

# Message

## FROM THE VICE-PRESIDENT (RESEARCH)

Research—and its impacts—are woven seamlessly into our daily lives. Within the pages of this issue you will learn about developments that have enabled everyday things like cell phone and satellite communications. You will also learn how researchers are working to record the history of Aboriginal elders and their traditions, how studying sustainable agricultural practices is going to improve our environment, and how the creative process is being recreated with mathematical and computational analysis.

This issue also has a common thread among many of the research projects featured: they were supported with funding from the Canada Foundation for Innovation (CFI) and the Manitoba Research and Innovation Fund (MRIF). The support provides the ‘nuts and bolts’ required to do research—equipment, facilities, furnishings—all very important things that allow the world class research machinery at the University of Manitoba to be at the cusp of discovery.

CFI and MRIF are two strong and equal partners in funding research infrastructure at the University of Manitoba. There are many partners who help us reach the full support needed for the research projects funded by CFI and MRIF. You will read about some of these partners within the stories themselves and more specifically, about one partner, Western Economic Diversification Canada, in our Ideas to Innovation section on page 17.

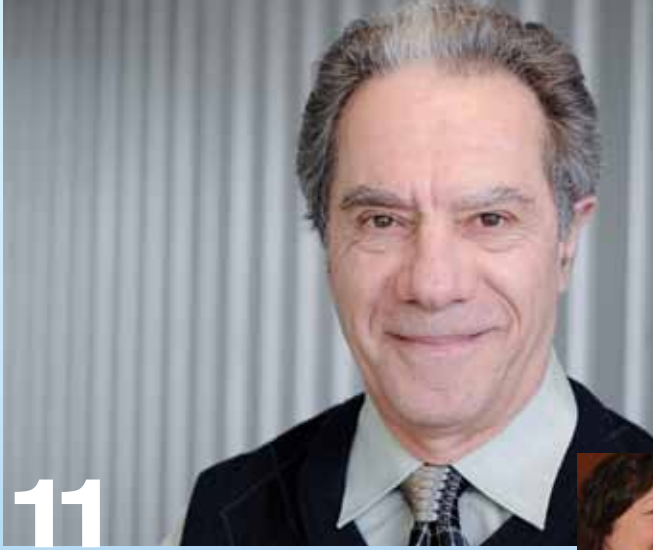
Research is a collaborative process in and of itself that goes beyond the one idea or individual to come to fruition. Support for this research requires many partners. We are grateful for their support and look forward to a future of reaping the many rewards of research at the University of Manitoba.

—Digvir S. Jayas, PhD, PEng, PAg





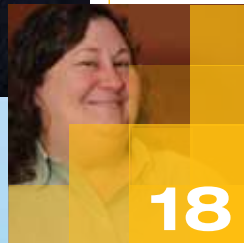
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# HAPPENINGS

## HARMONIOUS EXCHANGE

THE CREATIVE PARTNERSHIP BETWEEN THE UNIVERSITY OF MANITOBA and the Winnipeg Symphony Orchestra's (WSO) New Music Festival moved into the realm of medicine in February, with the debut performance of distinguished visiting composer John Corigliano's *Symphony No. 1*. The symphony is the composer's personal response to the HIV/AIDS epidemic of the 1990s.

WSO composer-in-residence Vincent Ho brought Corigliano to Winnipeg for the performance, which coincided with the University of Manitoba's International HIV Prevention Exchange symposium.

"Although HIV infects 30 million people globally, the impact often seems very distant," says Keith Fowke, professor of medical microbiology and co-chair, (with Marissa Becker and James Blanchard), of the exchange.

The exchange brought together more than 120 local and international experts for a two-day scientific symposium to discuss HIV prevention and care, with the goal to exchange best practices and establish new collaborations.

Ho has previously collaborated with the university aboard the CCGS Amundsen during International Polar Year, and debuted his resulting composition *Arctic Symphony* at the 2010 New Music Festival.

The University of Manitoba is a recognized leader in international HIV research and prevention, with collaborations and partnership programs in Kenya, India, Colombia, Pakistan, China and Nigeria. The exchange also had a number of round table discussions with a theme of community engagement through arts and using art as a means of communicating HIV prevention messages.



Chris Reid

The inner workings of GREX (above).

## NEW GREX ON CAMPUS

**THERE'S A NEW HERD MAKING WAVES** on the University of Manitoba campus. The Latin word for herd, GREX, is a new supercomputer capable of performing over 40 trillion calculations per second. It will be put to use by researchers to solve problems in physics, chemistry, biology, medicine, engineering, economics and environmental modelling.

The new building where GREX is housed is also Manitoba's first energy-efficient High Performance Computer Centre (HPCC) and along with GREX, was unveiled in December 2010. The building has an innovative heating and cooling system. The computer equipment is water cooled and the heat produced is recycled during the winter months to provide heat to adjacent buildings.

This system is made possible by a collaborative \$8 million investment from the Canada Foundation for Innovation, Western Economic Diversification Canada, the Manitoba Research and Innovation Fund, the University of Manitoba and Silicon Graphics International. (See a related story on this in the Ideas to Innovation section on page 17.)



## PARTNERS IN TIME

**FOSSIL LOVERS EVERYWHERE WILL BE EXCITED** to learn that the University of Manitoba is joining forces with the Canadian Fossil Discovery Centre (CFDC) in Morden, Man. The two organizations recently inked a Memorandum of Understanding (MOU) that lays the groundwork for collaborations that will expand their capabilities for fossil discovery, research, training and education.

"CFDC's decades of hard work and dedication toward fossil discovery, research, and educational programming are starting to pay huge rewards. Our organization has been developing this resource for the last 40 years," said CFDC board president Henry Penner. "We are so pleased to now be working in cooperation with the University of Manitoba to advance our joint interest in higher education and quality academic research."

The MOU will allow for such things as joint academic programs and courses, coordinating

staff and students for lab and field oriented teaching, research and training projects, publications, academic events and expanding the already significant research expertise that both institutions currently house.

CFDC headquarters are located in Morden, at the Morden Access Event Centre. The centre houses Canada's largest collection of marine fossils including "Bruce", a 43-foot long mosasaur and the largest in the country. CFDC is working towards building a new state-of-the-art facility in the Manitoba escarpment.



## THE STRATEGIC APPROACH

**BREAST CANCER, PEAS, ASIAN NOODLES.** Together, they are an odd combination. Separately, they are what three University of Manitoba researchers—Joe LoVetri, Martin Scanlon, Peter Zahradka—will be researching with more than \$1 million in funding from the Natural Sciences and Engineering Research Council of Canada (NSERC) Strategic Project Grants. The three projects allow these scientists to join forces with industry on promising new projects that will add to and expand existing knowledge in areas that have direct impact on local and national economies.

LoVetri, an electrical and computer engineering professor, will team up with fellow engineer Lotfollah Shafai to collaborate with IMRIS, a global leader in image guided therapy solutions, and colleagues at CancerCare Manitoba. They will use of state-of-the-art Microwave Tomography (MWT) systems for breast cancer and bone imaging, and the detection of ischemic tissue.

Scanlon, a food science professor, and physics professor John Page, will be working with Dave Hatcher from the Grain Research Laboratory at the Canadian Grain Commission to examine the properties that control texture in the commercial production of Asian noodles. They will use Canadian wheat to make the product fibre-enriched, moving Canadian wheat to the growing product sector in Asia.

Zahradka, a physiology professor and team leader at the Canadian Centre for Agri-food Research in Health and Medicine (a partnership between St. Boniface General Hospital, the University of Manitoba, and Agriculture and Agri-Food Canada) and his team which includes human nutritional sciences colleagues Carla Taylor and Michel Aliani, will be working to identify and characterize the molecule in pulse crops—peas, beans, lentils, chickpeas and faba beans—that have been shown to decrease arterial stiffness. This molecule will then be available for incorporation into novel enriched or fortified functional food products, or utilized in its purified form as a nutraceutical.

## FASD RESEARCH TO LEAP FORWARD

**A NEW CANADA-ISRAEL FETAL ALCOHOL SPECTRUM DISORDER (FASD)** research consortium is one step closer to reality. The Province of Manitoba will provide matching funds up to \$750,000 raised by the Canadian Friends of the Hebrew University toward this consortium over the next five years. The support comes from the Science and Technology International Collaboration component of the Manitoba Research and Innovation Fund.

FASD is a spectrum of disorders caused by prenatal exposure to alco-

hol. According to Health Canada, an estimated 9 in every 1,000 children born in Canada have FASD. The costs associated with one individual diagnosed with FASD, over their lifetime, are about \$1.5 million. The damage of alcohol consumption for pregnant women can occur as early as the third week of embryo development, and many cases of FASD can potentially result unwittingly.

“We are thrilled to see research, which began 12 years ago in Dr. Abraham Fainsod’s lab at Hebrew University, now be the

focus of this collaboration with University of Manitoba researchers,” said Faith Kaplan, Winnipeg chapter president, Canadian Friends of Hebrew University. “Fetal alcohol spectrum disorder is a serious concern in communities around the world and we are confident our research consortium will improve the understanding of what leads to children being born with FASD. Such collaboration is completely consistent with Hebrew University’s mission to improve the world.”

## SCIENCE CENTRAL

**THIS YEAR MARKS THE 40TH ANNIVERSARY** of the Manitoba Schools Science Symposium (MSSS) and its move to the University of Manitoba campus. It is only fitting that the provincial university is now host to the province’s largest annual student science symposium, open to all students from grades 4 to 12.

This year’s symposium saw some 550 young scientists present the results of their research in nine divisions and four age categories. Six of these students were recognized as the best and headed off to Toronto to compete in the Canada-Wide Science Fair.

The winners included: Siyuan Cheng, Abhishek Chakraborty, Daisy Liu, Ella Thomson, Amanda Wong and Cody Shaw. Complex and impressive experiments covered areas of research such as leukemic B-cells, snow fungus polysaccharides, DNA and genetic modification.

These future scientists, who each had various government and corporate sponsors supporting their experiments, won plaques, the expenses for the trip to Toronto, and shared about \$3,000 in cash prizes.

According to MSSS organizers, many of the students seek out their own mentors at the university and work tirelessly, beginning next year’s projects the day after this year’s symposium ends.



## GETTING A HEAD START

**FINDING NEW AND EXCITING WAYS** to engage readers of *ResearchLIFE* is something we always strive for. Recently, a young reader was brought to our attention. “My 2-year-old daughter was found this way (totally unstaged) on my last visit to the Office of Research Services (Bannatyne Campus),” says Sarah Khan of the University of Manitoba’s Stu Clark Centre for Entrepreneurship.



Sarah Khan

# HEALING HEARTS

**NARANJAN DHALLA** is many things to many people: a pioneering cardiovascular scientist who put Manitoba on the map internationally as a leader in cardiovascular research, a community leader, a humble and caring person.

He recently passed two new milestones in his 44-year career by publishing his 600<sup>th</sup> paper in a peer-reviewed publication (a number nearly double that of most other scientists) and being the inaugural inductee into the St. Boniface Research Hall of Fame. Peer-reviewed publishing is the gold standard measure of research conducted by scientists around the world, which critiques and validates their findings.

Affectionately referred to as 'Dr. D,' Dhalla is a Distinguished Professor of physiology in the Faculty of Medicine, he serves as director of Cardiovascular Developments at the Institute of Cardiovascular Sciences at St. Boniface Hospital Research centre, a joint institute of the University of Manitoba and St. Boniface Hospital. Dhalla was head of the Division of Cardiovascular Sciences for two decades preceding the formation of the institute in 1996. The institute is widely regarded as one of the preeminent basic cardiovascular research programs in the world.

Dhalla is executive director of the International Academy of Cardiovascular Sciences and editor-in-chief of the medical journal *Molecular and Cellular Biochemistry*. He has been engaged in promoting the scientific basis for the practice of cardiovascular medicine all over the world. He served as secretary general and then president of the International Society for Heart Research for more than 20 years.



Rob Blainch

He is the recipient of numerous honours including the Order of Canada, Order of the Buffalo Hunt and a special Canadian Medical Association (CMA) Medal of Honour awarded to him in recognition of his personal contributions in the advancement of medical research and education.

## ADVOCATE FOR CHANGE

**CHILDREN, MOST WOULD AGREE,** need to be protected, nurtured and treated with respect. Joan Durrant, an associate professor of family social sciences at the University of Manitoba would agree. She focusses significant attention on promotion of nonviolence in families by many means. People took notice and are listening around the world.



Lisa Waldner

She was recently recognized for her work by the Canadian Red Cross, Manitoba Chapter, with the awarding of this year's Humanitarian of the Year award. A few weeks later, she was again recognized with a YMCA-YWCA Women of Distinction Award in the Education, Training and Mentorship category. The Red Cross award recognizes inspiring achievements that have made a difference and, that demonstrate the spirit of humanity through hard work and dedication to humanitarian principles. The YM/YWCA award recognizes her contributions as a mentor and teacher to students and the benefits of her expertise and commitment to children around the world.

She is currently researching what leads some parents to strike their children as punishment. This research has taken her to Sweden, where she is studying the history and implementation of the world's first ban on physical punishment, as well as Swedish parents' approaches to child discipline.

Durrant, a child-clinical psychologist, was the principal researcher and co-author of the Canadian Joint Statement on *Physical Punishment of Children and Youth* and co-editor of *Eliminating Corporal Punishment: The Way Forward to Constructive Discipline (UNESCO)*. She is a member of the Research Advisory Group to the *United Nations Secretary-General's Study on Violence against Children*, the Research Advisory Group to the *Canadian Incidence Study of Reported Child Abuse and Neglect*, and the *Research Committee of the Centre of Excellence on Early Childhood Development*.

# EARLY ACHIEVERS



Seven emerging researchers at the University of Manitoba recently received the 2010 Rh Award. The awards were established in 1973 by the Winnipeg Rh Institute, now the Winnipeg Rh Institute Foundation, and each consists of a \$10,000 award to conduct further research. These honours are given to academic staff members who are in the early stages of their careers and who display exceptional innovation, leadership and promise in the fields of applied sciences, creative works, health sciences, humanities, interdisciplinary studies, natural sciences and the social sciences.

## APPLIED SCIENCES

**POURANG IRANI**, computer science, is director and founder of the internationally recognized Human-Computer Interaction laboratory at the University of Manitoba. His research has led to the development of novel navigation interfaces, particularly for mobile devices. He has developed new computer input devices, including the PressureMouse and LensMouse, patented technologies, which allow users to interact more efficiently with their computers.



Mike Latschslaw

## CREATIVE WORKS

**GORDON FITZELL**, music theory and composition, works in the area of original music composition. His original works have been commissioned by musicians around the globe, including Chicago sextet eighth blackbird, whose



Grammy-winning recording *strange imaginary animals* features two of his pieces. A composer, performer, producer and concert organizer, Fitzell's music has been reviewed in international publications such as *The Globe and Mail*, *BBC Magazine*, and *The New York Times*.



## HEALTH SCIENCES

**ANNETTE SCHULTZ**, nursing, Psychosocial Oncology and Cancer Nursing Research Group, St. Boniface Hospital, does research that spans three areas: tobacco dependence issues within health care services and policies; youth resolve to remain smoke free; and equity, social justice and rights-based premises in tobacco issues. Her published work focused on youth resolve to remain smoke free generated evidence to support the current national trend of smoking bans in cars with youth as passengers.



All photos Mike Latschlaw

(top l-r): Michelle Faubert, Francis Lin, bottom l-r: Wen Zhong, Brooke Milne

## HUMANITIES

**MICHELLE FAUBERT**; English, film and theatre; has garnered an international reputation by offering original insights into Romantic studies and the history of medicine. Her first monograph, *Rhyming Reason: The Poetry of Romantic-Era Psychologists*, was nominated for the prestigious British Society for Literature and Science Prize. She holds a British government fellowship, and is a Visiting Fellow at Northumbria University in England.

## INTERDISCIPLINARY

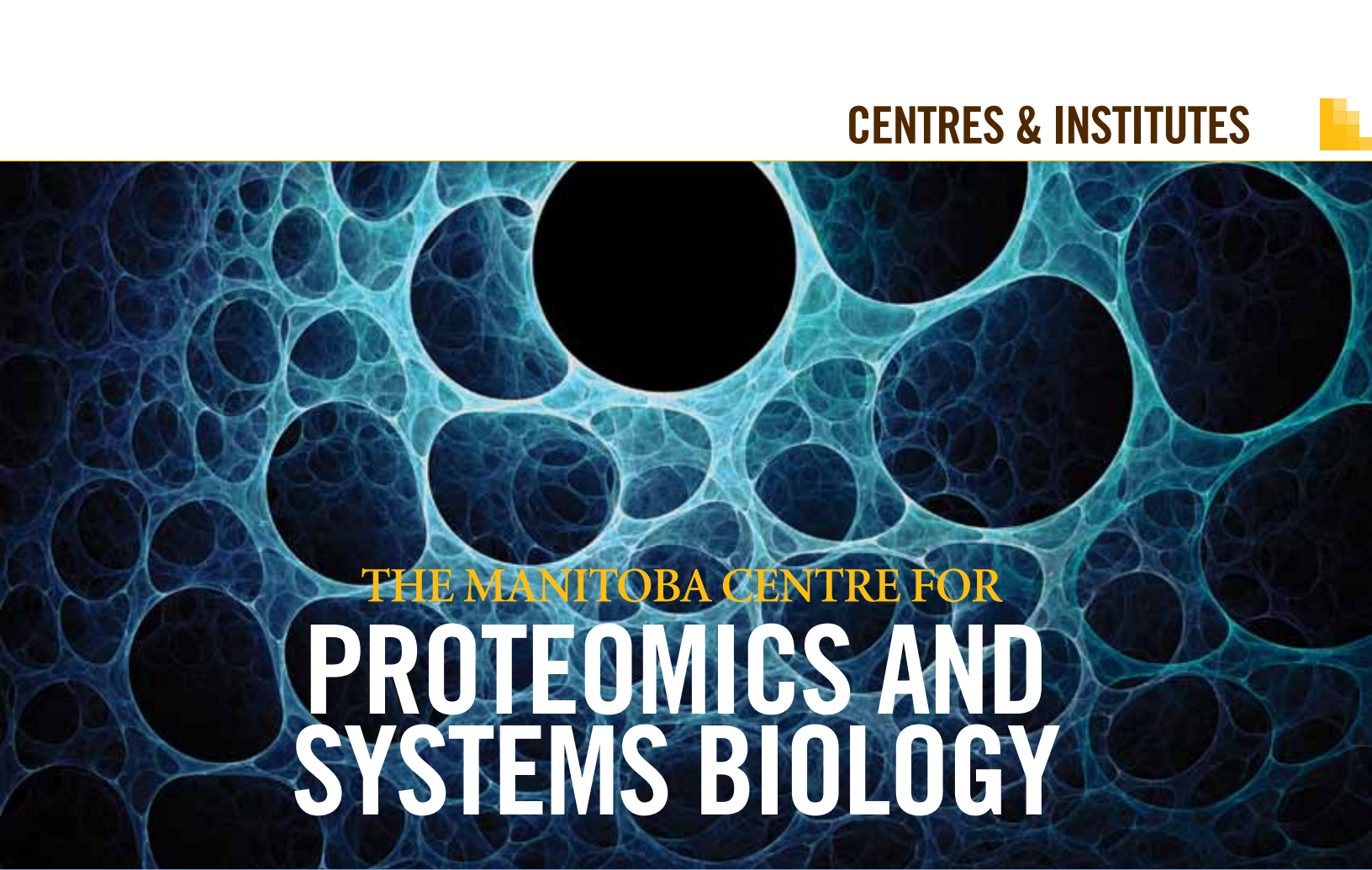
**FRANCIS LIN**, physics and astronomy, integrates methods from biophysics, engineering, cell biology and immunology, to the study of immune cell migration and trafficking. His innovative approaches have led to the early development of microfluidic devices and their use for cell migration studies. His current research focuses on developing novel microfluidic systems for rapid diagnostic applications for diseases such as the H1N1 virus infection and cancers and for stem cell based tissue engineering applications.

## NATURAL SCIENCES

**WEN ZHONG**, textile sciences, does research in the area of medical textile and fibre materials. Her expertise in understanding nanofibres for biomedical applications has led to the development of functional nanofibres for the delivery of multiple bio-molecules that can be used as functional wound dressings and regeneration of tissues. Her innovative approaches have led to multiple publications and the opportunity to present at conferences across North America.

## SOCIAL SCIENCES

**BROOKE MILNE**, anthropology, does explorative research in the field of Canadian Arctic archaeology. Colleagues have praised her as an emerging leader in the analysis of Canada's earliest Arctic hunter-gatherer populations and stone-tool technology. Her ambitious research has taken her into the deep interior of Southern Baffin Island where the logistics of conducting fieldwork are complex and where comparatively little work has been done before. ■



## THE MANITOBA CENTRE FOR PROTEOMICS AND SYSTEMS BIOLOGY

**THE MANITOBA CENTRE FOR PROTEOMICS AND SYSTEMS BIOLOGY** is a unique facility providing researchers with the environment and the tools necessary to conduct leading-edge research in diverse areas. The centre's success is built on the combined efforts of applied and basic scientists with expertise in biology and medicine, chemistry, physics, mathematics and engineering.

Within the walls of the sweeping 10,000 square foot Manitoba Centre for Proteomics and Systems Biology, researchers are examining systems ranging from the individual cells that make up who we are to the body tissues that these cells form.

*Proteomics* is the study of proteins, the biomolecules that form the building blocks of cells and run the chemical reactions that sustain life. Genes, of course, are a blueprint for the structures and functions of our bodies—how we look, how we are made and how our bodies work. However, proteins do all the work in a cell according to the genes' instructions, and when they fail, disease may result. The goal is to understand what all of the proteins do in a living system and how they work with one another.

*Systems biology* uses the genomic and proteomic information to develop models to describe how all of these parts interact in health and disease. The aim is to be able to predict how a drug will work or how a disease starts. This information is essential for the identification of new approaches and targets for treating disease.

Located at the University of Manitoba Bannatyne Campus, the centre collaborates with dozens of Canadian and international

researchers to study diverse topics including the diagnosis and development of new approaches to treating cancer, the monitoring and protection of organ transplants or understanding how infections such as SARS, influenza, Ebola cause the damage that they do. These approaches are not limited to human systems. Indeed a recent project with professors Richard Sparling (microbiology) and David Levin (biosystems engineering) is using systems biology based approaches to develop more efficient methods of biofuel production from materials such as straw.

The centre opened in 2006, and has truly been the result of collaborative efforts, with basic infrastructure supported by grants from the Canada Foundation for Innovation and Manitoba Research and Innovation Fund. Operating grants have been provided by the Canadian Institutes for Health Research, the National Institutes for Health, and industry with essential support coming from the Health Sciences Centre Foundation, the University of Manitoba, and the Province of Manitoba.

As recently as last year, two members of the centre, physics professors Kenneth Standing and Werner Ens, won the \$100,000 2010 Manning Innovation Award for their advanced mass spectrometer design. The mass spectrometers that they developed are one of the most successful instruments currently used for proteomics.

The centre's director, John Wilkins, said "What Ken and Werner have done with the instruments that they've developed is to make it really practical for biologists such as myself to be able to probe biological systems in a way that I never thought would be feasible during my scientific career." ■

# “ONE project

**DR. GILLES G. PATRY, CM, PEng, PhD, FCAE**  
PRESIDENT AND CEO, CANADA FOUNDATION FOR INNOVATION

Dr. Gilles G. Patry became the fourth President and CEO of the Canada Foundation for Innovation (CFI) August 1, 2010, following a long and distinguished career as a consultant, a researcher, and a university administrator. He holds a BA Sc and MA Sc in civil engineering from the University of Ottawa, and a PhD from the University of California, Davis in environmental engineering. He is a Member of the Order of Canada, a recipient of the Order of Ontario and a Fellow of the Canadian Academy of Engineering.

What follows is an excerpt from **a conversation with Gilles Patry:**



“Research is synonymous with discovery. It’s the process by which one tries to understand a problem or a phenomenon. Very often this process leads to fascinating discoveries and/or to other questions that lead to more research and more discoveries.

I am an environmental and water resources engineer by training. I practiced engineering for many years before undertaking my PhD and joining academia. As a practising engineer, I was trained to find innovative, cost-effective solutions to complex environmental engineering problems. As a researcher, I seek to develop a comprehensive understanding of these issues, propose solutions and ensure that policies are in place so that these concepts and ideas can be translated into practice — it is one of the most gratifying feelings there is. For me, the transition from the practice of engineering to research was very natural — it is probably the reason why I continued to practice engineering while still in academia.

The CFI was created by the Government of Canada in 1997 to enhance our national capacity for research and innovation. It does so by providing funding to universities, colleges and research hospitals for all types of research infrastructure. Over the years, these investments have transformed the research landscape across the country. Canada has gone from an era of brain drain in the early and mid-1990s to the current era of brain gain, with some of the most brilliant researchers from around the world being attracted to this country because of its commitment to research, its investments in people and in research infrastructure.

As I travel across Canada I am able to witness first-hand the impact the CFI is having on the nature and quality of the research that is now taking place in our universities, colleges and research hospitals. It is important to remember that the challenge of building a more innovative economy is about

more than a slab of concrete or a piece of equipment — it’s really about people. As the Public Policy Forum’s recent report on innovation in Canada points out, “It’s people, not organizations, who innovate.” It’s talented, well-trained individuals who drive new ideas, develop original products and come up with new methods of tackling issues. Investing in people, providing the tools they need, and creating opportunities to collaborate across boundaries are all critical factors requiring focused attention at the organizational, sectoral, regional and national levels. This is exciting! The CFI holds a critical place in this research and innovation landscape in Canada.

How well Canada is doing in the innovation game is a matter of much debate these days. Perhaps the only point of general agreement is that the Canadian economy must be based on innovation in order to compete effectively in the global arena. Our exceptionally high standard of living cannot be maintained by relying solely on the exploitation of natural resources, and our industries cannot compete against those in developing countries based on the price of goods and services. It is only by bringing new ideas to the marketplace in the form of products, services and processes that we can maintain our standard of living.

Innovation is a very complex and challenging process. It is important to keep in mind that innovation is not just about jobs and wealth creation. Innovation holds the potential to address a wide range of societal challenges — improving health through new medical interventions, developing new social policies and programs to alleviate poverty and deal with the impacts of an aging population, finding new ways to protect the environment and increasing national security. Innovation holds the key to both the economic and social well-being of all Canadians.”

# MANY partners

## HONOURABLE DAVE CHOMIAK

MINISTER OF INNOVATION, ENERGY AND MINES, PROVINCE OF MANITOBA

Minister Dave Chomiak was appointed Minister of Innovation Energy and Mines on November 4, 2009. Mr. Chomiak has also served as Minister of Justice and Attorney General; Minister of Health, for five years; and Minister of Energy, Science and Technology. He first won election in 1990 as the Member of the Legislative Assembly for Kildonan, subsequently winning re-election in 1995, 1999, 2003 and 2007. Prior to being elected, he worked as a lawyer in private practice. Mr. Chomiak also served as Executive Assistant to the Honourable Ed Schreyer, Premier of Manitoba.

What follows is an excerpt from **a conversation with Dave Chomiak:**



“Research means exploring ideas. The ideas can come from any perspective or motivation, but the essence of research is about exploring ideas. I think about Manitobans and how they use research in their day-to-day life. It could be in adopting new technologies to lessen the cost or the environmental impact of the product they are using; like in Manitoba’s wind energy industry. The idea to use a renowned prairie resource such as wind and optimize it for energy production is grounded in research and the incremental exploration of many related ideas.

I am a curious person and care deeply for the state of the world around me. How people live, our quality of life, and the impact we have on the place we live for the next generation are concerns that I think about daily. Through research, we are able to ask and test questions that inform our decisions, and ultimately improve how we connect with each other, and improve the quality of life for ourselves and society today and in the future.

Intuitively, for me it comes back to ideas. The ideas of innovative Manitobans are constantly inspiring me, and I’ve had the privilege of learning about so many of these in my role as Minister of Innovation, Energy and Mines. While the motivation may differ from one project to the next, the overall theme of creating hope and having impact in the lives of Manitobans is ever present, whether it is in areas such as life sciences, energy, or communication technologies, to name just a few.

Research and access to higher education offer so many opportunities for young people to explore their strengths and interests. By choosing to be involved in research, a young person learns the structure and process of testing new concepts, providing them with the tools to reach their full potential in

exploring their own ideas. We are presently on the cusp of increasing integration of traditional research areas, where you can, for example, be an expert in computer programming or data management and find yourself working on a team that delivers e-health solutions. Or, with your IT skills, you may find yourself working on a team that optimizes weather forecasting and flood predictions for Manitoba’s agricultural community. Research offers many opportunities to tackle societal issues from a range of perspectives!

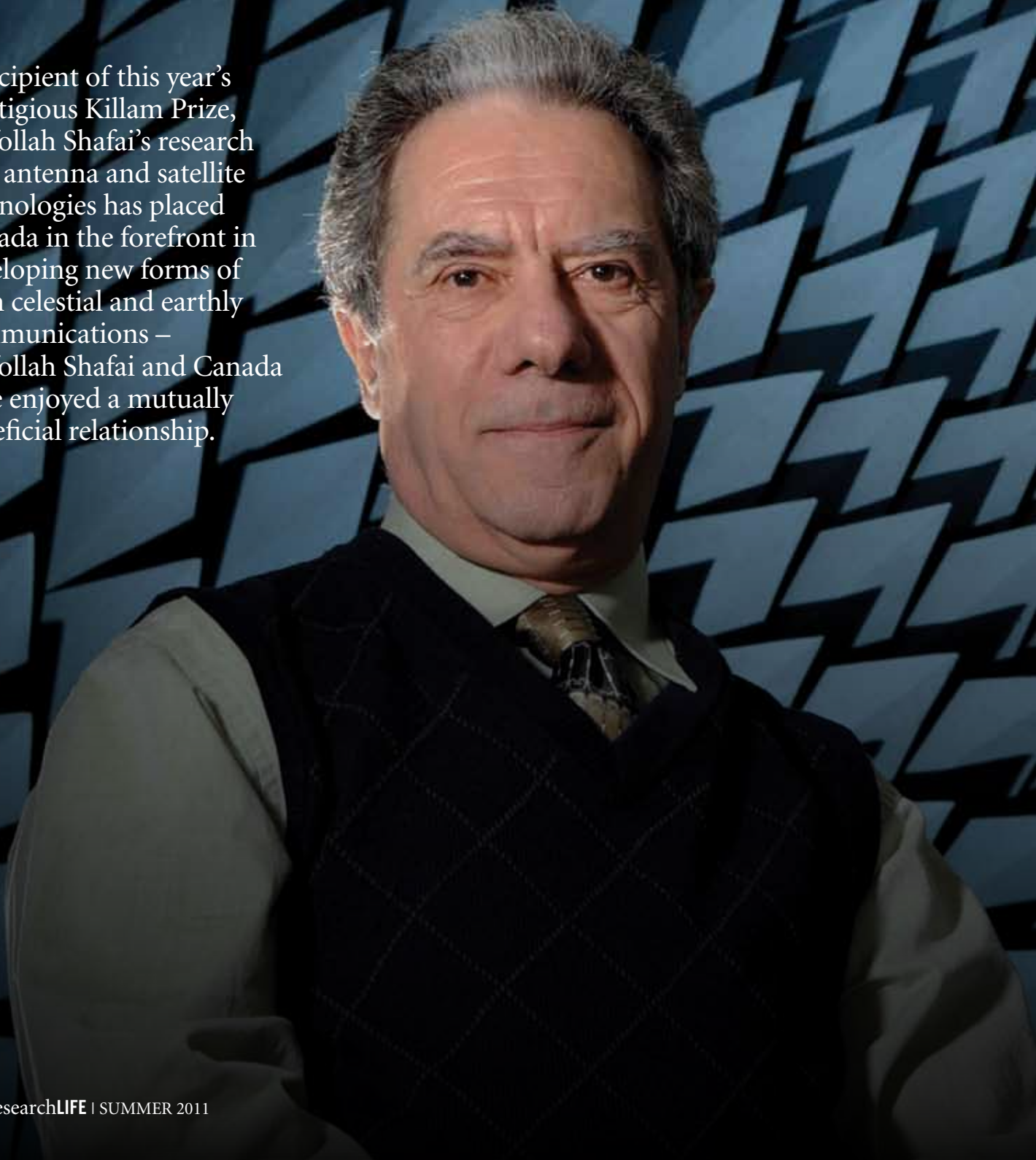
One of the key ways in which the province supports research is through the Manitoba Research and Innovation Fund (MRIF). The MRIF supports innovation, science, research and technology commercialization initiatives that enhance Manitoba’s research capacity and economic competitiveness. For example, by enhancing research infrastructure and capacity in partnership with organizations such as the Canada Foundation for Innovation, the MRIF assists Manitoba post-secondary research institutions in attracting and retaining world-class researchers and to conduct leading edge research that will lead to improvements in the health, environment, and quality of life for citizens in Manitoba, Canada and beyond.

Research outcomes touch all of us, every day and almost every minute. It’s more than just technological changes, but in how we understand each other and how we live together. Research impacts the diagnosis and advice your doctor might provide so you can better manage your own health and that of your loved ones. Research can also inform policies that require your car to have airbags, and where these airbags should be placed to minimize harm from a collision. These are only two examples that show how research touches the day-to-day life of all Canadians.”

# THE GREAT COMMUNICATOR

BY CURT CHEREWAYKO

A recipient of this year's prestigious Killam Prize, Lotfollah Shafai's research into antenna and satellite technologies has placed Canada in the forefront in developing new forms of both celestial and earthly communications – Lotfollah Shafai and Canada have enjoyed a mutually beneficial relationship.





Mike Latschlaw

As the second largest country in the world, yet one of its most sparsely populated, Canada has relied heavily on the University of Manitoba engineering professor's large catalogue of research and inventions in the field of antenna and satellite technologies to, among other things, connect remote communities and explore vast uninhabited terrain.

Late nights in the lab deserve a lot of the credit, but Shafai has become an international leader in his field partly because his experimental backdrop has been the uniquely difficult geography and demography of Canada.

And it is not just remote, rural Canadians who are affected daily by Shafai's communications research.

Because of advancements he has made in the connectivity and miniaturization of antennas, the modern-day cellphone no longer requires an antenna protruding out of its top. And those oversized television satellite dishes that were common backyard lawn ornaments a couple decades ago have been replaced by smaller rooftop dishes designed by Shafai.

"People just see the hardware, they don't see all the knowledge behind it," said Shafai.

Over the last 35 years, the Canadian Space Agency has frequently looked to Shafai for help in solving its communications conundrums.

Shafai is a Tier 1 Canada Research Chair in Applied Electromagnetics since 2002.

The lofty, Government of Canada posting provides Shafai with \$200,000 in research funding annually.

Last April, Shafai was again recognized for his contributions to the engineering field. He was one of five prominent Canadian researchers awarded the \$100,000 Killam Prize, which is one of Canada's most distinguished science

awards, presented annually by the Canada Council for the Arts.

Born in Iran, Shafai completed a bachelor of science degree in mechanical engineering at the University of Tehran in 1963. The next year, following the advice of his brother, Shafai emigrated to Canada to attend the University of Toronto. He arrived in Canada with \$35 in his pocket and no English vocabulary. For the first six months of his studies he required an English dictionary beside his textbook.

His decision to pursue an electrical engineering degree instead of continuing with his mechanical engineering studies was a surprisingly arbitrary one: he considered his language skills over any career motivations.

“There was only one professor I could understand and he was kind enough to listen to me,” said Shafai.

That professor happened to be in electrical engineering; Shafai had found his calling.

In 1969, shortly after completing a PhD in the Faculty of Applied Science and Engineering at the University of Toronto, he accepted a job as a lecturer in U of M’s department of electrical and computer engineering. In 1978, shortly before being named a professor in the department, Sha-

fai made his first major scientific breakthrough: designing the ground terminals for the Hermes satellite, which was at that time Canada’s most ambitious space project. Canada, in a partnership with NASA, used the Hermes satellite to test satellite television signals over a network of ground terminals across the country.

The ground terminals were each the size of a small house.

As a result, to distribute them to points across Canada, they needed to be cut into smaller pieces, shipped by truck and then reassembled at their destination. Shafai designed a ground terminal a fraction of the standard size. His picoterminals, which were less than 2 feet wide, were installed in locations across Canada and used in the Hermes program to conduct experiments in teleconferencing, telemedicine and remote television distribution.

An oft-told story about Shafai’s work involved him conducting final tests on the first Hermes picoterminal atop the roof of Shirleys Bay Communications research centre near Ottawa. Shafai was having scant success finding a clear signal through the dish so, on a calculated whim, he placed his wedding ring on top of dish’s antenna. Over his walkie-talkie, Shafai’s colleagues from within the lab below immediately and enthusiastically confirmed that the picoterminal had found a signal. As a last-minute design tweak, a signal-conducting ring the exact size of Shafai’s wedding ring was bolted to the top of each picoterminal antenna.

“His presence in this field can be seen throughout Canada in many ways, not just from his technical contributions,” said George Eleftheriades, an electrical and computer engineering professor at the University of Toronto.

As an example, he pointed to the make up of the staff at the Communications Research Centre in Ottawa, which is the federal government’s largest lab for telecommunications research.

“You get the impression when you’re there that most of the antenna group are PhD graduate student of Shafai’s,” said Eleftheriades.

He noted that Shafai is also known prominently both nationally and internationally because of his leadership in bringing researchers together to share

ideas at major technology conferences like ANTEM. Shafai established ANTEM in 1986 and it has grown to become Canada’s foremost conferences on antenna and electromagnetic research.

Perhaps ironically, given that his life’s work has revolved around creating better communications systems for people, Shafai is a shy, understated man. He’s most at home in the lab.

“I like building things,” he said.

The University of Manitoba’s Applied Electromagnetics Lab—Shafai’s main workspace—is largely made up of three echo-free, or anechoic, chambers. Shafai, other researchers and students use the chambers to design, test and characterize antennas, electromagnetic sensors and microwave components for a plethora of applications. The lab was funded by the Natural Sciences and Engineering Research Council of Canada, the Canada Foundation for Innovation and the Manitoba Research and Innovation Fund. Shafai and his team finance the lab’s ongoing development primarily through contract work—antenna testing, sensor development and so forth—for companies like Bristol Aerospace Ltd., Nortel Networks, Manitoba Hydro and InfoMagnetics Technologies Corp., Canadian Space Agency and other government departments, European Space Agency and U.S. interests. Various types of radio wave frequency and hardware testing occurs in each of the three chambers, which vary in size, but are each roughly 300 square feet.

In one chamber, researchers and students can test near-field signals like those that swirl around your head while speaking on a cell phone. In the other two chambers, far-field signal testing is done in which radio waves are bounced off of parabolic, reflective surfaces in order to mimic the effects of distance on radio waves. The far-field tests allow researchers to understand how radio waves behave after travelling distances of anywhere from two kilometres to infinite. Thousands of blue, carbon triangles jut out of every spot of wall in each testing chamber. The triangles absorb radio waves, preventing them from reflecting and skewing test readings.

There are now a number of electromagnetics labs in Canada, although none as





““ It’s a very abstract science and very mathematically intense,” he said. “You really have to be a thinker, and Lot really is a thinker.”

large or as equipped as the University of Manitoba’s.

“I haven’t seen a better antenna lab in any university anywhere in the world,” said Eleftheriades.

Shafai’s work has also taken him and fellow researchers outside the lab to remote places like Canada’s arctic.

In recent years, much of his focus has been on novel electromagnetic devices and interactions, such as electromagnetic mapping of Arctic sea ice. This study will help in understanding how the different characteristics of Arctic sea ice—its density, thickness, age—appear in satellite readings.

Other researchers can benefit from this study to understanding things like the seasonal behaviour of sea ice and how it is being effected by climate change.

“Lot is very much in demand,” said Frank Franczyk, a former student of Shafai’s and founder of Persentech Inc., a small Winnipeg-based firm that is developing satellite technology for gathering vehicle travel data. Franczyk became keenly interested in electromagnetics 30 years ago while taking a third-year course taught by Shafai.

“It’s a very abstract science and very mathematically intense,” he said. “You really have to be a thinker, and Lot really is a thinker.”

While contract work for industry has helped fund the development of the Applied Electromagnetics Lab, students have priority use of it, followed by researchers, then the private sector.

Franczyk noted that Shafai’s day-to-day schedule reflects that hierarchy.

“He would do his required classes and student interfaces during the day, then he would head home, maybe have something to eat, sleep a little bit, and then come back to the university and work on research through the night,” said Franczyk.

“I in fact changed my habits to sleep during the day like Shafai and come to the lab at night.”

Shafai, who remains an unpaid advisor with Persentech, gets particularly excited when he sees his research, or the research of students like Franczyk, applied in industry or in everyday life.

And while Shafai’s research is grounded in abstract mathematical equations, radio

frequencies and high-tech hardware, many of his contributions to the communications field have been driven by needs the layman can understand: the need, for example, for smaller communication devices that have better connectivity.

Another need the layman can understand: saving lives. Computational code he created has not only played a large role in modernizing antenna design, but has been key to the design of hardware for detecting land mines and undetonated bombs.

A glimpse at some of his more recent research suggests that Shafai’s future contributions to the field will increasingly seem like the stuff of science-fiction.

For example, through the clever manipulation of electromagnetic waves, he’s exploring the concept of using a single antenna to create a series of virtual, or phantom, antennas that don’t require a physical form to pick up signals.

“Most of my work is for something in the future,” said Shafai. But that’s how research is – it’s looking at something you don’t know about yet.” ■



## NOT JUST CHINA: THE RISE OF RECALLS IN THE AGE OF GLOBAL BUSINESS

(Palgrave Macmillan, 2010)

Hari Bapuji • business administration

### PRODUCT RECALLS SPANNING TOYS,

children's products, food, pet food, and automobiles have increased dramatically in the recent past. Consequently, the safety of imported products has been pushed to the top of the agenda for companies, consumers, and governments. It has often been argued that recalls occur due to differences among national standards, cost pressures and opportunistic behavior by companies. However, analysis of US toy recalls over a 20 year period reveals that the key to decreasing recalls and harm from defective products lies in improving product designs, learning from recalls and swiftly acting on incidents. Together, these point to the inherent dangers in the disaggregation of value chain and the need to effectively manage those dangers.



## ABORIGINAL, NORTHERN, AND COMMUNITY ECONOMIC DEVELOPMENT PAPERS AND RETROSPECTIVES

(Arbeiter Ring Publishing, 2010)

John Loxley • economics

### JOHN LOXLEY HAS

WORKED in community economic development as a practitioner, advisor, teacher and scholar for over 30 years. The wealth of that experience is reflected in this book, which grapples with the conceptual and political complexities of addressing northern and Aboriginal poverty. Loxley examines a number of possible approaches to economic development, placing each within a broader theoretical and policy perspective, and considering its growth potential and class impact. Accessible and theoretically sophisticated, the book blends international development theory with northern Canadian and Aboriginal realities. It includes an important chapter on traditional Aboriginal values and culture and their relationship to the land.



## POWER AND INEQUALITY: A COMPARATIVE INTRODUCTION

(Oxford University Press, 2010)

Gregg M. Olsen • sociology

### THIS GROUND-BREAKING BOOK

examines the nature and implications of social inequality in a new and illuminating way. The author examines key measures of social inequality and indica-



tors of poverty across six selected nations - three Anglo-American countries (the US, UK, and Canada), and three Nordic nations (Finland, Norway, and Sweden). Professor Olsen's research shows that while inequality is an inherent and pervasive aspect of capitalism, and while the past few decades have seen sharp rises in inequality across the industrialized world, nonetheless substantial variances between countries continue to exist. In those countries like the US that have most zealously embraced neoliberalism, inequality and poverty have been exacerbated to a much greater degree than is the case in the Nordic lands, which still rank among the most egalitarian of countries. This cross-national variation challenges many prominent classical and contemporary theoretical accounts of inequality, and suggests that high levels of social inequality are neither necessary nor inevitable in advanced capitalist societies. They are, rather, the product of constellations of power and the interactions of social forces. Human beings create social inequality, and human beings possess the power to reduce such inequities.

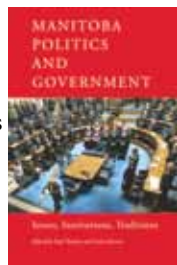
## MANITOBA POLITICS AND GOVERNMENT: ISSUES, INSTITUTIONS, TRADITIONS

(University of Manitoba Press, 2010)

Edited by Paul Thomas • political studies and Curtis Brown • graduate studies

MANITOBA HAS ALWAYS BEEN a province in the middle, geographically, economically, and culturally. Lacking

Quebec's cultural distinctiveness, Ontario's traditional economic dominance, or Alberta's combustible mix of prairie populism and oil wealth, Manitoba appears to blend into the background of the Canadian family portrait. But Manitoba has a distinct political culture, one that has been overlooked in contemporary political studies.



*Manitoba Politics and Government* brings together the work of political scientists, historians, sociologists, economists, public servants, and journalists to present a comprehensive analysis of the province's political life and its careful "mutual fund model" approach to economic and social policy that mirrors the steady and cautious nature of its citizens. Moving beyond the Legislature, the authors address contemporary social issues like poverty, environmental stewardship, gender equality, health care, and the province's growing Aboriginal population to reveal the evolution of public policy in the province. They also examine the province's role at the intergovernmental and international level.

*Manitoba Politics and Government* is a rich and fascinating account of a province that strives for the centre, for the delicate middle ground where individualism and collectivism overlap, and where a multitude of different cultures and traditions create a highly balanced society.

### COOPERATIVE CELLULAR WIRELESS NETWORKS

(Cambridge University Press, 2011)  
 Edited by Ekram Hossain • electrical & computer engineering, Dong In Kim (Sungkyunkwan University) and Vijay K. Bhargava (University of British Columbia)

A SELF-CONTAINED GUIDE to the state-of-the-art in cooperative communications and networking techniques for

next generation cellular wireless systems, this comprehensive book provides a succinct understanding of the theory, fundamentals and techniques involved in achieving efficient cooperative wireless communications in cellular wireless networks. It consolidates the essential information, addressing both theoretical and practical aspects of cooperative communications and networking in the context of cellular design. This one-stop resource covers the basics of cooperative communications techniques for cellular systems, advanced transceiver design, relay-based cellular networks, and game-theoretic and micro-economic models for protocol design in cooperative cellular wireless networks. Details of ongoing standardization activities are also included. With contributions from experts in the field divided into five distinct sections, this easy-to-follow book delivers the background needed to develop and implement cooperative mechanisms for cellular wireless networks.



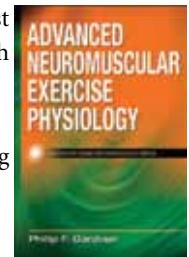
### ADVANCED NEUROMUSCULAR EXERCISE PHYSIOLOGY

(Human Kinetics, 2011)  
 Phillip Gardiner • kinesiology & recreation management

ADVANCED NEUROMUSCULAR EXERCISE PHYSIOLOGY uses a mix of biochemistry, molecular biology, neurophysiology, and muscle physiology to provide a synthesis of current knowledge and research directions in the field. The first text devoted solely to the topic, Advanced Neuromuscular Exercise Physiology assists readers in identifying current directions in research and new avenues for exploration.

Recognizing the rapid changes occurring in the field of neuromuscular exercise physiology, the book provides readers with a foundation of knowledge

while detailing the most recent findings. Though the text is written at an advanced level, the author succeeds at making the content accessible. Analyses of research findings and research applications are highlighted in special sidebars. Detailed illustrations and graphs assist readers in understanding research findings. The text offers an authoritative perspective of current research in the field as it seeks to encourage discussion, further study, and new research directions.



### CODE POLITICS CAMPAIGNS AND CULTURES ON THE CANADIAN PRAIRIES

(University of British Columbia Press, 2011)  
 Jared J. Wesley • political studies

IN *CODE POLITICS*, Jared Wesley draws on over eight hundred pieces of campaign literature to reveal that the region's dominant political parties have used one key device — rhetoric — to foster and carry forward their province's cultural values or political code. Social Credit and Progressive Conservative leaders in Alberta emphasized freedom over security, whereas New Democrats in Saskatchewan turned that message on its head. Successful politicians in Manitoba, by contrast, steered a middle course, underscoring the importance of moderation in their campaign platforms. ■



# A 'Super' Partnership

BY JOHN RYMON

**IT TAKES A VILLAGE TO RAISE A CHILD**, and that helping hand is often needed when financing a major project. The University of Manitoba has seen many partnerships formed to support new and innovative measures.

Equipment and facilities make up the strong infrastructure needed for the university to continue its tradition of world class research and technology. So when there were plans to integrate Manitoba's first energy-efficient High Performance Computing (HPC) system into the university, another collaborative effort was underway.

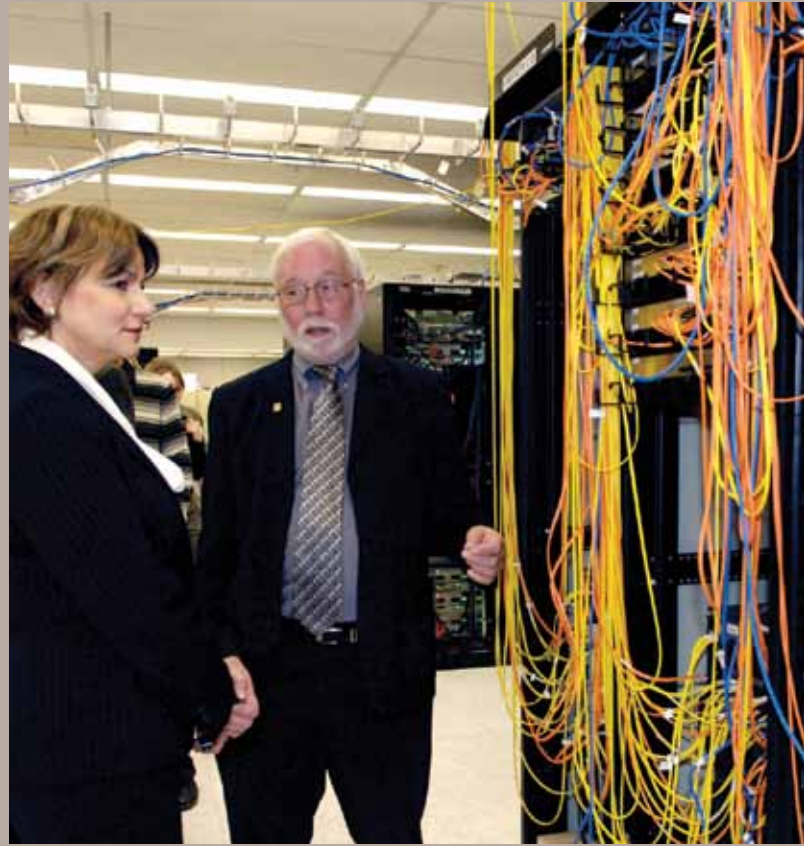
Approximately \$4 million to fund the High Performance Computer Centre (HPCC) was provided by the Canada Foundation for Innovation (CFI) and the Manitoba Research and Innovation Fund (MRIF). However, this still left \$2.6 million in construction costs to build the facility housing the supercomputer, named GREX. Western Economic Diversification Canada (WD), a department of the Government of Canada, stepped in and partnered with CFI to fund the facility itself.

WD was established in 1987 to improve the long-term economic competitiveness of the western provinces, with infrastructure being a significant priority. As demonstrated in this project, a majority of WD's grants are delivered in partnership with other levels and departments of government, allowing for cost sharing of initiatives that respond to regional needs or opportunities.

GREX has proven to be a positive investment, allowing researchers to solve large-scale computationally demanding problems in a few hours or days, instead of weeks or months. This gives the university's researchers a competitive edge, whether it be cancer researchers simulating how diagnostic radiation travels through the body, electrical and computer engineers modeling a high-voltage electric grid, or environment and geography researchers developing better weather forecasts.

GREX is also recognized as one of the most energy-efficient computer systems, ranking second overall in Canada. The facility's cooling system exchanges heat generated by the equipment through a campus-wide water-based heating system, thus re-using and reducing overall energy demands.

Building strong, competitive and innovative businesses and communities in Western Canada is what WD is all about, and



(l-r) The Honourable Lynne Yelich, Minister of State (Western Economic Diversification) viewing the infrastructure with Mr. Gerry Miller, University of Manitoba

the \$5 million Canadian Wheat Board (CWB) Centre for Grain Storage Research was another example. A number of players collaborated in this effort – not only WD, but CFI, MRIF, the Canadian Wheat Board, Manitoba Hydro, Agriculture and Agri-Food Canada, the University of Manitoba and other industry and private donors.

Canadian farmers are internationally known for their high-quality grain, much of which is stored and shipped to countries around the world. The University of Manitoba has been a leader for over 30 years in research aimed at protecting the quality of stored grain.

"No other research group in Canada is working to solve problems of stored-grain ecosystems using a multi-disciplinary approach. We are bringing together engineers, entomologists, chemists and agricultural economists with this centre, the most comprehensive facility of its kind in the world," said Dr. Digvir Jayas, Vice-President (Research) and former Canada Research Chair in Stored-Grain Ecosystems.

The HPCC and CWB Centre for Grain Storage Research are just two examples of how WD is driving economic development through collaborations with government, the academic community and industry, working together to identify projects that will help to keep Manitoba in the forefront of the knowledge-based economy. ■

“For as long as the sun shines, the grass grows and the waters flow”

—Treaty 1 signed on August 3, 1871, between Queen Victoria and the Anishinabek and Nehiyaw Nations of Southern Manitoba.

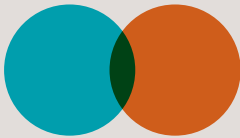
From where she stands, the sun is shining, the grass is growing and the river is certainly flowing. The poetic expression, as it is written in the Numbered Treaties, very much resonates the view from the window.

# MAMAWIPAWIN: DAWN OF A NEW ERA

BY MELNI GHATTORA



The circular space represents life and Indigenous understandings of the world. Everything happens in a circle; life is not linear, society is not linear, knowledge is not linear, and it has no beginning and no end,” explains Ladner.



## IDENTIFYING THE NEED

“Youth today are not taught in reserve schools, in community schools, in Canadian schools, about what Indigenous forms of government were. So we have youth today who are walking around and saying that this Indian Act is a piece of [expletive], but many do not know what an alternative is,” says Kiera Ladner. “And so it’s about trying to create knowledge of that opportunity, knowledge of that option, and knowledge of the traditional forms.”

Ladner, a Canada Research Chair in Indigenous Politics and Governance and associate professor in the Faculty of Arts, is about to embark on a new chapter at the University of Manitoba; the next chapter in her journey to understanding ways for Canadians and Indigenous Peoples to live in a mutually supported manner.

In 2009, the Canada Foundation for Innovation (CFI) and the Manitoba Research and Innovation Fund (MRIF) announced funding for the development of the Indigenous Governance and Community Based Research Space, a new and innovative research infrastructure at the University of Manitoba.

This was exciting news for Ladner. “To be able to enhance research space at the university and to be able to do things that we really don’t have the chance at doing right now is phenomenal, absolutely phenomenal and it’s going to mean so much to my research agenda that I can’t wait. I

sit on pins and needles and ask when can I move in? When can we get this up and running?” she says.

Construction on *Mamawipawin* (Cree for gathering space) is nearing completion with an anticipated soft opening in mid-June. The research facility will occupy the fourth floor, Isbister Building, at the University of Manitoba.

## OPENING DOORS

The three part research lab is made up of a circular multifunctional research space, a training room, which will house the standing lab, and a portable lab for off-site research. The strategically thought out design reflects critical Indigenous teachings about community, and individuality.

“The circular space represents life and Indigenous understandings of the world. Everything happens in a circle; life is not linear, society is not linear, knowledge is not linear, and it has no beginning and no end,” explains Ladner.

What really sets this lab apart, quite possibly making it the only one of its kind in Canada, is how the finished space will be used. The lab is architecturally equipped with a dedicated ventilation system to support research protocols like smudging ceremonies and other Aboriginal traditions. It will also house state-of-the-art computer equipment and software, as well as the latest in audio visual technology.

“There is nothing like this in Manitoba or at other universities in Canada,” says Ladner. “I’ve envisioned a way to create an infrastructure to support a different end, hopefully to create a model for other researchers. I can’t wait to see what we can do; it’s a wait and see approach.”

## MOBILIZING KNOWLEDGE

Ladner and her team will not only have the ability to bring elders into a culturally friendly and culturally relevant environment; they also have the chance to bring members of remote communities into the space through live video conferencing.

User-friendly technology such as Skype allows her to stay connected with research associates in New Zealand and other parts of the world. This real-time research will allow her to create an exchange between scholars at the University of Manitoba and Victoria University of Wellington, New Zealand, where she has already established collaborative relationships. The two groups will meet to discuss various issues; this year they will discuss official languages and the recognition of Indigenous languages in Manitoba.

At the outset, these groups will work alongside one another at an upcoming meeting slated for late August. It will mark the official grand opening of *Mamawipawin*. By early next year, the teams will move towards virtual collaboration.



## BEYOND BORDERS

Ladner aims to provide a lens into knowledge that Canadians simply do not know.

“I teach a course in Indigenous governance and most years I have fifteen to twenty people walk in and most of them do not know anything. Maybe they have a range of knowledge that is based mostly on stereotypes and wrongful knowledge,” she says. “When you go into a class and say ‘What is a treaty?’ And you get responses like ‘Well Indians get all these things,’ you kind of go ‘Ouch,’ what are we missing?”

For Ladner, it’s about providing that knowledge base by establishing a community website, or a web interface, or through the use of social networking tools; Ladner is prepared to do whatever she can to get the message out to others.

“*Mamawipawin* will also try and reach those who are not typically reading academic journals by putting up material to answer questions like ‘What is a treaty?’ or ‘What were residential schools?’ ‘What is Aboriginal governance?’” she explains.

According to Ladner, many times educators in the public school system are teaching subject materials that aren’t necessarily correct. What she is hoping to find out is how that problem is going to be fixed.

“It’s not going to be fixed overnight. Using the vehicles that I have been provided by this new infrastructure, the research that will be done in the research space, and through the Canada Research Chair, will enable me to create research materials that can be used. These can hopefully help address some of the misinformation or some of the lack of information, both in Canadian society and Indigenous communities,” says Ladner.

## BUILD IT AND THEY WILL COME

The University of Manitoba does not offer a PhD program in Political Studies. Students who have completed their Masters program, here at the university, and are looking to work towards a PhD move on to other institutions around the world. *Mamawipawin* has already proven itself to lend a hand in garnering a positive response from one PhD student.

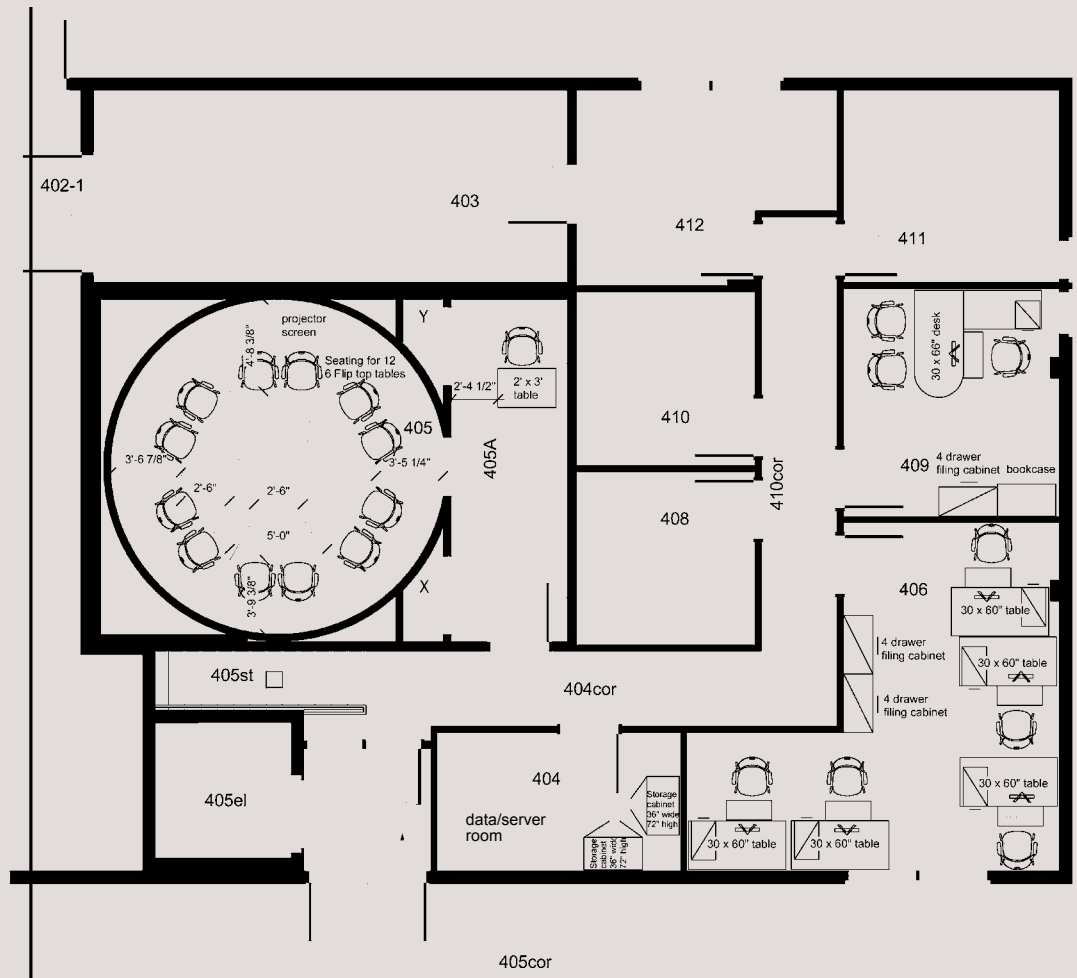
Damien Lee, who was courted by several universities to complete his PhD in native studies, confirmed he will be heading to the University of Manitoba this coming fall.

“The key issue is offering a safe space for Indigenous students to learn that is free of having to constantly provide background on ‘the Indigenous situation in Canada’ to non-Indigenous students,”

says Lee, currently a graduate student at the University of Victoria.

“The problem is, there might be other academic programs that are dedicated to Indigenous studies but in most cases those spaces become occupied by non-Indigenous students wanting to learn about Indigenous issues, resulting in space being taken away from Indigenous students who are interested in resisting colonialism. Having a space for Indigenous students all to themselves is very important to building a culture of resistance.”

Lee, who was adopted into his Anishinabek community in northern Ontario at the age of one, feels that a dedicated research lab is important to his research, “for me personally it’s going to be key because it’s what I’m looking for, to put it simply. To have a space with other students who are coming from a reserve or urban Aboriginal context, to be able to hit the ground running and not have



to worry whether that space is safe to discuss real issues and solutions.”

While a space like *Mamawipawin* is very attractive when making an important life decision, Lee admits that the opportunity to work alongside Ladner and Peter Kulchyski, a professor in the native studies department, was the deal maker in deciding where he would complete his PhD. That said, notes Lee, “*Mamawipawin* is a very nice incentive for doing my research at the University of Manitoba.”

In total, there will be two PhD and four Masters students working alongside Ladner.

## FUTURE FORECAST

Ladner plans to launch a youth pilot project that will include up to ten University of Manitoba students from various disciplines. From there she will involve high school students from across the province and within the next five years, hopes to draw students from across the country.

“The idea is to expand from university students to non-university students and then to expand on a national basis. We plan to bring high school students to the university during summer months to engage in activities surrounding Aboriginal governance,” explains Ladner.

These students will have full access to all of the equipment within the research facility.

“What I urge these students to do, especially the ones that are coming

together on the governance project, is to engage in research and to think about research in a diversified way. The end result of our community-based research on governance [this youth project] need not be a research paper. It might be working with kids in a community to create a photographic essay or a video documenting an elder’s story on governance. It could be creating a website for a community, the sky is the limit.”

While the future of *Mamawipawin* and the research that will come out of the facility is unknown, there is one thing that Ladner wants to achieve, “I hope that my research project has touched the lives of Aboriginal youth in our province, that it has more people thinking about Aboriginal governance in communities and rebuilding communities. It’s the dawn of a new era and it’s going to be fun.” ■

# Viewpoint

## Global Research at Work and Play

BY SANDRA ANNETT



Mike Latschislaw

### “GLOBALIZATION.”

It is a word that comes up on the news, in magazines, in scholarly articles and civic protests. Often it is tossed into texts without any explanation, as if it were something we already understand. “Globalization is changing the face of Canada,” says the media. “We have to respond to the new realities of globalization.” Every day brings a new story about the “global economy,” the “global media,” or the “global political climate.” But what is this thing that is shaping our lives in so many ways?

In fact, globalization is not just one thing that is known, felt, and lived the same way the world over. Ask researchers who work in different disciplines or different countries what globalization is, and you are sure to get a range of impressive and sometimes impassioned responses. The Centre for Globalization and Cultural Studies, directed by Canada Research Chair Diana Brydon, is a place where international, interdisciplinary researchers gather to collaborate on projects that explore the many social, cultural, and political aspects of globalization. As Dr. Brydon’s research assistant and advisee, I have had a chance to see how the centre works and to conduct my own research on globalization and cultural studies.

I began working with Dr. Brydon in 2007, a year after the centre was started with funds from the Canada Foundation for Innovation and Manitoba Research and Innovation Fund. Since then, I’ve met scholars and students from all over the world, including the Caribbean, Brazil, and several African countries. Researchers have come to work on everything from multilingual literacies to the cross-cultural circulation of video games. I have also been able to contribute a little to the discussion on globalization through my own personal interest in global media cultures.

My just-completed doctoral dissertation, “Animating Transcultural Communities,” investigates how people form connections across cultural differences by building fan communities around globally-circulating animated works. Using examples of popular American, Canadian, Japanese, and Korean cartoons, I show how animation fans create “transcultural communities,” in which diverse members connect through a shared interest, while negotiating the frictions that arise from their differing backgrounds. During the course of my interdisciplinary research, I conducted fieldwork at fan events in Japan, Canada, and the United States, and closely analyzed classic and contemporary films, TV series, and web cartoons for their representations of global animation audiences. In this way, I was able to explore the cultural work that goes on in communities of mediated play.

Through my research and my association with the Centre for Globalization and Cultural Studies, I have realized that globalization is not something that takes place “out there,” on a vast, abstract scale. It is a varied, uneven process that reaches from the most local, everyday ways of living to the largest multinational corporations. And in a way, it is also something that happens here, in the collaborative, international effort to understand a complex concept and put it to productive use, in research and life, in work and play. ■

*Sandra Annett has just completed her PhD in the Department of English, film, and theatre in the Faculty of Arts. She looks forward to taking up an assistant professor position in Wilfrid Laurier University’s Department of English and film studies.*



BY KARI DUERKSEN

SCIENCE, ENGINEERING & TECHNOLOGY (SET) DAY 2011 was a day of exciting and inspiring presentations by researchers at the University of Manitoba. SET Day gives Manitoba high school students and their teachers a glimpse at what the fields of science, engineering and technology may be doing—25 years into the future. Student attendees were challenged to enter the SET Day Essay Competition, and tell us what excited them about the day and their experiences. What follows is this year's essay winner's perspective: Ms. Kari Duerksen is a student from Steinbach Regional Secondary School in Steinbach, Man.

## The world through a scientific lens

High school science students face a set of challenges that is unique from other students. Music students have concerts to work towards and successful art students can have their work displayed. What do science students get? Another theory, another

equation, another reason to wonder, "What is the purpose?"

When writing about the Science, Engineering, and Technology (SET) Day at the University of Manitoba, I could simply give you the notes I took, or explain to you "The Theory of Everything,"



but that wouldn't help to give a sense of what this day was about. As captivating and inspiring as the talks were, there is one extremely valuable lesson that I learned. Science has a purpose. I've been told this throughout my school career, but after spending hours learning how to name compounds or memorize the structure of DNA, the relevance of it all can seem, quite frankly, non-existent. It is one thing to tell myself



2011 SET Day students



that what I'm learning now will help me in a future career in one of these sciences, but it's quite another to hear from people who have paid their dues and mastered their science. It brought a sense of purpose to the tedious learning that I am only just beginning.

The speakers lectured on a variety of topics, but there was a clear underlying message throughout the day: science can, and is, being applied in bold attempts to improve the human condition. Whether it's through the spread of information, through mending a broken brain, or through finding alternative fuels, research is done to make tomorrow better than today. Science is a truly unique field because to appreciate it, you can't just ask "how," you must also ask "why."

When the day came to a close, that notorious question popped into my head, "What is the purpose?" That day, I had an answer—to discover. The purpose is to look at the world around you through a new lens, to ask the question "How can we make this better?" and to be armed with the knowledge to answer this question. As the next generation of scientists, it is not only our purpose, but our duty, to equip ourselves with the tools that have been discovered for us, so we can discover and create a whole new, and better, world for the generations to come after. If that isn't a purpose worth working towards, I don't know what is. ■

## LISA SPANGELO

### FACULTY OF SCIENCE

UNDERGRADUATE STUDENT LISA SPANGELO is currently completing her final co-op placement of an honours biochemistry degree with chemistry professor Sean McKenna. McKenna studies protein-nucleic acid interactions and their biological effects. As part of her fourth year honours project, she worked on a collaborative project with microbiology professor Brian Mark's lab, investigating a key step in the replication cycle of a highly pathogenic human virus belonging to the *Bunyaviridae* family.

Lisa was able to demonstrate that this step involves an interaction between a viral protein and specific viral nucleic acid structures. As part of her co-op term, she is working on generating RNA-protein complexes for high-resolution structural determination by x-ray crystallography. This technique will allow for the determination of the intermolecular interactions that make the formation of this complex possible.

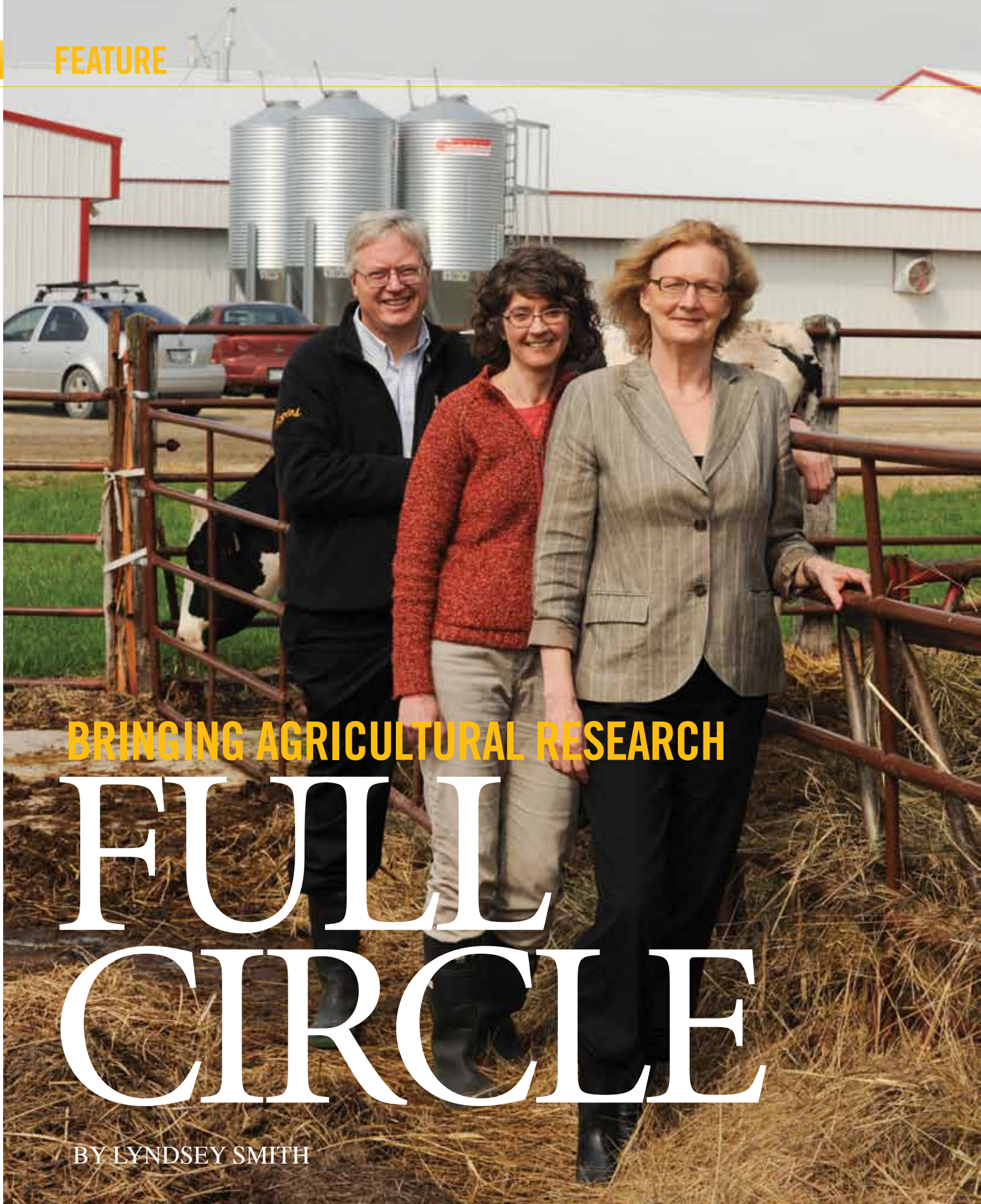
The ultimate goal of this research is to obtain structural information to be used for the design of drugs able to specifically target and shut down the replication of this virus in infected human cells without causing further harm to the individual.

*The Canada Foundation for Innovation and Manitoba Research and Innovation Fund both provided support to the laboratories of Sean McKenna and Brian Mark.*



Stefanie Novakowski

FEATURE



BRINGING AGRICULTURAL RESEARCH

# FULL CIRCLE

BY LYNDSEY SMITH

Mike Latschislaw

(l-r) NCLE team members Don Flaten, Kim Ominski, Karin Wittenberg

A substantial Canada Foundation for Innovation grant, with matching funds from the Manitoba Research and Innovation Fund, provided much needed infrastructure that became the one-of-a-kind, multi-disciplinary National Centre for Livestock and the Environment (NCLE). A prime example of the power of teamwork and collaboration, NCLE seeks to offer more complete answers to complex questions.

The National Centre for Livestock and the Environment (NCLE) got its start during a strategic planning session for the animal science department at the University of Manitoba. During that gathering, researchers came to the realization that working in isolation just wasn't cutting it anymore. "The traditional way of providing answers regarding animal nutrition and production management was not answering related and resulting questions of the impact on the environment or animal welfare," says Karin Wittenberg, associate dean of research for the Faculty of Agricultural and Food Sciences and professor with the Department of Animal Science at the University of Manitoba.

"It was clear that we needed a new multi-disciplinary approach to solving issues and challenges of food, fibre, feed and fuel production," she says. "Around this same time frame, the Canada Foundation for Innovation (CFI) put out the call for proposals; we saw an opportunity to develop the extensive infrastructure necessary to support the scope and scale of research we wanted to do."

The most typical agriculture research model is linear. Each input, let's say it's feed, is measured to have the greatest impact on the output, let's say that's a pound of pork or beef. But livestock produces by-products, for example, in the form of manure. What happens to the manure after it leaves the farm becomes the domain of

a different science, perhaps soil science or microbiology. What's more, crop producers need and purchase nutrients, like those found in manure, to apply to their fields, but rarely are the two production streams connected from a research perspective.

There's a reason, of course. Performing research that involves the full lifecycle of nutrients and pathogens, for example, requires the expertise of several university departments and perhaps industry or government organizations. Co-ordinating all those researchers and experts requires a framework on which to build — a framework that didn't exist at the university at the time.

The University of Manitoba did have the Glenlea Research Station, located just south of Winnipeg. "We knew we could build on the existing infrastructure, plus add other research locations, to close the research loop and start to look at the integrated, big-picture impact of agricultural practices on the environment and more," Wittenberg says.

All this discussion resulted in an \$8.8 million CFI grant, matched equally by the Province of Manitoba's Research and Innovation Fund (MRIF), that funded the infrastructure NCLE is built on. With the CFI/MRIF-funded infrastructure in place, researchers could now look at things like how a change in animal production impacted crop production, soil quality and the risk of excess nutrients in runoff water.

A scientist could look at the persistence and impact of a pathogen in manure, and how levels of that pathogen changed based on feeding or housing changes, or how a pasturing strategy changed the net greenhouse gas emissions of cattle production, all the while focusing on their own field of expertise.

## PARTNERSHIP IN ACTION

Don Flaten, professor of soil science with the University of Manitoba and current chair of NCLE, highlights why a collaborative effort is so necessary when it comes to agricultural research. "Fundamentally, farmers first have to remain profitable to stay in business," he says. But agriculture is also one of the few industries that relies and interacts so extensively with the natural environment. It means that there's a heavy burden on farmers to produce food and feed in a sustainable, environmentally-conscious way. That also means that agriculture research can be very complex and involves several different disciplines to fully answer a question.

As an example, one project can easily grow to include six university departments, a livestock commodity group and a federal department. Just ask Kim Ominski, associate professor of animal science with the University of Manitoba, and a lead researcher from one of NCLE's first multi-disciplinary projects. The six-year

pasture study based at La Broquerie, Man., brought together in excess of 10 different organizations, not to mention several departments within the university and local businesses and groups.

“The team-based approach is inclusive,” says Ominski. “All players have ownership of the project, and because of that reality, step up and perform whatever part of the

study that is best suited to its organizations’ strengths. There’s buy-in because of that. It becomes ‘our’ research initiative, not ‘mine’ or ‘theirs.’”

While the La Broquerie project was the beginning of NCLE, a new project looking at feed conversion efficiency of overwintering cattle is the latest multi-disciplinary project to get the green light. What’s

unique about this project is that the impetus for it first came from the research side.

“The idea for this project started on the research side, but quickly took on a life of its own. This study will span several disciplines, from applied research to genomics, and will involve cattle groups from all three Prairie Provinces and researchers from several universities,” Ominski says. “The vision for this project is very long term, and that’s only possible because of the infrastructure at NCLE and the commitment of so many researchers and industry stakeholders.”

It would be nice to say that the collaborative effort sped up the research process, but that’s rarely the case. “There’s an incredible amount of co-operation and coordination that has to happen in order for this many departments and companies to work together,” Ominski says, “and that all takes time. However, in the end, we usually end up with results that are far more comprehensive than we could each have achieved on our own. The project will take four years, but we’ll get the maximum out of it that we can.”

## FOR THE FARM AND FOR POLICY

NCLE’s unique partnership-based approach to research has far-reaching implications that stretch from the very grassroots level all the way up to policy creation. Because of the mix of partners from many industries, work at NCLE can simultaneously make the most of the extension work that the provincial government does, for example, while fully informing policy makers, says Flaten. “In addition, each research team’s connections to government, industry, farmers and extension staff also enhance the quality and practical value of our research.”

The results from each project are everyone’s to share and make use of, Flaten says, and that can be especially helpful to commodity groups who feel under the constant pressure of scrutiny from the public.

“NCLE can provide objective and scientific research to help shape the dialogue between policy makers, the public and farmers about issues like odour control or



Mike Latschlaw



Mike Latschlaw

(l-r) Christine Rawluk (NCLE research development coordinator), researchers Don Flaten and Karin Wittenberg, in the new greenhouse adjacent to the Farm and Food Discovery Centre.

water quality. The research may be very sophisticated or very practical, and because of this partnership approach the findings are shared and can be acted upon much more quickly than the more typical trickle-down approach to research,” he says.

What fascinates and motivates Flaten is the about-face that the NCLE-model has done regarding how projects begin. “Instead of us going to a group and saying ‘What can you do for us?’ we very much reach out to commodity groups and other industry stakeholders and instead ask, ‘How can we help?’ It’s a very different mindset,” he says. “The fact that it’s incredibly fun to work on such complex projects and with such a great team of experts is just a bonus.”

## RESEARCH FOR THE LONG TERM

Wittenberg says that unlike many research projects that are three to five years in scope, NCLE’s base infrastructure and an on-going CFI maintenance grant means that researchers can measure the impact of several management practices over the long term. Of note, the centre boasts a 20-year cropping system with fully archived soil, crop and manure samples. “It’s really a living laboratory,” she says. Going forward, this means that researchers from across several disciplines can access the findings and samples from the site and incorporate that data into new research, avoiding duplication or time lost to smaller-scale projects involving only one variable.

Two recent additions, valued at \$2 million, have increased NCLE’s capacity to do research and demonstrate technologies for manure and other low value byproducts, with the goal of better nutrient recycling

and testing new ideas for creation of value added bioproducts, including energy.

What’s more, additional fundraising for NCLE was so successful, a strong teaching and outreach component was recently added to the centre. The Bruce D. Campbell Farm and Food Discovery Centre opens this fall, and will offer students and the public a chance to experience aspects of modern agriculture like never before. The centre will offer extensive, interactive displays that will teach visitors about healthy food, technology and agriculture, how to make cheese and much more.

“NCLE has started the dialogue between several disciplines, so that we can create a holistic approach to agriculture research,” says Wittenberg. “There is a strong training and learning component to NCLE as well. New grad students and researchers working with NCLE are evolving to think about challenges in a more circular, full lifecycle approach.” ■

BY SHAMONA HARNETT

# CALCULATING THE MUSE

**AN ABRUPT FRENZY OF OMINOUS CELLO MUSIC COMBINED WITH THE SOUND OF FROGS TENDS TO MAKE AUDIENCES JUMP WHEN THEY FIRST HEAR ONE OF ÖRJAN SANDRED'S FAVOURITE COMPOSITIONS.**

It's a reaction the University of Manitoba composition professor relishes.

"I want people to come to my concert and have a kick, whatever background they have," says the soft-spoken Sandred, as one of his

prize compositions—Amanzule Voices—blares out of the speakers of his music studio and laboratory. "I want them to say, 'Wow!'"

Sandred achieves his unusual music through the use of computers. In fact, he's one of the few composers in the world specializing in computer-assisted composition, a type of music writing that employs computers and mathematical algorithms.

Think of computer music and the sounds of over-produced 80s pop music might come to mind. That's not quite what Sandred's brand of music is about.



He focuses on what he calls ‘art music,’ a contemporary, experimental music genre based on advanced, complex structures.

Where most composers might sit down at an instrument and write music using their instincts, Sandred tries to push the limits of composition by creating computer programs that identify the structural compositional patterns of a composer.

“You take your idea and bring it further than you would be able to do yourself,” says the Swedish-born Sandred, who came to the University of Manitoba from Stockholm in 2005. “Otherwise, I have to trust my intuition. And if I just trust my intuition, I tend to fall back to what I did before.”

Sandred’s main goal is to create music that’s never been heard before.

Is that even possible? “No,” says Sandred, laughing.

“If I can make something that no one else thought about before, I would be very happy. But it’s very, very hard. That’s where the research comes in, I think.”

Most of Sandred’s work happens at Studio FLAT in the Marcel A. Desautels

Faculty of Music, containing computer equipment, mixing boards, electronic keyboards and speakers. The set-up of this unique research lab was funded by the Canada Foundation for Innovation and the Manitoba Research and Innovation Fund.

This is where Sandred—who started composing at age 13 on the piano—teaches some of his composition students and where he comes up with his research.

On a computer screen filled with boxes, notes and numbers, he plays with pitches and beats with the click of a mouse.

He can generate sounds that emulate any number of instruments—or he can write music that sounds computer-generated until a musician plays it.

He admits that the computers are excellent at identifying and creating music structures—but they leave out the emotion that can only come from the heart of a human composer.

“My role as a composer is to figure out how they are related. Why do certain types of structures work better and trigger certain emotions?”

He says his goal of creating music that no one has heard before is “very risky” because people are more comfortable with music structures they recognize.

But he’s willing to take the risk. And so are art music audiences around the world. Audiences and music researchers from Shanghai to Paris follow Sandred’s work.

This fall, he’s slated to perform at Paris’ Auditorium Saint-Germaine. (He will operate his computer while instrumentalists play the piano and saxophone).

He hopes other composers can use his research and his compositions to push their own creative boundaries.

Meanwhile, he listens closely as his interviewer reacts to his *Amanzule Voices*. He points out the symphony frogs in the composition’s fade-out—sounds he recorded while canoeing in the West African country of Ghana.

“It’s crazy, I know,” says Sandred, who admits that he “wants to wake people up” with his creations. “It’s all about communication. If I was the only person on earth, I would probably stop writing music.” ■



Images depicting the computer composition process (provided by Örjan Sandred)

# CREATIVE WORKS

## TRANSFORMING CONCRETE

BY SHAMONA HARNETT

UNIVERSITY OF MANITOBA ARCHITECTURE professor Mark West speaks about concrete building molds and columns the way poets describe their muses.

“They’re soft. They’re sensual. They’re natural. They’re beautiful. They’re interesting. They’re intelligent. They love light,” says

West, director of the Centre for Architectural Studies and Technology (C.A.S.T.).

The researcher—who is known around the world for his innovative concrete inventions—admits that most people would never consider the material the way he does.

“You see concrete as these gigantic, gray, rectangular blocks with a really crappy, rough finish on it. It’s very cold, impersonal,



(1) Mark West in his element (above, r and below) work in the C.A.S.T. lab

brutal, rectangular, flat blocks of stuff,” says West.

But not after he’s finished with it.

West and his U of M research team have changed the face of concrete. They’ve transformed it from a straight-edged, hard material into something artistic, curvaceous and sculptural. His methods also make concrete a more sustainable construction material by reducing the amount of material consumed in its construction.

Their concrete molds—used to form the walls of buildings—look like folded fabric.

They accomplish this by pouring concrete over inexpensive, plastic tarps found at construction supply stores. In turn, they create “curvy, bulgy” forms. Their y-shaped supporting columns for example look like branching trees, or artifacts from an ancient civilization.

Each concrete building component is not only beautiful, but it’s functional, says West.

“It’s efficient. It’s strong. And it’s drop dead beautiful.”

West’s research takes place at the U of M’s C.A.S.T. building, a \$1.5 million facility built nine years ago to support his research through funding from the Canada Foundation for Innovation, the Manitoba Research and Innovation Fund and Western Economic Diversification, as well as over 100 private donors from the construction industry. Students also attend workshop classes here.

The charcoal-coloured structure nestled beside the Faculty of Architecture building



Aleksandra Chomik



looks foreboding, a bit like a bunker. Inside, the vibe is more welcoming, even if dusty.

Today, calming violin music plays over a speaker as the hammering sounds of an industrial workshop grumble in the background. It's a dichotomy that matches the concrete created here.

This is where West and his team invent the methods builders, architects, and engineers can use to execute his curved and efficient concrete visions. Building small-scale models followed by full-scale prototypes is the main way they do this.

West—who came to U of M 13 years ago from his post at Carleton University—says he's used to getting calls from architects, engineers and builders from around the globe looking for advice.

A recent project: Inventing the technique that an Asian contracting firm used to build a cutting-edge Korean corporate guesthouse “with deeply folded walls.”

“That building is like a vision of something I never imagined,” says the professor.

West, a former sculptor who was raised in New York City, invented his fabric-formed concrete technique in the mid-1980s while working at the University of Kentucky.

He says his ultimate goal is to create more sustainable, cost-efficient buildings that look organic, ancient and new all at once. He also wants his buildings to be stronger and use less material than traditional reinforced concrete.

He says he's accomplishing his dreams. “We are making things that have never been seen on the planet before.”

Ronnie Araya-Caceres, agrees. The C.A.S.T. research associate and architect who hails from Chile joined the U of M team three years ago after falling in love with West's concrete techniques.



“There's something so magnetic about it. Everyday that we do this, it's like a birth. Something new comes out of the mold and it's like, ‘Wow.’ And that feeling hasn't stopped,” says Araya-Caceres. ■

## CIHR CAFÉ SCIENTIFIQUE

# 2011



Melini Ghattora

Café scientifiques started in the late-20th century as an informal discussion about scientific subjects. They were never intended to be lectures. The same holds true for the University of Manitoba hosted series of Café Scientifiques – sponsored by the Canadian Institutes of Health Research (CIHR) and the Vice-President (Research) Office at the UofM. What, or who, is CIHR do you say? CIHR is the largest health research funding agency in Canada and is funded by the Government of Canada – or you!

The cafés provide insight into health-related issues of popular interest to the general public, and in turn provoke questions and provide answers. The University of Manitoba

hosted Café Scientifiques bring together experts with non-researchers (you, me, neighbours, friends) in the relaxed atmosphere of McNally Robinson Booksellers, in Winnipeg, to talk about their work and the questions it raises. Come and join the discussion!

### FOOD: THE ANSWER TO WHAT AILS YOU?

September 13, 2011 – 7:00 p.m.  
McNally Robinson Booksellers  
Winnipeg



### BREAST CANCER RESEARCH: WHAT DOES THE FUTURE HOLD?

October 11, 2011 – 7:00 p.m.  
McNally Robinson Booksellers • Winnipeg

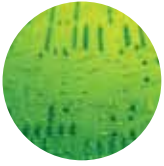


### ORAL HEALTH: MORE THAN JUST BAD BREATH

November 1, 2011 – 7:00 p.m.  
McNally Robinson Booksellers • Winnipeg

RSVP recommended to  
[research\\_communications@umanitoba.ca](mailto:research_communications@umanitoba.ca) or (204) 474-9020





# JUST THE FACTS

## CANADA FOUNDATION FOR INNOVATION

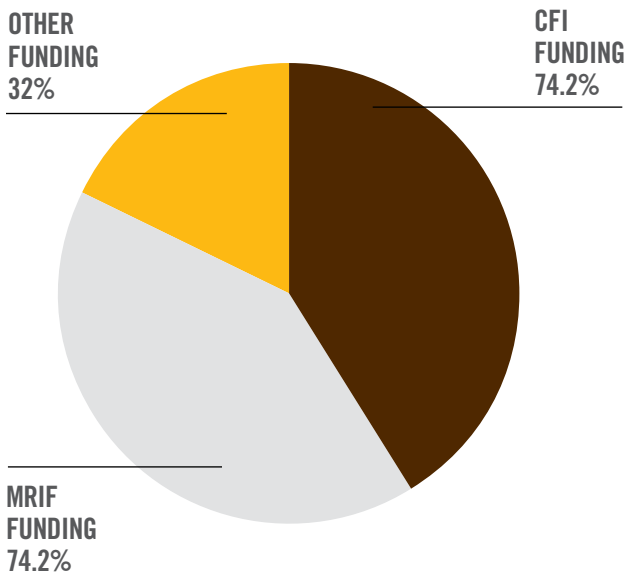
Created by the Government of Canada in 1997, the Canada Foundation for Innovation (CFI) strives to build our nation's capacity to undertake world-class research and technology development to benefit Canadians. CFI normally funds up to 40 per cent of a project's infrastructure costs which are invested in partnership with eligible institutions and their funding partners from the public, private, and voluntary sectors who provide the remainder. In Manitoba, the Province of Manitoba matches 40 per cent of a project's infrastructure costs.

## MANITOBA RESEARCH AND INNOVATION FUND

The Manitoba Research and Innovation Fund was created to help increase the capacity of the province's universities, colleges, hospitals and other institutions to carry out important, world-class research and development. Since 2003, it has provided over \$90 million in research and innovation support for health and agriculture, technology and aerospace, cultural and new media industries, and alternative energy developments.

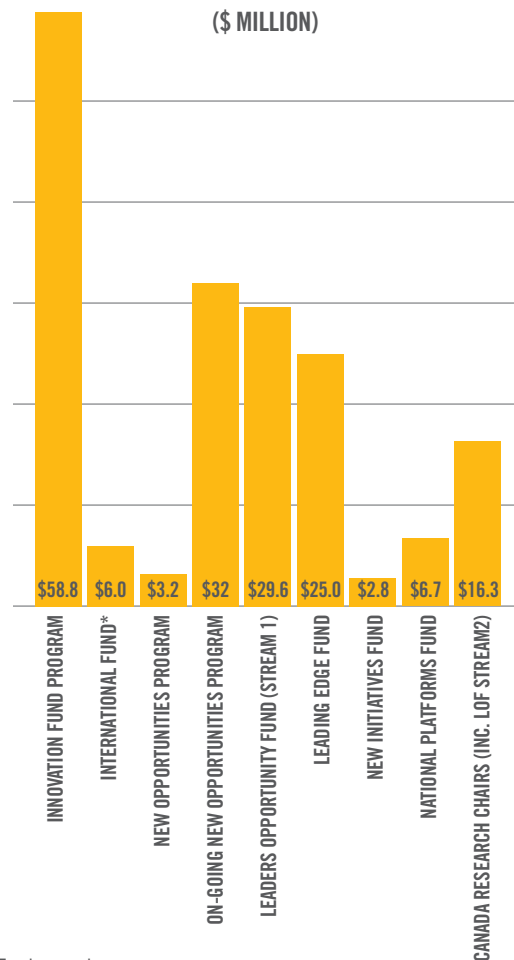
Together, CFI, MRIF and other partners have supported \$180.4 million in research infrastructure at the University of Manitoba.

### TOTAL SUPPORT FOR RESEARCH INFRASTRUCTURE FROM CFI, MRIF & OTHER



**TOTAL PROJECT FUNDING: \$180.4 MILLION**

### BREAKDOWN OF CFI SUPPORT PROGRAMS



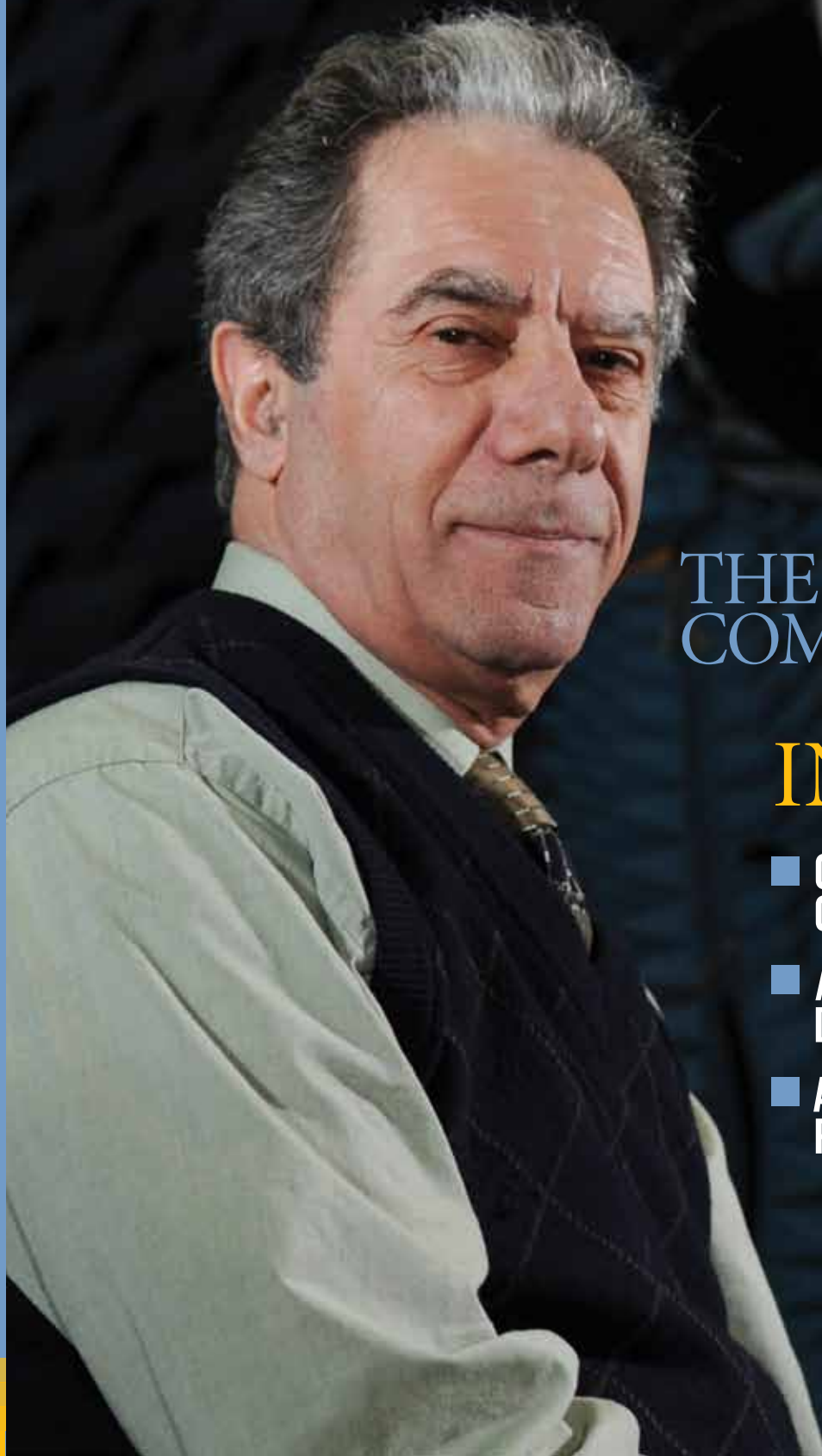
\*International Fund covered 100% of eligible project costs.



(l-r) Kim Ominski and Karin Wittenberg from the National Centre for Livestock and the Environment (see story on page 25).



# UNIVERSITY OF MANITOBA Research **LIFE**



THE GREAT  
COMMUNICATOR

## INSIDE:

- CFI PRESIDENT  
GILLES PATRY
- *MAMAWIPAWIN:*  
DAWN OF A NEW ERA
- AGRICULTURAL  
RESEARCH FULL CIRCLE