed uninfected children who show an unusual immune resistance to HIV infection. The holder of the Ontario HIV Treatment Network Chair in HIV/AIDS Research, she is also Director of the HIV Research Program in U of T's Department of Medicine. She has held posts such as chair of the Canadian HIV Vaccine Network, member of the Federal Ministerial Council on HIV/AIDS and she is on the Scientific Advisory Board of the International AIDS Vaccine Initiative. She is testing two HIV vaccine prototypes.

CAN WE BEAT AIDS?

GEORGE ELLIOTT CLARKE

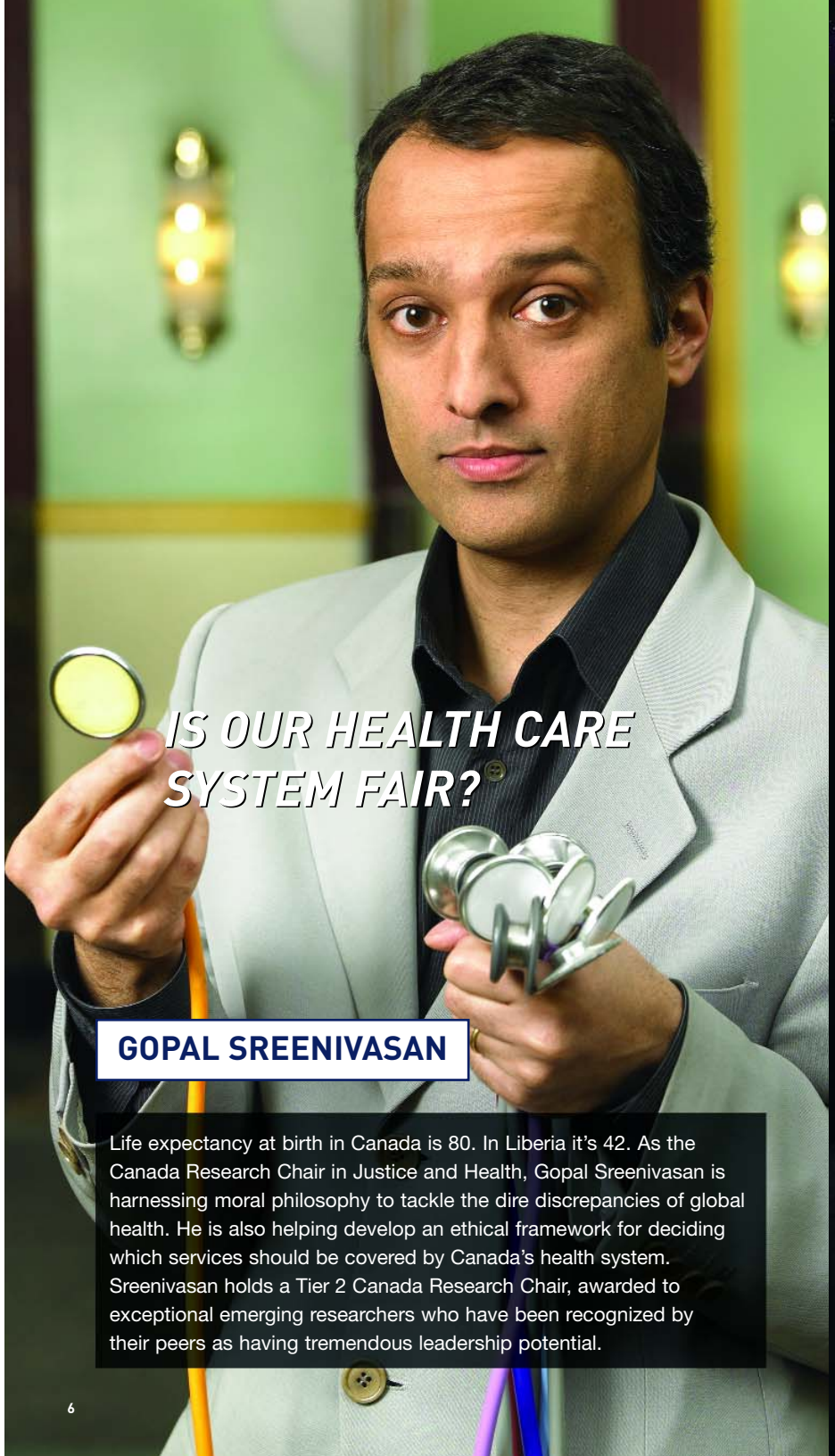
HOW DO WE DEFINE OURSELVES?

George Elliott Clarke has been writing about his home community in Nova Scotia for 25 years. The poet, playwright and literary critic is U of T's E.J. Pratt Professor of Canadian Literature. A seventh-generation Canadian of African-American and Mi'kmaq heritage, Clarke, who is helping redefine Canadian literature, has won numerous awards, including a Trudeau Foundation Fellowship and a Governor General's Literary Award.

TONY PAWSON

WHAT DO CANCER CELLS SAY TO EACH OTHER?

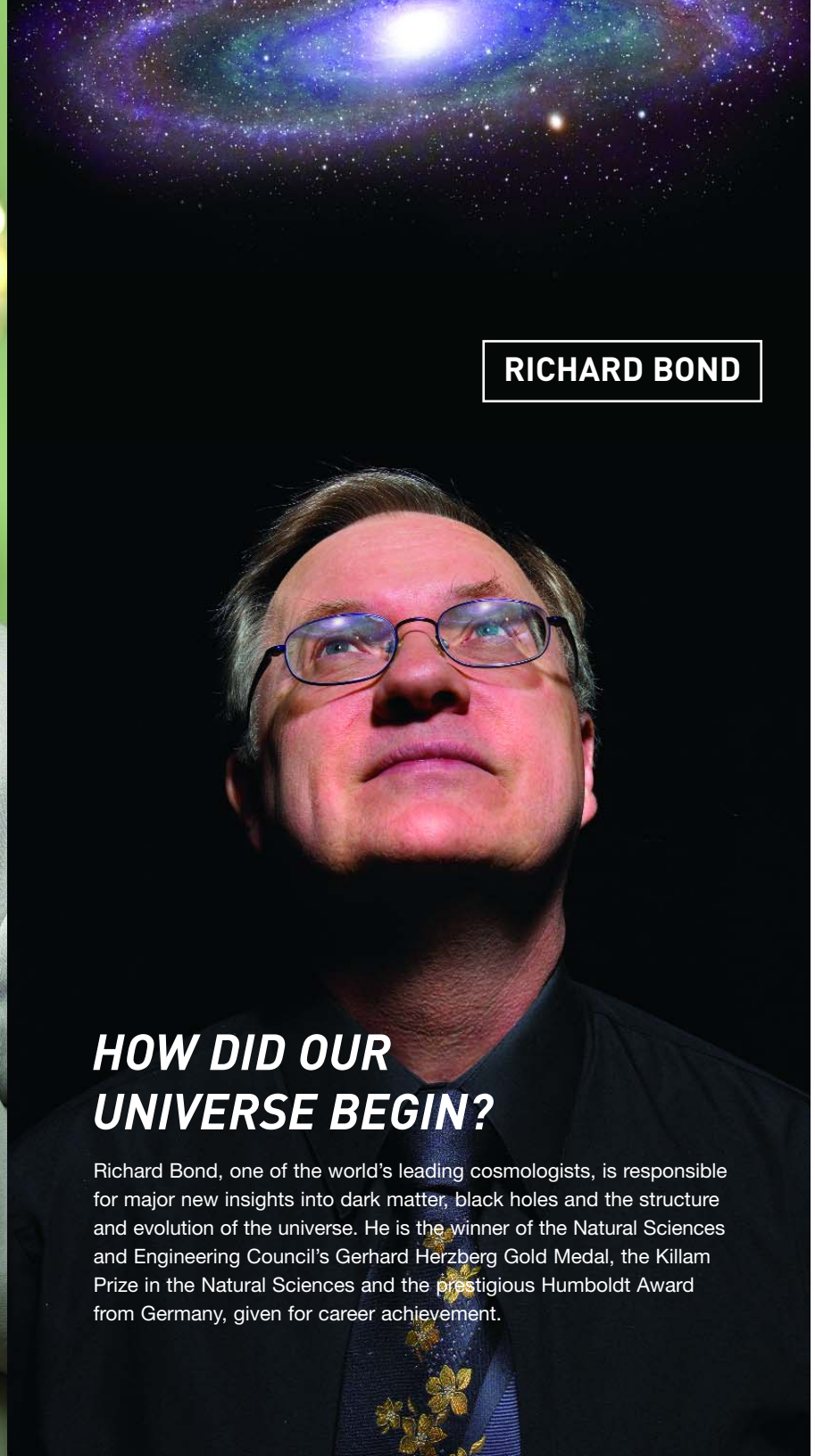
Tony Pawson is world-renowned for his research into how cells grow and communicate. His discoveries have stimulated the development of new drugs that block the proliferation of some types of cancer cells. For a decade, he has been deemed one of the most highly-cited researchers by the Institute for Scientific Information and he has been honoured with a host of awards, including the Gairdner Award, the Order of Canada and Britain's Order of the Companions of Honour.



IS OUR HEALTH CARE SYSTEM FAIR?

GOPAL SREENIVASAN

Life expectancy at birth in Canada is 80. In Liberia it's 42. As the Canada Research Chair in Justice and Health, Gopal Sreenivasan is harnessing moral philosophy to tackle the dire discrepancies of global health. He is also helping develop an ethical framework for deciding which services should be covered by Canada's health system. Sreenivasan holds a Tier 2 Canada Research Chair, awarded to exceptional emerging researchers who have been recognized by their peers as having tremendous leadership potential.



RICHARD BOND

HOW DID OUR UNIVERSE BEGIN?

Richard Bond, one of the world's leading cosmologists, is responsible for major new insights into dark matter, black holes and the structure and evolution of the universe. He is the winner of the Natural Sciences and Engineering Council's Gerhard Herzberg Gold Medal, the Killam Prize in the Natural Sciences and the prestigious Humboldt Award from Germany, given for career achievement.

JANET POLIVY

WHY CAN'T I STICK TO MY DIET?

Janet Polivy's work on eating behaviour, the role personality plays in dieting and the cognitive and emotional reactions that surround eating have earned her inclusion on the Institute for Scientific Information's list of most highly-cited researchers and fellowship in the Royal Society of Canada. The U of T Mississauga psychologist is also a frequent media commentator.

HOW FAR CAN WE GO WITH SOLAR POWER?

TED SARGENT

Ted Sargent's giant imagination meets the tiny frontier of nanotechnology, where he envisions connecting to the Internet through contact lenses and recharging cell phones with solar power from clothes. The Canada Research Chair in Nanotechnology, Sargent works with research subjects that are a billionth of a metre in size – that's 1/80,000 the width of a human hair. In 2003 Sargent was named one of the world's top young innovators by MIT's *Technology Review* and in 2005 was named a research leader in the *Scientific American* 50.

CAN ALL KIDS PLAY THE PIANO?

TOM CHAU

As the Canada Research Chair in Pediatric Rehabilitation Engineering, Tom Chau creates innovative devices for children with special needs. One of them is a virtual musical instrument (pictured at left) that gives children with physical challenges the opportunity to play and learn music. Chau, named to the 2007 *Globe and Mail* Top 40 Under 40 list, is also Scientist and Innovation Theme Leader at Bloorview Kids Rehab.

WHO ARE TOM

WOJCIECH GRYC

Wojciech Gryc exemplifies U of T's tradition of student excellence. An international development studies and mathematics graduate, he received a 2008 Rhodes Scholarship – one of the world's most prestigious prizes for undergraduates – from the University of Oxford. Gryc will pursue a master's degree in mathematical modelling and scientific computing. While at U of T Scarborough, Gryc travelled to Kibera, Kenya, one of Africa's poorest areas, where he trained young adults to use computer software and produce a newspaper. He also founded Five Minutes to Midnight, which promotes human rights and international issues among the world's youth.

ORROW'S RESEARCH LEADERS?

Working with scholars who are at the forefront of their fields, U of T students are intensely involved in research, from first-year undergraduate seminars to advanced doctoral research. Every year, more than 1,800 graduate students earn research-intensive masters or doctoral degrees and 2,000 undergraduate students are employed in projects on our campuses or at partner hospitals. In addition, 3,500 undergraduates enrol in seminar or research courses each year.

Undergraduate student Joe Leung conducted surface chemistry research with Professor Cynthia Goh through the Faculty of Arts and Science's Research Opportunity Program.

DICK PELTIER

WHAT'S WITH THIS CRAZY WEATHER?

Dick Peltier studies the whole world – literally. The award-winning climate modeler is interested in interactions among ice sheets, oceans, clouds, the atmosphere and land surfaces. He is the winner of the Vetlesen Prize (often called the Nobel Prize of earth sciences) and was a lead author of the influential fourth report of the United Nations International Panel on Climate Change. His leadership in securing major funding from the Canada Foundation for Innovation and the Province of Ontario for high performance computing will bring powerful tools to U of T and its partner hospitals.

DARLENE JOHNSTON

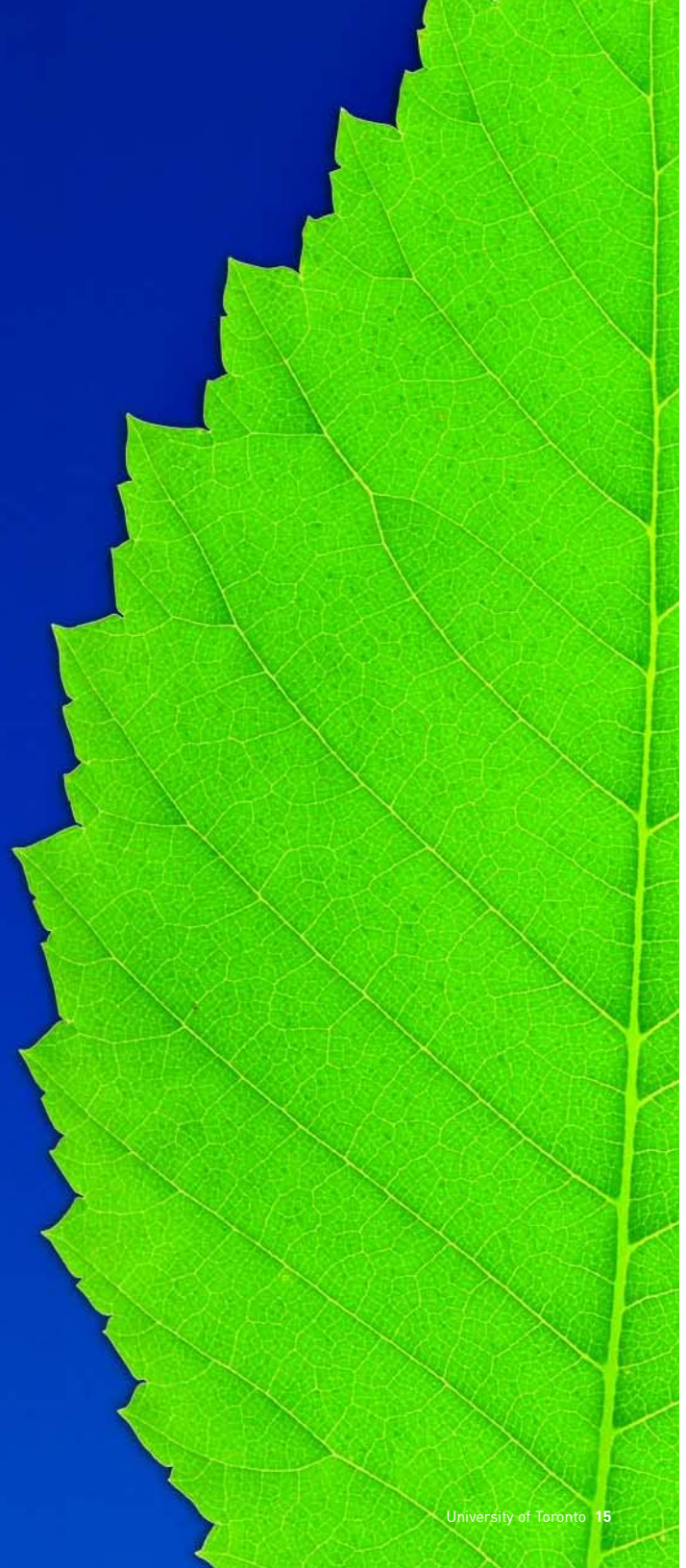
HOW CAN WE SHARE THE LAND?

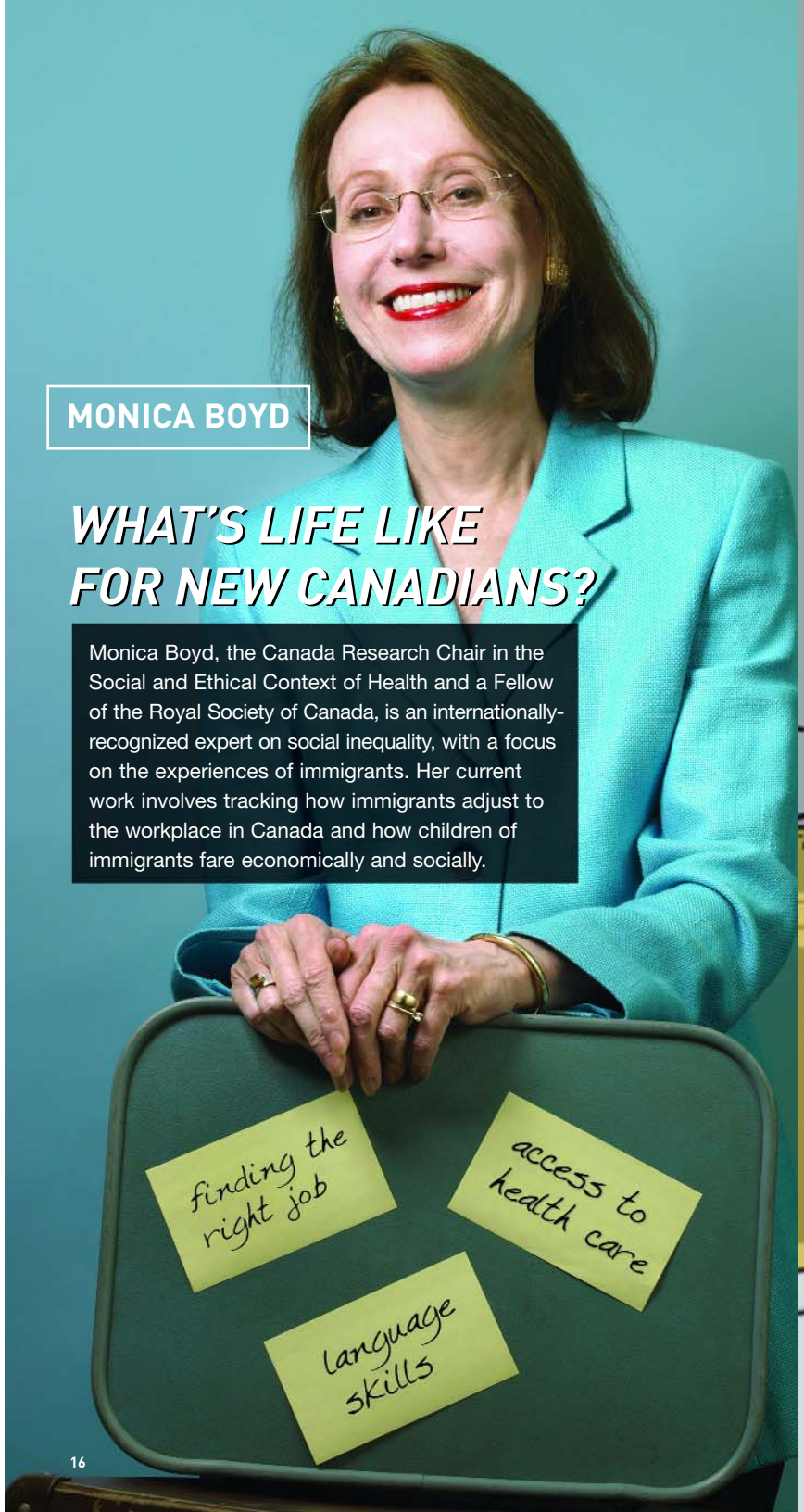
A member of the Chippewas of Nawash First Nation, Darlene Johnston became a lawyer to amend an injustice regarding her people's ancestral land on the Bruce Peninsula in Ontario. Today, at U of T's Faculty of Law, she is applying her expertise to land claims for aboriginal groups across North America and for the Mayan people of Belize.


MYRNA SIMPSON
ANDRÉ SIMPSON

IS OUR SOIL DIRTY?

Myrna and André Simpson are a dynamic team (and, yes, they're married), revolutionizing the way we study the role of soil in environmental processes. Their Environmental Nuclear Magnetic Resonance (NMR) Centre at the University of Toronto Scarborough was the first of its kind in the world dedicated to research in environmental chemistry when it was launched in 2004. With NMR technology, the Simpsons are analyzing how organic matter interacts with environmental pollutants in soil. "Soil is the world's garbage can," says Myrna. "This technology will allow us to answer fundamental environmental problems."





MONICA BOYD

WHAT'S LIFE LIKE FOR NEW CANADIANS?

Monica Boyd, the Canada Research Chair in the Social and Ethical Context of Health and a Fellow of the Royal Society of Canada, is an internationally-recognized expert on social inequality, with a focus on the experiences of immigrants. Her current work involves tracking how immigrants adjust to the workplace in Canada and how children of immigrants fare economically and socially.

KARAN SINGH

CAN COMPUTER GRAPHICS IMPROVE THE BOTTOM LINE?

Computer scientist Karan Singh, who was technical director for the Academy Award-winning short film *Ryan* and designer of software used by Steven Spielberg and George Lucas, is commercializing technology with the help of The Innovations Group at U of T. "Sketch-mapping" will change the way industrial designers work. Companion software called SketchConnect links designers to vendors.

MOHINI SAIN

CAN WE MAKE AUTO PARTS OUT OF VEGETABLES?

Mohini Sain sees the car of the future made up of durable bumpers from renewable resources. The forestry and chemical engineering professor has pioneered the use of renewable raw materials, such as soybean oils, potato starch, wood and agro-fibre, instead of plastic in automobile parts, office furniture, sports equipment and ultimately medical devices. His spin-off company Greencore is working with a manufacturing company to further research manufacturing plant trials. Sain says that these green materials represent an important step towards reducing petrochemical-based material consumption and living in a bio-based economy.

LYNN McDONALD

DOES AGING HAVE TO BE SO HARD?

Lynn McDonald, social work professor and director of U of T's Institute for Life Course and Aging, wants to know how we'll care for the 9.2 million Canadians who will be 65 or older by 2041. With colleagues at universities, governments and businesses across Canada, she has formed the National Initiative for the Care of the Elderly (NICE). "The system we have now for caring for older adults is inadequate," says McDonald. Headquartered at U of T, NICE was launched in 2006 by the Government of Canada as part of the Networks of Centres of Excellence program.

JAMES KIPPEN

WHAT'S BEHIND THE BEAT?

To James Kippen, the tabla is more than a drum – it is a research tool and a window onto the past. The ethnomusicologist, widely regarded as one of the world's leading Hindustani music scholars, uses the tabla to investigate the roots of today's classical music culture in north India. He recently published a book that helps rewrite the history of Indian rhythm, metre and drumming. "The history of the tabla opens onto a fascinating world of musical change at a time of great social upheaval in India," says Kippen, who continues to practice and perform tabla for the academic insights it brings.

Research resources

EDGE MAGAZINE

What are the causes and consequences of stress? What does film teach us? Is the car a friend or foe? What can be done about climate change? Award-winning *Edge* Magazine profiles University of Toronto researchers who are asking and answering important questions that have an effect on our everyday lives. Published three times annually, *Edge* covers research and scholarship across all campuses and disciplines.

For a free subscription to *Edge* send your name and mailing address to: **research.publications@utoronto.ca** or visit us online at: **www.research.utoronto.ca/edge**

GET CONNECTED

The Innovations Group at U of T (TIG) connects researchers, patent agents, lawyers, investors, businesses and governments to bring innovations to society.

TIG's team of professionals is made up of people who have come from (and are still active in) a variety of sectors, offering a mix of services and benefits focused on getting U of T researchers and businesses results. Our reach is far and powerful, so when you work with The Innovations Group at U of T, you can't help but get connected. Contact us and find out how it works. **www.innovations.utoronto.ca**

Produced by Research Communications, Office of the Vice-President, Research, University of Toronto

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Photo of Wojciech Gryc on page 10 by **Ken Jones**

Photo of Darlene Johnston on page 13 by **Taffi Rosen** as part of the “Women Trailblazers” Photo Exhibit displayed at U of T’s Faculty of Law, Flavelle House, 78 Queen’s Park.

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