

UNIVERSITY OF MANITOBA

ResearchLIFE

SPRING 2022 | VOLUME 1

CHURCHILL MARINE OBSERVATORY

Marine science in
Canada's third ocean

GROUNDED PERSPECTIVE

Artworks connect to the natural world

MEASURING RECONCILIATION

Canadian reconciliation barometer

SAVING LIVES WITH DATA

Long-term partners get quick results

TRANSFORMING AGRICULTURE

Leveraging technology

Message

FROM THE VICE-PRESIDENT
(RESEARCH AND INTERNATIONAL)



THIS ISSUE MARKS MY LAST IN MY role as vice-president (*research and international*) at UM. The magazine has afforded me the opportunity to share the incredible research, scholarly works and creative activities undertaken by the exemplary group of university faculty members, post-doctoral fellows and students at UM.

It has been my privilege to oversee the research enterprise at UM for the past thirteen years. I sat down with

this magazine's editor to chat about my time in my administrative role. You can read an excerpt from that conversation in the Insights section (*page 18*).

In this issue you will read about some of the things I think of as having had a hand in making come to fruition, like the opening of the Churchill Marine Observatory, slated to open in 2022.

During my term there were many such infrastructure projects that resulted in new facilities that support research, teaching and learning at UM. They include the Taché Arts Complex, the Manitoba Institute for Materials, the Stanley Pauley Engineering building, Smartpark Innovation Hub, the Richardson Centre for Functional Food and Nutraceuticals, the Canadian Wheat Board Centre for Grain Storage Research and the Sea-ice Environmental Research Facility.

I am especially proud of the growth in undergraduate research experiences and support. When launched in 2012, we were the first university in Canada to offer the Undergraduate Research Awards in all disciplines open competitively to all students. You can read more about undergraduate research and sparking the interest of the next generation in the Spotlight on Students section (*page 36*).

I look forward to seeing the further growth of the research enterprise at UM for years to come. I close with my sincere and heartfelt gratitude to you, our readers, our supporters and our partners.

—Digvir S. Jayas, OC, PhD, DSc, PEng, PAg, FRSC



12



20



26



38



32



SPRING 2022 | VOLUME 1

IN EVERY ISSUE

- 4 Happenings & Kudos**
An array of research news and awards
- 11 Viewpoint**
Hockey parents who yell at referees
- 17 Books of Note**
Grains: Engineering fundamentals of drying and storage
- 18 Insights**
Dr. Digvir S. Jayas, VP (Research and International)
- 24 Centres & Institutes**
A decade of human rights research
- 30 Innovation**
From lab to market
- 31 Innovation**
Manitoba Industry-Academic Partnership
- 36 Spotlight on Students**
Seeing the bigger picture
- 42 On the Horizon**
Upcoming events
- 43 Just the Facts**
Research facts and figures

FEATURES

- 12 Churchill Marine Observatory**
Science facility opens in sub-arctic region
- 20 Grounded Perspective**
Artworks connect to the natural world
- 26 Taking up the work of Reconciliation**
Canadian Reconciliation Barometer
- 32 Saving Lives with Data**
Long-term partners get quick results
- 38 Transforming Agriculture**
Leveraging technology

ResearchLIFE

Return undeliverable
Canadian addresses to:

UNIVERSITY OF MANITOBA
Office of the VP (Research and International) 111 Administration Building
Winnipeg, MB Canada R3T 2N2

ResearchLIFE@umanitoba.ca

Vice-President (Research and International) Digvir S. Jayas

Editor: Janine Harasymchuk

Art direction: Kathryn Carnegie

Design: UM

CONTRIBUTORS: Julie Brodeur, Sharon Chisvin, Helen Fallding, Ron Friesen, Jahssme Guillaume, Marianne Mays Wiebe, Susan Peters

PHOTOGRAPHY: Sarah Ciurysek, Alex De Vries, Helen Fallding, Nardella Photography and UM Photography Services

Member of the University Research Magazine Association: www.urma.org
umanitoba.ca/research

Publication of this magazine is supported by funding from the Government of Canada's Research Support Fund, as is all research at the University of Manitoba.

ISSN# 1918-144



1



2



3



4



5



6



7

Inspiring Minds

The 2021 recipients of the Terry G. Falconer Memorial Winnipeg Rh Institute Foundation Emerging Researcher Awards are exemplary UM faculty members in the early stages of their careers. They have displayed exceptional innovation, leadership and promise in their fields of research, scholarly activities and creative works.

APPLIED SCIENCES

1 Sabine Kuss (chemistry) investigates molecule transport across cell membranes by electrochemistry. The transport of metabolites, ions and pharmaceuticals is a crucial part of survival mechanisms for any living cell. The overall goal is to detect diseases, such as cancer, and to understand the development of medical phenomena, such as antimicrobial drug resistance, endocrinological diseases and mitochondrial dysfunctions. In the Kuss research team bio-electroanalytical assays are being discovered and developed into rapid, accurate and cost-efficient point-of-care biosensor devices, aiming to save time, health care costs and, most importantly, lives.

2 Filiz Koksel (food and human nutritional sciences) is a food scientist with expertise in food processing and non-destructive assessments of food quality. Her research program aims to tackle issues related to an ever-increasing demand for sustainable high-quality plant-based foods at the interface between food processing and materials science. To bring Canadian crops from the field to our tables, her program looks at several process unit operations involved - such as milling, mixing, baking, texturization and extrusion - in transforming these crops into foods with superb palatability and nutritional value.

HEALTH SCIENCES

3 Natalie Mota (clinical health psychology) uses epidemiologic data to study the psychological and physical impacts of trauma exposure in the general population and among individuals who serve in high-risk occupations (e.g., military, public safety

personnel). She is particularly interested in understanding sex and gender differences in traumatic experiences and coping, and in identifying resilience factors that can mitigate the development of post-traumatic stress disorder (PTSD) and related conditions. The overarching goal of her research is to use this knowledge to develop and improve upon prevention programs and treatments for PTSD and to increase their delivery on a larger scale.

HUMANITIES

4 Amar Khoday (Faculty of Law) studies the connections between resistance and the law. Resistance is manifested in public and private spaces through myriad forms of conduct – ranging from the violent to the non-violent, the lawful to the criminal and the directly confrontational to the clandestine. His research considers the ways in which resistance shapes law, and importantly, how law may legitimize acts of resistance. With respect to the latter, he examines the narratives and legal norms that sustain such legitimacy.

INTERDISCIPLINARY

5 Aleeza Gerstein (microbiology, statistics) studies the evolution of human fungal pathogens. Her interdisciplinary lab combines clinical sampling, microbial experiments, bioinformatics and statistical methods to understand the factors that influence when and how drug resistance arises and the conditions that promote virulence. The team has a particular interest in understanding the cause of recurrent yeast infections, a chronic condition that affects many women. Persistent infection in the human body essentially represents

‘evolution-in-action’, as the microbial population adapts to repeated cycles of drug stress. Her work seeks to identify novel treatment strategies to reduce the physical and emotional costs of these infections.

NATURAL SCIENCES

6 Raphaël Clouâtre (mathematics) studies operator algebras. These are collections of infinite-dimensional matrices and they arise in the mathematical foundations of quantum mechanics. Classical tools are available to analyze certain symmetric operator algebras. In some scientific applications however, no such symmetry is present. The goal of the research program is to develop tools to better handle and to exploit this absence of symmetry, by viewing operator algebras as consisting of what one may call “non-commutative functions.” The resulting theory underlies recent developments in quantum information.

SOCIAL SCIENCES

7 Fenton Litwiller (Faculty of Kinesiology and Recreation Management) studies gender euphoria and queer joy. They are currently developing a project driven by interrelated research questions about gender, youth and sexuality by connecting queer youth to a drag performance and genderplay workshop. In this ethnographic research context, mentors work with youth to explore gender through make up, movement to music and costuming. This work has the potential to promote queer youth wellbeing by creating possibilities for making sense of, and naming, oneself, and by connecting youth to needed community allies and resources.

Vanguard of Kidney Transplantation

Improving Outcomes for Patients

BY SHARON CHISVIN

The field of transplant immunology medicine is life altering and life giving. It is also extraordinarily complex and challenging. Dr. Peter Nickerson has devoted his career to understanding those complexities and overcoming those challenges, and in the process has transformed transplant services across Canada.

A Distinguished Professor of Internal Medicine and Immunology at UM, Nickerson holds the position of vice dean (research) in the Rady Faculty of Health Sciences and is the Medical Director of Transplant Manitoba.



AN INTERNATIONAL SUPERSTAR IN THE FIELD OF TRANSPLANT immunology research and clinical services delivery, Nickerson is the 2021 recipient of the prestigious Dr. John M. Bowman Memorial Winnipeg Rh Institute Foundation Award. The award recognizes outstanding research accomplishments by a current, established UM faculty member.

After graduating from UM with a BSc and MD in 1986, Nickerson completed a postdoctoral research fellowship at Harvard Medical School. Returning to his alma mater in 1995, he immediately established a clinical research program in transplant medicine.

In the 27 years since then, that program has significantly enhanced patients' access to transplants, reduced their risk of rejection, personalized their drug delivery and improved their quality of life.

"The one thing I've done the most and that has had the greatest impact was around assessing pre-transplant risk for developing rejection post-transplant," Nickerson explains.

By applying an ultra-sensitive cross match system that had never been used clinically in Canada, Nickerson began testing the compatibility between kidney donors and their recipients in order to discern if the recipients had previous exposure—as determined by the presence of low-level antibodies—to their donors' tissue type. Previous exposure, as was well known, meant that the recipients would likely reject their new organs. But by discovering and documenting that exposure in advance, Nickerson was able to make those rejection scenarios all but obsolete.

"I'm very humbled to get this award as it recognizes the pioneering work of what we are doing. Being recognized as a leader in our area and having that in connection to the prestige of who John Bowman was is a real honour."

Once it became evident that Nickerson's approach translated into significantly improved one-year outcomes for kidney allograft survival, this cross match system was adopted as the standard of practice across Canada and around the world.

That success, in turn, led to Nickerson establishing an interprovincial organ sharing system in partnership with Canadian Blood Services—where Nickerson serves as medical advisor in the organ donation and transplantation division. From its onset, that system encompassed two groundbreaking programs that have greatly increased the number of donor recipient matches made in Canada. While the kidney-paired donation program matches living donors with non-related recipients, the highly sensitized patient program

Dr. Peter Nickerson, Distinguished Professor of Internal Medicine and Immunology at UM, is vice dean (research) in the Rady Faculty of Health Sciences and the Medical Director of Transplant Manitoba.

identifies compatible donors for the most challenging to match transplant candidates.

"For individuals who have very high levels of antibodies, it was like a needle in the haystack to find them a compatible donor," Nickerson explains. "But instead of them just having access to the local provincial donor pool that exists they now had access to donors from the entire country."

Nickerson and his team's other main area of research in recent years has focused on the development of another ground-breaking scoring system designed to improve transplant outcomes. By examining the degree of similarity between potential donors and recipients at the level of a single amino acid, Nickerson's HLA molecular mismatch scoring system makes it possible to accurately predict and customize the amount of immunosuppressant therapeutics required post-transplant. The personalization of drug therapy, in turn, mitigates the risk of both rejection and infection.

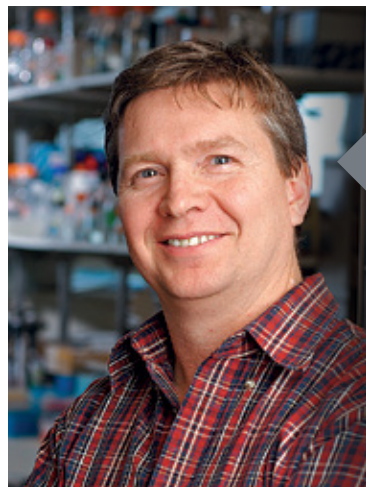
That research, like all of Nickerson's investigations, has been generously supported by the university, where he holds the endowed Flynn Family Chair in Transplant Medicine, as well as by a variety of funding bodies. While Nickerson has received myriad appointments, accolades and awards, being honoured with one named for Dr. Bowman has special significance for him.

"I'm very humbled to get this award as it recognizes the pioneering work of what we are doing," Nickerson says. "Being recognized as a leader in our area and having that in connection to the prestige of who John Bowman was is a real honour."

That honour is clearly well deserved by a clinician scientist whose lifelong interest in immunology and transplant medicine has meant longer life for so many patients in his care. **IR**

Meritorious Recognition

Ten UM researchers and scholars were recognized in 2021 for excellence, expertise, service and leadership in their fields in Canada and beyond.



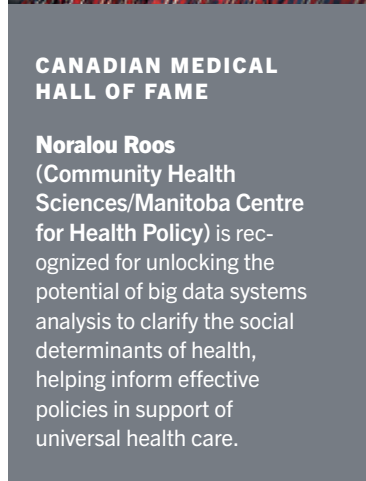
CANADIAN ACADEMY OF HEALTH SCIENCES

Keith Fowke (Medical Microbiology & Infectious Diseases) researches individuals who are intensely exposed to HIV, yet remain uninfected, have been paradigm shifting and led him to develop the “Immune Quiescence (IQ) hypothesis”.



CANADIAN ACADEMY OF HEALTH SCIENCES

Ruth Ann Marrie (Medicine, Community Health Sciences) is known internationally for her innovative work regarding the effect of comorbidity on people with multiple sclerosis (MS), a largely unexplored area in the field of MS before she began her work.



CANADIAN MEDICAL HALL OF FAME

Noralou Roos (Community Health Sciences/Manitoba Centre for Health Policy) is recognized for unlocking the potential of big data systems analysis to clarify the social determinants of health, helping inform effective policies in support of universal health care.



CANADA RESEARCH CHAIR (CRC)

Rotimi Aluko (Food & Human Nutritional Sciences/Richardson Centre for Functional Foods & Nutraceuticals) Tier 1 CRC in Bioactive Peptides, seeks to convert regular (or inert) food proteins into smart or active molecules called peptides that can correct or normalize metabolic deficiencies and positively impact human health.



CANADA RESEARCH CHAIR (CRC)

John Ataguba (Community Health Sciences) Tier 2 CRC in Health Economics, is developing and applying a framework and metrics that will help countries assess their progress toward universal health coverage.



CANADA RESEARCH CHAIR (CRC)

Samar Safi-Harb (Physics & Astronomy) Tier 1 CRC in Extreme Astrophysics, seeks answers to fundamental questions about the behaviour of matter in extreme environments unattainable on Earth, and the origin of the heavy elements and of high-energy cosmic rays driving the chemical and dynamical evolution of galaxies.



ORDER OF CANADA & ROYAL SOCIETY OF CANADA

Evelyn Forget (Community Health Sciences) is a multidisciplinary political economist who uses the tools of economics to inform policy debate locally, nationally and worldwide.



ORDER OF CANADA

Gerald Friesen (History) for his contributions to Canadian historical discourse through his inclusive and comprehensive research on Indigenous and ethnic groups in western regions.



ROYAL SOCIETY OF CANADA

Michael Eskin (Food and Human Nutritional Sciences) has made exceptional contributions to research on edible oils, particularly canola oil, and is one of world's leading food science writers.



ROYAL SOCIETY OF CANADA

Meghan Azad (Pediatrics & Child Health; Children's Hospital Research Institute of Manitoba) is shaping policy and practice regarding infant feeding, human milk banking and maternal-child healthcare. She holds a Tier 2 CRC in Developmental Origins of Chronic Disease. Azad was also recognized as one of Canada's Top 40 Under 40.

The Most Powerful Women in Canada



Joanne Embre



Patricia Birk



Melanie MacKinnon



Tracie Afifi



Janice Ristock



Tina Chen



Melanie Morris

A RECORD SEVEN PROFESSORS AT UM HAVE BEEN NAMED AMONG Canada's Top 100 Most Powerful Women in 2021, by Women's Executive Network (WXN). Launched in 2003, WXN is Canada's national organization that propels and celebrates the advancement of women at all levels, in all sectors and of all ages. The winners range from rising stars to top of their fields to advocates to champions for others to community leaders to teachers and students.

CIBC Executive Leaders category recognizes women who not only exemplify what it means to be a great leader, but also build confidence and champion others.

Joanne Embre (Pediatrics & Child Health/Children's Hospital of Winnipeg) is a pioneer in the study of childhood infectious diseases, having been the medical lead for infection prevention and control at the Children's Hospital since 1990. She is also a member of the National Certifying Committee for Vaccine Preventable Diseases in Canada and a member of the Infection Prevention and Control Expert Working Group for the Public Health Agency of Canada and its chair, since 2017.

Janice Ristock (Women & Gender Studies and former UM Provost & Vice-President), her scholarly work focuses on community well-being and social justice, with an emphasis on the intersecting areas of gender and sexuality. While in her administrative role, she enhanced teaching excellence, advanced student supports for well-being and mental health, and furthered the UM's commitments to equity, diversity and inclusion and to Indigenous engagement.

Intact Professionals category recognizes women who are professionals in practice and play a leadership role within their organizations.

Patricia Birk (Pediatrics & Child Health) is focused on addressing inequities in care and leading systemic changes.

Tina Chen (History) is a champion of equity, diversity and inclusion.

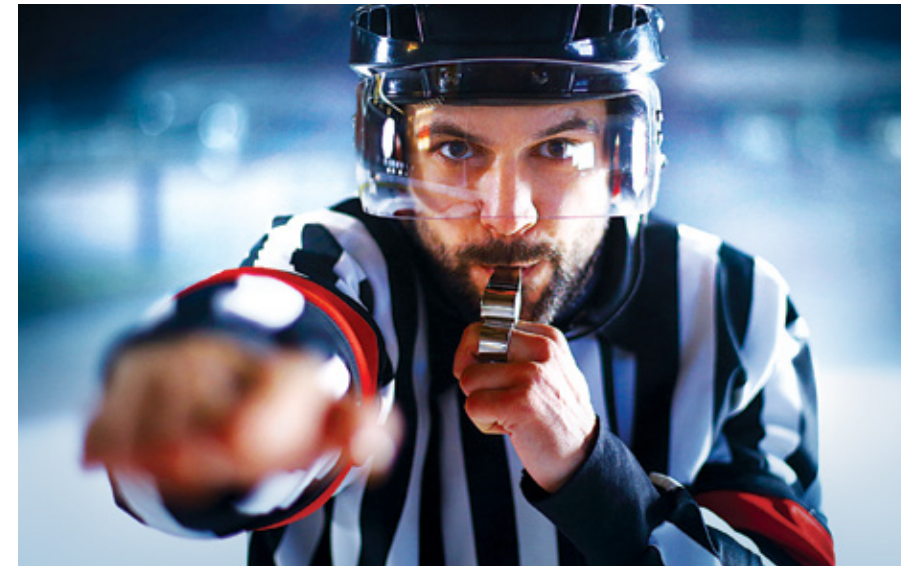
Melanie MacKinnon (Ongomiizwin Indigenous Institute of Health and Healing), whose patient-centered and culturally safe approach to health program design and delivery has modernized the outreach medical model.

Mercedes-Benz Emerging Leaders category recognizes women who have been targeted for successive leadership positions within their organizations and have a proven passion for learning and innovation.

Tracie Afifi (Community Health Sciences/Psychiatry) CRC in Childhood Adversity and Resilience, researches child maltreatment, mental health, intervention and prevention.

Melanie Morris (Rady Faculty of Health Sciences), the first Indigenous pediatric surgeon in Canada who has created a minimally invasive program of pediatric urology.

These seven winners join 20 previous UM recipients named Canada's Most Powerful Women: Top 100 since the awards began. **IR**



Hockey Parents Who Yell at Referees

BY JULIE BRODEUR

HOCKEY REFEREES ARE QUITTING IN THE PROVINCE (SPORT Manitoba, 2019) and, when asked, referees often state that spectator abuse is a reason for quitting. To this end, Sport Manitoba created a campaign aimed at bringing awareness to declining numbers of officials, with the use of #norefnogame as a tag on social media accounts. While their campaign wasn't aimed only at hockey referees or those sports where officials were quitting, the campaign served to illustrate that without officials, sport has a problem.

I am seeking to learn if parents of youth hockey players experience passion for the activity of being a hockey parent and if they do, do those parents who are higher in obsessive passion tend to show more verbal aggression toward officials?

Throughout my own exposure to youth sport, I noticed different behaviours from different parents in the stands. These behaviours piqued my curiosity into why some parents behave in an exemplary way in relation to their children's sport, while others fulfilled the stereotypical role of the parent who goes berserk at their children's sport. I wanted to understand why some parents may come to behave in ways that would be detrimental to organized sport.



Julie Brodeur, MA in Kinesiology and Recreation Management

This led me to begin examining the role of passion in parents of youth athletes, specifically youth hockey players in Canada. I chose this population for a few reasons; my familiarity with the sport and the prevalence of hockey in Canada. My advisor, Dr. Ben Schellenberg studies passion in sports fans and hockey parents could be considered the ultimate sports fans.

Passion, as defined through the work of Robert Vallerand, arises from an activity that a person finds enjoyable or even loves, invests time, effort and energy into, identifies with and values. Vallerand's work in passion identifies different types of passion. One type—obsessive passion—often involves maladaptive outcomes and has been linked to poor fan behaviour in some studies. It is thought that obsessive passion emerges from unbalanced needs in people's lives. My research aims to look at if the role of a persons' basic psychological needs and whether those needs are fulfilled in general, or only through an activity, can be a cause of passion. In other words, if someone feels autonomy, relatedness, and competence in general they may tend to be more harmoniously passionate in being a hockey parent. Alternatively, if someone does not have their basic psychological needs met in general, but only in being a hockey parent, the thought is that this person may be higher in obsessive passion.

I am seeking to learn if parents of youth hockey players experience passion for the activity of being a hockey parent and if they do, do those parents who are higher in obsessive passion tend to show more verbal aggression toward officials? The final piece of the puzzle comes from where passion arises. My research asks parents to report their needs, obsessive passion and spectating behaviour to test the possibility of needs, obsessive passion and yelling at referees all being correlated.

I hope to be able to fill that research gap of where passion arises, as well as to gain more insight into parental behaviours in youth sport. This will help us create better sporting environments for players, parents, coaches and officials. **IR**

MARINE SCIENCE

PAIRING
SCIENTIFIC
RESEARCH
WITH
COMMUNITY
IMPACTS

BY SUSAN PETERS

The Churchill Marine Observatory (CMO) is opening, after years of delays from the shutdown of the rail line to Churchill and COVID-19. While the Environmental Observing (EO) system, which includes the research vessel (R/V) William Kennedy, has been operating since 2018, the Ocean-Sea Ice Mesocosm (OSIM) is getting ready to start its first experiments.



The University of Manitoba is sad to share news of the passing of Distinguished Professor Dr. David G. Barber on Friday, April 15, 2022, following complications from cardiac arrest. Through his vision, leadership and endless efforts, Dr. Barber established UM as a global leader in Arctic research. His tireless work has helped to place Canada at the forefront of Arctic research and created opportunity for innumerable students, professors and research staff collectively, working to better understand the rapidly changing Arctic and its impacts on people, diverse habitats and beyond.



IT'S A ONE-OF-A-KIND FACILITY THAT'S GOING TO BE extremely useful to understand the impacts of climate change," said David Barber, a professor and Canada Research Chair in Arctic-system Science who headed the CMO. "The shipping lanes have never really been open for human use and now they're opening up. Though we're not used to thinking of it that way, the Arctic gives Canada access to a third ocean."

Pride of place in the \$45 million facility are the twin outdoor pools of OSIM. Filled with freshwater or ocean water, the OSIM tanks allow for experiments where one pool serves as a control and one as an experimental pool to study how marine transportation-related contaminants such as oil spills interact with water and ice.

Feiyue Wang, a professor and Canada Research Chair in Arctic Environmental Chemistry at the Centre for Earth Observation Science (CEOS) in the Clayton H. Riddell Faculty of Environment, Earth, and Resources, is the chief scientist in charge of the OSIM pools.

"THE SHIPPING LANES HAVE NEVER REALLY BEEN OPEN FOR HUMAN USE AND NOW THEY'RE OPENING UP. THOUGH WE'RE NOT USED TO THINKING OF IT THAT WAY, THE ARCTIC GIVES CANADA ACCESS TO A THIRD OCEAN."

"I'm a chemist, so I think of this as a bigger beaker," Wang jokes. His research has focused on legacy contaminants such as mercury and now emerging contaminants like oil spills and microplastics.

More seriously, Wang describes the windows built into the pools as an education opportunity that will allow students and community members to watch processes like how oil freezes in ice.

"The main thing is these youth are the future of Arctic research. Scientists, researchers and leaders will come out of these youth. We want them to take the next step and be a researcher in their own homeland, connected to science and technology, and linked with traditional knowledge."

The outreach includes Frontier School Division students who are welcomed to shadow CMO researchers or work on science fair projects.



Feiyue Wang, professor of environment and geography at CEOS and OSIM chief scientist at CMO.



Gary Stern, board co-chair of the CMO and adjunct professor of environment and geography at CEOS and lead on the GENICE project.



PREVIOUS PAGE: Churchill Marine Observatory located on Cape Merry Road, Churchill, Manitoba

CURRENT PAGE: Top left: OSIM pool, other photos of interior spaces, bottom right is exterior photo of CMO

“We tend to think we’re a prairie province or a Canadian shield province, but we’re a coastal province. People fly to Florida to see the ocean, and I always wonder, why not fly to Churchill instead?” says Wang.

As the largest facility at the University of Manitoba, the CMO is opening with high expectations, given the impact of climate change, the risk of spills from a fuel delivery to Arctic communities and increased ship traffic in general. There’s also oil exploration and drilling in the Russian Arctic, as well as U.S. interest in Arctic oil.

“IN THE EARLY DAYS, WE WERE A SMALL GROUP AND WE WOULDN’T HAVE BEEN ABLE TO GET THE FUNDING FOR THE CMO, BUT OVER TIME WE GOT BIGGER AND BETTER, AND WE WERE ABLE TO COMPETE FOR FUNDING.”

“Regardless of whether Canada continues to extend our moratorium on oil exploration and drilling in Arctic marine waters, should there be a spill in international waters, the oil knows no boundary and could still end up in Canadian waters, for example, the 2020 Norilsk oil spill in Russia,” says Gary Stern, board co-chair of the CMO and lead of the GENICE project. With a background in contaminant research, he studies to what extent native bacteria present in Arctic marine waters could naturally respond and biodegrade the spilled oil. The research ties into how remote communities might be prepared to be the first responders to an oil spill—or know when to stand back—when a spill occurs near them.

“For people who live in the Arctic, this is important for them. They’re the first responder to oil spills and it’s important for them to understand how to respond,” says Stern. It’s another facet of the community relations that CMO researchers have built over time.

Designed to work with industry partners, the CMO has collaborated with organizations such as Manitoba Hydro, Environment Canada, NASA and other space agencies. On the academic side, the facility gives the opportunity to collaborate with researchers at international institutions like University of Copenhagen and Aarhus University in Denmark, and University College London, along with domestic universities both large and small, ranging from the University of Calgary to the University of Quebec at Rimouski. Undergraduate students from UM in engineering, chemistry, geography and social science may find jobs at the facility this summer.

All those scientists visiting Churchill represent a boon to the region’s economic development. Barber noted Churchill’s long-time mayor has been lobbying for a facility similar to the CMO for almost 20 years: “He sees science as an economic pillar of the community.” If the CMO has been a long time in coming, it echoes how UM has built its research strengths in the Arctic. “In the early days, we were a small group and we wouldn’t have been able to get the funding for the CMO,” said Barber. “But over time we got bigger and better, and we were able to compete for funding.” The result of those years of efforts is now coming to fruition. **IR**



OCEANOGRAPHIC RESEARCH



CJ Mundy, professor of environment and geography at CEOS and EO chief scientist at CMO

TOP RIGHT: Research Vessel William Kennedy

OPERATED ALONG WITH THE ARCTIC RESEARCH Foundation, the R/V William Kennedy has a shallow draft that allows it to sail near the shores of coastal communities where large icebreakers can’t reach.

“We’ve been able to sample shallow coastal areas that we wouldn’t be able to typically access with a larger vessel like the CCGS Amundsen,” says CJ Mundy, chief scientist in charge of the CMO-EO. “It opens up research in the coastal Arctic, like Hudson Strait, Hudson Bay, Foxe Basin and James Bay.”

One annual task for the ship is to visit the two environmental observation buoys that are moored to iron train wheels in the centre of Hudson’s Bay. The visit lets researchers download data collected over the past 12 months on oceanographic factors like salinity and temperature. “Each sensor has its own data and battery pack. You hope the sensor doesn’t leak—or the battery fail,” says Mundy, an associate professor in the department of environment and geography whose research includes algae, phytoplankton and kelp. “Sometimes it’s perfect, but the risk of sensor failure cannot be avoided. I always feel nervous when deploying and retrieving the sensors every year.” The batteries are designed to last for 24 months, in case a winter of thick ice means the ship can’t make the trip in August.

“When I’m talking to my friends, they’re surprised we have a marine observatory in Manitoba,” says Mundy. “We’re the single largest international group that focuses on sea ice, for many good reasons. One of them is the fact that Manitoba has ocean-front property on the Arctic Ocean.”

Grains Engineering Fundamentals of Drying and Storage

DRYING AND STORAGE ARE TWO significant unit operations in the food industry and are applied to both raw and processed products including cereal grains, oilseeds, legumes, flour, noodle, coffee, and cornstarch. The common characteristic of these materials is that all of them are hygroscopic and contain water. The hygroscopic properties are influenced by their physical properties, which are influenced by their storage environments such as bins, warehouses, bunkers, and temporary storage structures. This book focuses on the storage and drying of bulk products in these storage structures.



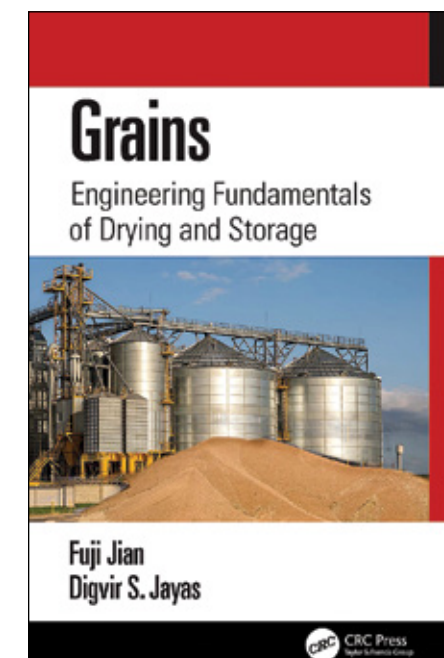
Fuji Jian is a professional engineer and associate professor in the Department of Biosystems Engineering at UM.

On many occasions in our work with the grain storage and drying personnel especially our graduate students and industry contacts, we found a book explaining the fundamental principles of grain storage and drying is needed. Therefore, the primary objective of this book is to help readers understand the fundamental principles of grain storage and drying and develop a well-informed approach to solve grain storage and drying problems. Technologies for grain storage and drying are advanced through research; therefore, literature review and background on each topic has also been included. The book is generally intended for grain storage and drying students, engineers, and scientists. As reflected in the contents which are presented at several levels of depth, this book will serve well readers with different backgrounds and interests. An effort has been made to allow for independent reading of different sections, and to make a large part of this work accessible to a non-mathematical audience.

“We hope our readers will benefit from the contents of the book for many decades.”

The authors have combined their experience of teaching grain storage and drying to undergraduate and graduate students in the Faculty of Agricultural and Food Sciences and Price Faculty of Engineering.

Material in the book is organized into broad topic areas: physical properties (Chapters 1 and 2), grain temperature and moisture (Chapters 2 and 6), water in biomaterials and relationship with its environment (Chapter 3), fundamental principles of aeration, drying, and rewetting (Chapter 4), and mathematical modelling of isotherm, drying, and re-wetting (Chapter 5). **IR**



Digvir S. Jayas is a Distinguished Professor of Biosystems Engineering at UM and vice-president (research and international).

Fuji Jian, Digvir S. Jayas (CRC Press, 2022)

Research Leader

Distinguished Professor Dr. Digvir S. Jayas has served the university as Vice-President (Research) and Vice-President (Research and International) since 2009. His administrative term is ending in 2022. What follows is an excerpt from a conversation with Digvir Jayas.

JAYAS WAS EDUCATED AT THE G.B. Pant University of Agriculture and Technology in Pantnagar, India; the University of Manitoba and the University of Saskatchewan. In addition to his current role, he served the UM as Associate Vice-President (Research) for eight years, Associate Dean (Research) in the Faculty of Agricultural and Food Sciences, Head of the Department of Biosystems Engineering and Interim Director of the Richardson Centre for Functional Foods and Nutraceuticals. He has also served nationally as Interim President of the Natural Sciences and Engineering Council of Canada and Interim-Director (CEO) of TRIUMF (Canada's particle accelerator centre). He is a Registered Professional Engineer and a Registered Professional Agrologist and previously held a Tier 1 Canada Research Chair in Stored Grain Ecosystems.



What are some of the initiatives you are most proud of during your term?

The new internal funding programs initiated to support researchers, such as enhanced start-up funding, internal grants funding for all disciplines and other funding programs such as University Collaborative Research Program and University Indigenous Research Program.

The other area which I can say is contribution to enhancement of research infrastructure. A lot of funding came through CFI and other federal and provincial sources, during my term. Research infrastructure has a total investment of over \$145 million in CFI funding alone. I would also include an almost 50% growth in research funding during my term. The 2020/2021 total sponsored research income was a record \$231 million.

“I HAVE A HIGH REGARD FOR RESEARCHERS IN ALL UNITS OF THE UNIVERSITY WHO CONTINUE TO WORK VERY HARD TO GROW THE RESEARCH ENTERPRISE. THEIR COMMITMENT TO RESEARCH EXCELLENCE I GREATLY APPRECIATE.”

I am also proud of the initiatives I've launched that engage and support undergraduate research at UM: the Undergraduate Research Awards, the Undergraduate Research Poster Competition as well as Science, Engineering and Technology Day [for high school students in Manitoba].

Another initiative would be Transformational Partnerships in 2013 [a new approach at that time in Canada], which brought research expertise together with industry to help solve their problems and also removed barriers to using the IP that traditionally had been there.

What major institutional priorities have you been involved with?

I am also honoured to have been involved in the bidding process to bring the National Centre for Truth and Reconciliation to the UM campus and its support in the early years.

The Canada Research Program Equity, Diversity and Inclusion (EDI) targets: UM has always exceeded expectations of the program from both the discipline perspective and the designated group perspective.

What contributions have you been involved with nationally?

Serving on TRIUMF and NSERC boards – the national entities that support the research enterprise across Canada. I was also involved in coordinating research nationally by facilitating gatherings of national VPRs twice and by serving as U15 Research Committee vice-chair for 2 years.

How do you feel research admin has changed and what's stayed same?

Certainly, what has stayed the same is always the commitment to support the researchers and supporting best applications possible for funding opportunities. It is a lot more complex research enterprise in the sense that expectations have changed over the years in relation to financial accountability, EDI, heightened regulatory requirements, the responsible conduct of research framework, and most recently, research security.

Who are some of the mentors or role models who influenced you the most in your career?

Early on, Dean Emeritus of the Price Faculty of Engineering, Garland Laliberte, who was my department head when I was hired in the then Department of Agricultural Engineering [which became what is now Biosystems Engineering]. As well as Ross Bulley, who followed Garland as department head.

During my term in administration, I would say that the leadership traits I saw exhibited by Joanne Keselman (Provost Emeritus), Emőke Szathmary and David Barnard (Presidents Emeriti) certainly influenced me.

I appreciate the opportunity UM has given me to do this role. The UM has treated me so well I have never been tempted to leave.

What's next when your term ends?

My plan is to graduate my current graduate students [8 in total]. Write a book. Organize the 2024 international Controlled Atmospheres and Fumigation in Stored Products conference.

After that, I plan to go back to my department [Biosystems Engineering] and certainly do the teaching but also try to hopefully develop a unique research program focused on training of graduate students. **IR**

BY SHARON CHISVIN

Sarah Ciurysek did not spend her childhood dreaming of becoming an artist. But as an artist she has come to realize, and appreciate, just how much that childhood, largely spent roaming the great outdoors at her family's northern Alberta farm, has impacted her artwork.

Ciurysek is a land-based photographer and multi-media artist who is constantly exploring the existential and emotional relationship between humankind and the land. Many of her images reflect barren branches, uprooted trees, graves, voids and other replications of death and decay, but much of her work also draws attention to the life-affirming properties of the land.

ARTWORKS
CONNECT TO THE
NATURAL WORLD

GROUNDED PER SPECTIVE

“A LOT OF MY WORKS ARE MOST OBVIOUSLY ABOUT DEATH,” Ciurysek explains, “and that is a subject matter that comes to the fore quite quickly. But at the same time, I’m usually aiming to encourage for the viewer a sense of returning to their body and, in spending time with the artworks, to just feel grounded themselves and present and alive.”

Her works, she adds, may be physically dark, but not necessarily heavy or sad.

“They feel inextricably tied in with the experience of living, of being human.”

Ciurysek was drawn to art, and photography in particular, through political activism, and has remained committed to photography because of what she perceives as the medium’s democratic nature.

While studying political science with a focus on Indigenous self-determination at the University of Alberta, Ciurysek worked for the student newspaper as a photographer. That combination of work and study led, after graduation, to a job with the Metis Settlements General Council in Alberta, where she edited a community magazine.

HER WORKS, SHE ADDS, MAY BE PHYSICALLY DARK, BUT NOT NECESSARILY HEAVY OR SAD. “THEY FEEL INEXTRICABLY TIED IN WITH THE EXPERIENCE OF LIVING, OF BEING HUMAN.”

“From this, I realized my deeper interest in visual art and my hopes for how art can contribute to social change,” Ciurysek says.

Ciurysek enrolled in the photography program at the Emily Carr University of Art and Design—receiving rigorous technical and conceptual training—and then went on to Concordia for a MFA. She joined the University of Manitoba as an associate professor at the School of Art in 2013.

“When I was in grad school in Montreal,” Ciurysek says, “I began to see that my experience with land was rather unusual. I felt a familiarity and comfort with the ground that I started to understand not everyone had, and I wanted to share that proximity to the ground that I felt with others.”



That desire, she adds, coincided with a determination to celebrate rural perspectives, which she found to be missing from contemporary art at that time.

“Channeling the pleasures and powers of the ground through my photographic installations seemed right to me,” the artist asserts.

Those pleasures and power are evident in both Ciurysek’s early and current work, including the 2016 photographic series, *Fell*, which depicts the dark root balls at the base of trees that have fallen over, and the photographic mural of intertwining tree branches that she is currently working on during a six-month research leave.

Ciurysek works primarily with physical photographs that have a material existence, and her images are often site specific, representing the ground as it really appears. Her 2011 photographic mural, *Landscape*, is an anomaly, made up, as it is, of soil images re-configured and recomposited from old excavation negatives. Ciurysek’s sonic photographic piece, *Dear Mary*, is an even greater departure from her usual practice. *Dear Mary*, part of a commissioned exhibit at Loughborough University in England, pays tribute to an older



Sarah Ciurysek, Associate Professor, School of Art

PREVIOUS PAGE: *Fell 2*. Silver gelatin photograph, 40”x50”, 2016

TOP: *Landscape*. Toner photographs printed on Tyvek, total size 9’x8’ (separated in 3 panels), 2011 Photo: Blaine Campbell

LEFT: *Collage-in-progress*, 2022

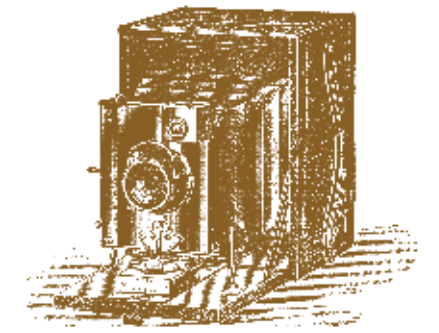
woman’s life as a farmer, while evincing Ciurysek’s feminist perspective and determination to represent unknown or undervalued women’s experiences.

Many of Ciurysek’s installations—which have been exhibited across Canada and in the UK, Austria and South Africa—are intentionally designed to require an unusual viewing experience, such as leaning over the artwork.

“I AM ALSO HOPEFUL THAT MY ARTWORKS ENCOURAGE THE VIEWER TO CONSIDER THEIR RELATIONSHIP TO THE GROUND AND THEIR RELATIONSHIP TO THE NATURAL WORLD.”

“I believe that triggering the viewer’s senses and body heightens the emotional impact of the stories that are embedded in the works,” she explains. “I am also hopeful that my artworks encourage the viewer to consider their relationship to the ground and their relationship to the natural world.”

Ciurysek encourages that same consideration in her students, whether she is introducing them to non-traditional research methods at an outdoor class at FortWhyte Alive or teaching them darkroom secrets in the School of Art’s analogue photography facilities. Those facilities, she says, are “amazing,” and are just one representation of the many ways in which the U of M so generously supports her research, her art making, and her determination to connect others with the land. **IR**



TOWARDS DECOLONIZATION

SARAH CIURYSEK’S RESEARCH AND resulting artwork have consistently reflected her ties to and passion for the land. But her approach to that research and artwork, she admits, has been as a “settler artist,” an artist who benefits from accepted art practices, even though they may be rooted in colonial power imbalances.

Ciurysek is now intent on changing that trajectory and focusing more of her practice on decolonization.

“I have been very committed to intercultural work and decolonization in my work as a teacher, and as a person,” she says, “but I haven’t explicitly worked on decolonization in my own creative research yet.”

Ciurysek’s commitment to exploring decolonization will involve creating future photographic based artwork that clearly engages with the topic. But the commitment will also involve a lot of looking back.

“Some of my work ahead is to go back and reexamine my past artworks to see if those artworks have been complicit in conventional colonial landscape art practices,” she explains.

The first step in reexamining that past will mean thoroughly researching the history of colonization in northern Alberta’s Peace River region in Treaty 8 territory. That is where Ciurysek grew up and where she first connected to, and was inspired by, the land.

“I’ve always known the general history of the area, but now I’m really turning to learning in a deeper fashion,” she says. “Not enough landscape art acknowledges the history or is working productively towards decolonization. It is time that I do that learning and address that topic.”

Centre for Human Rights Research

Celebrates 10th Anniversary with New Direction



WHEN PROFESSOR ADELE PERRY MOVED INTO HER Robson Hall office as the second director of the Centre for Human Rights Research (CHRR), the building was mostly empty and every surface was sanitized. A few months into the COVID pandemic, she took on the challenge of keeping the centre dynamic by designing research projects and public programming suited for virtual connection. One of the first online events Perry chaired was on work, care and human rights in the age of COVID. Training researchers to podcast was also on the agenda.

There are some upsides to lockdowns, such as the ability to Zoom

“It is an honour to work to build the CHRR in ways that speak to an ongoing pandemic and the pressing need to connect research to present-day barriers that too often keep people from living full and rich lives,”



Karen Busby



Adelle Perry

in top speakers from across Canada and beyond as the interdisciplinary research centre turns 10.

As a historian, Perry is taking the centre in new directions that complement the work done by founding director and law professor Karen Busby. The centre’s most recent seminar series included speakers on the contemporary implications of Canada’s history of enslaving black people, internment Ukrainians, turning away Asian migrants, purging queers and displacing Indigenous people.

“It is an honour to work to build the CHRR in ways that speak to an ongoing pandemic and the pressing need to connect research to present-day barriers that too often keep people from living full and rich lives,” Perry said. **IR**

Centre for Human Rights Research Timeline

<p>2009</p> <p>UM’s strategic plan identifies human rights as a priority, recognizing that the Canadian Museum for Human Rights will help Winnipeg become a globally recognized centre for human rights.</p>	<p>FALL 2011</p> <p>Launch of CHRR Student Speakers Bureau. Launch of the first annual Critical Conversations seminar series on an emerging human rights topic. This credit course for Law and graduate students is also open to the public.</p>	<p>APR. 1, 2012</p> <p>CHRR is granted official status and core funding by UM’s board of governors.</p>	<p>JUN. 2013</p> <p>First Anishinaabe nibi inaakonigewin (water law) multi-day, outdoor gathering led by Law professor Aimée Craft.</p>	<p>OCT. 2013</p> <p>Special issue of Canadian Journal of Woman and the Law guest edited by Karen Busby on feminist approaches to assisted human reproduction.</p>	<p>JAN. 30, 2018</p> <p>A proposal co-ordinated by CHRR to establish Canada’s first interdisciplinary Master of Human Rights degree program is approved by UM’s board of governors.</p>	<p>JUL. 1, 2020</p> <p>Distinguished Professor of history and women’s and gender studies Adele Perry takes over as CHRR director.</p>	<p>JUL. 2021</p> <p>The Canadian government agrees to an \$8-billion settlement for a First Nations drinking water lawsuit. Arguments based on CHRR research results informed the First Nations negotiating strategy.</p>
<p>2010</p> <p>Karen Busby receives \$75,000 from UM’s Academic Enhancement Fund to establish CHRR, with support from the Faculties of Law, Education, Arts and Social Work.</p>	<p>FEB. 2012</p> <p>A proposal coordinated by CHRR is submitted to the Truth and Reconciliation Commission of Canada to establish what will become the National Centre for Truth and Reconciliation.</p>	<p>2012–13</p> <p>CHRR’s research on the human right to drinking water and sanitation is funded by all three of Canada’s main research granting agencies:</p> <ul style="list-style-type: none"> • Soil scientist Annemieke Farenhorst is awarded a \$1.65-million NSERC grant to train Indigenous and non-Indigenous science and engineering graduate students to work towards water and sanitation security in First Nation communities. • CHRR director is awarded a \$200,000 SSHRC grant to explore the right to clean water in First Nations. • Community Health Sciences professor Brenda Elias and Karen Busby are awarded \$25,000 from the Canadian Institutes of Health Research. 	<p>OCT. 2015</p> <p>The Idea of a Human Rights Museum book is published.</p>	<p>FEB. 2020</p> <p>Publication of Achieving Fairness: A Guide to Campus Sexual Violence Complaints co-authored by director Busby.</p>	<p>MAY.–JUN. 2021</p> <p>Perry and her colleagues receive two SSHRC awards to:</p> <ul style="list-style-type: none"> • Launch the At the Forks online meeting place for conversation about the intersection between Indigenous rights and human rights. • Synthesize knowledge about Indigenous Women, Two-Spirit People and Public Transit in Western Canada. 	<p>JAN. 2022</p> <p>The latest Critical Conversations seminar series focuses on Human Rights and Historic Wrongs.</p>	

TAKING UP THE WORK OF RECONCILIATION

How a new measuring tool based on research can push us further down the path to good and just relations

BY MARIANNE MAYS WIEBE

The mandate of the Truth and Reconciliation Commission (TRC) was to inform all Canadians about what happened in residential schools. The TRC documented the truth of Survivors, their families, communities and anyone personally affected by the residential school experience. This included First Nations, Inuit and Métis former residential school students, their families, communities, the churches, former school employees, government officials and other Canadians. The TRC also hosted national events in different regions across Canada to promote awareness and public education about the residential school system and its impacts.

Funding for the TRC began in 2007, and it took several years to define its mandate. Its work concluded in 2015 when it transferred all of its records to the safekeeping of the **National Centre for Truth and Reconciliation (NCTR)**, created in fulfillment of part of the TRC mandate as a permanent resource for all Canadians.



WHEN CANADA'S TRUTH AND RECONCILIATION Commission (TRC) released its 94 calls to action in 2012, it was a big question for all of Canada: of how—and even if—this work would be taken up. It would take years to achieve. And how would we know when we'd arrive at Reconciliation?

But as many Indigenous leaders and educators point out, because it's relational in nature, Reconciliation is less of a question of "arrival," and more a matter of working for continual, incremental progress in building understanding and relationships between Indigenous and non-Indigenous peoples in Canada.

"WE HAVE A NUMBER OF GOALS, ONE OF WHICH IS TO UNDERSTAND WHAT RECONCILIATION MEANS TO INDIGENOUS AND NON-INDIGENOUS IN CANADA,"

And now, with the inauguration of the Canadian Reconciliation Barometer project, the digital tools that have become common over the past decade will help to assess the progress being made.

"We have a number of goals, one of which is to understand what Reconciliation means to Indigenous and non-Indigenous in Canada," says the project's principal investigator, Katherine Starzyk. As an associate professor of psychology at the University of Manitoba, Starzyk focuses on psychometrics in her academic work—relying on theory and consultation to know what questions to ask and then large surveys as well as advanced statistical methods to develop statements or questions that are valid and reliable.

LEFT TO RIGHT: Ry Moran, associate university librarian - reconciliation, University of Victoria. Photo: Nardella Photography
Monument located at Long Plain First Nation, to those killed in the 1942 airplane crash that killed students returning home from residential school.
MacRae Library at Long Plain First Nation
Monument at Millbrook, near Truro, Nova Scotia paying tribute to Glooscap—a legendary figure to the Mi'kmaq people of Nova Scotia.

HOW TO MEASURE PROGRESS?

Ry Moran calls the Barometer "a complementary tool" to the work being done by the National Centre for Truth and Reconciliation (NCTR), which was created in fulfillment of part of the TRC mandate as a permanent resource for all Canadians. Moran worked as the first director of the NCTR, established in 2015.

Simply put, the Barometer will provide more data for how we are doing as a nation, he says. "Whether we are taking substantial steps in improving the relationship between Indigenous and non-Indigenous peoples, [and] whether or not the inherent rights of Indigenous peoples are being protected and promoted."

Starzyk notes that the project currently has 13 indicators of Reconciliation, which may evolve as the project continues.

To pinpoint factors that could be used to measure progress over time, the project drew on input from Survivors, Elders and Reconciliation leaders, and research through NCTR, including Survivor statements and transcripts.

"We wanted to listen to people rather than just come up with an idea ourselves," she explains.

The research is being led by a team of Indigenous and non-Indigenous researchers, and the project has also partnered with Probe Research to increase its polling capacity.

"THE HARM INFLICTED UPON INDIGENOUS PEOPLES IS NOT ONLY A PROBLEM FOR INDIGENOUS PEOPLES. IT IS A CANADIAN PROBLEM THAT REQUIRES ALL CANADIANS TO TAKE RESPONSIBILITY AND ACTION TO REPAIR THE DAMAGE DONE."

Highlighting the gaps in understanding between Indigenous and non-Indigenous peoples in Canada and comparing progress across sectors of society, the Barometer's current indicators include: Good understanding of the past and present, Acknowledgement of ongoing harm, Respectful relationships, Personal equality and Systemic equality.

DEFINING RECONCILIATION FORWARD

Any attention to its progress equally brings into view the multifaceted aspect of Reconciliation and what it means—how it's understood by both Indigenous and non-Indigenous peoples, notes Brenda Gunn, current academic and research director at the NCTR. Gunn, who is also a professor at UM's Faculty of Law, joined the project in 2021 after starting her NCTR position.

Gunn says that a great value of the Barometer is how it "provides a perspective on Reconciliation, and a definition and a place to work from."

"There are lots of definitions out there, but part of what we have here [with the Canadian Reconciliation Barometer project] is a definition and an approach and indicators of Reconciliation that are grounded in the years of research that are drawing on existing research [through NCTR]. But the other starting point is that residential schools are just one part of a broader colonial project that was grounded in law and policy for the assimilation of Indigenous peoples."

"The hope is for the findings to help inform future public policy," Gunn adds.

"So if we accept that Reconciliation is complicated and that residential schools were part of a coordinated approach to [Indigenous] assimilation grounded in law and policy, then I hope that it becomes clear that part of what we need to do in achieving Reconciliation, moving forward, is to ... address the laws and policies that supported residential schools, and its legacy as it exists today—because we know the impacts are ongoing."

THE LONG WALK TOWARD RECONCILIATION

For, as Moran asserts, "The harm inflicted upon Indigenous peoples is not only a problem for Indigenous peoples. It is a Canadian problem that requires all Canadians to take responsibility and action to repair the damage done."

The Barometer is intended to help prevent regression and ensure continued commitment to and investment in Reconciliation, as he puts it.

"The idea of a just, fair and equitable society—and Canada—still has to be created, and the continuous nature of it is something emphasized by the calls to action."

Starzyk agrees. "The walk toward Reconciliation will be a long one and lead us down many paths."

Read more about the Canadian Reconciliation Barometer project and its first report, released in February 2022: <https://reconciliationbarometer.ca/>

From Lab to Market

BY SHARON CHISVIN



IMAGINE DEVOTING YEARS TO THE DEVELOPMENT OF AN EXCITING new technology and then realizing that the market has no interest in or need for your product. That, unfortunately, is the reality for many post-secondary innovators. A new program at UM is quickly changing that trajectory.

Lab2Market (L2M) is a commercialization program created to make Canada more competitive on the global stage while supporting innovators in realizing their entrepreneurial pursuits.

The 16-week virtual program introduces participants to an array of business skills and strategies to help them convert their lab-based research into viable and valued market commodities. It teaches them about business models and methodologies, and how to interact with stakeholders, draw up business plans and analyze markets.

“This program provides participants with the ability to clearly identify the value proposition of their product or service, based on their research.”

It also gives them access to a network of industry experts and mentors.

“The researchers bring with them assumptions and hypotheses,” explains Brenda Frisk, L2M managing director, “as we introduce the entrepreneurial tools,

it helps them to define their market and customer assumptions. Many start to pivot. It’s a constant evolution for them as they move through the process.”

Mina Enayatollahi, a UM postdoctoral fellow in mechanical engineering, knows all about that learning experience.

As a participant in UM’s first L2M cohort in the fall of 2021, Enayatollahi was able to verify the real market for her drone-based solution to enable precision agriculture and has created a start-up company to bring it to market.

“L2M acted as a catalyst for me to find the right path to bring my

idea to the market,” Enayatollahi says. “I became more comfortable with the market as I got to know the different players and stakeholders, and in addition, connecting to a great network of successful entrepreneurs and leaders was very helpful and valuable.”

“This program provides participants with the ability to clearly identify the value proposition of their product or service, based on their research,” explains Darren Fast, UM’s director of partnerships and innovation. “As well, it clearly identifies the potential end users and what product, or service features, are required for them to make a purchase.”

Many L2M participants, like Enayatollahi, finish the program with the confidence to create their own companies, while others complete the program and realize they need to return to the lab to fine tune their technology before taking it to market. Still others, of course, concede that entrepreneurship is not for them.

But no matter which route they choose, Fast and Frisk agree, L2M participants come away from the program empowered and enlightened, with new ways of thinking about their research and its potential, and new skills that undoubtedly will ensure their leadership roles in all their future endeavours.

Lab2Market is funded by PrairiesCan and Mitacs, with support from North Forge, Ryerson University, Dalhousie University, Memorial University and UM. IR

Moving the Manitoba Economy Forward

BY SHARON CHISVIN



ONE HOUR, ONE QUESTION, ONE COMPANY.

That simple and straightforward concept is at the core of the Manitoba Industry-Academia Partnership (MI-AP), an initiative that is benefitting local academia, students and industry, while driving the Manitoba economy forward.

The main objective of MI-AP is to encourage and enhance tech transfer collaboration between local industry and academia, while increasing work-integrated learning opportunities for post-secondary students and promoting Indigenous student inclusion in those opportunities. The partners include Manitoba’s nine post-secondary institutions (PSIs) alongside the Business Council of Manitoba.

“MI-AP wants to ensure that industry always knows where to turn in terms of seeking out expertise and collaborating with PSIs on problems

MI-AP wants to ensure that industry always knows where to turn in terms of seeking out expertise and collaborating with PSIs on problems they might have.

they might have,” explains Jay Doering, UM’s associate vice-president (partnerships), “It has served as a bit of a tall lightning rod for industry to know where to turn.”

MI-AP pursues its lightning rod role through a variety of collaborative strategies and schemes that take advantage

of local talent. These include engagement tables and one day events known as AIMDays™.

In fact, says Myrna Grahn, MI-AP manager, more than 30 industry academia collaborations in such sectors as digital agriculture, construction solutions and sustainable protein, have already resulted from just four designated AIMDays™ held in the past year.

“We pick a theme, for example heavy equipment and vehicle manufacturing, and spend significant time promoting the concept and engaging all the companies working in that area and invite them to submit their

research challenges, questions or problems,” Grahn explains. “Then we reach out to all PSIs and specific researchers or subject experts that could help and we invite them to join the companies at the event.”

At that meeting, the companies and researchers are divided into break-out rooms and with the help of facilitators, spend the next hour discussing one challenge that is facing the company. Researchers are then given 24 hours to prepare proposals that address that challenge, and the companies, upon receipt of the proposals, are then given five days to review them and determine which ones they like.

After that, Grahn says, the collaborations take on a life of their own.

While AIMDays™ focus on partnerships that address specific industry challenges, MI-AP’s engagement tables encourage industry and PSIs to sit down together and discuss more expansive issues. To date, topics have included supply chains, media production and green energy. Four roundtables have been hosted to deliberate coordinated provincial approaches to supporting Indigenous students.

Like the AIMDays™, the engagement tables promote networking, information exchanges and creative thinking. And like all of MI-AP’s initiatives, they are already creating new learning, research and job opportunities, as well as new opportunities for economic growth.

MI-AP is funded by PrairiesCan, with support from the Business Council of Manitoba, the University of Winnipeg, RRC Polytechnic and UM. IR

SAVING LIVES WITH DATA

**Long-term
partners get
quick results**

BY HELEN FALLDING

Women in rural northern India must clear a long series of hurdles to give birth safely, including finding a health centre with competent nurses and medication that has access to specialists if something goes wrong. University of Manitoba researcher Dr. Vasanthakumar Namasivayam is helping lower those hurdles, one by one. “It’s more exciting than overwhelming.” He leads a technical support unit embedded in the Uttar Pradesh state government that analyzes data to quickly identify and fix barriers to maternal and child health.

DR. VASANTHAKUMAR IS ONE OF MANY HIGHLY trained, high-energy team members of the UM's Institute for Global Public Health (IGPH). They love their work because they can see the results. "Our infant mortality rate was reduced by 9.4 percentage points over five years and our maternal mortality rate was reduced by 19 percentage points over two years," Vasanthakumar says. "We saved 300,000 children."

A continent away, a veteran of the institute's ground-breaking HIV prevention work in India now collaborates with government and community groups in Kenya that quickly adapted to the COVID pandemic by delivering HIV home test kits and condoms by motorcycle.

"OUR INFANT MORTALITY RATE WAS REDUCED BY 9.4 PERCENTAGE POINTS OVER FIVE YEARS AND OUR MATERNAL MORTALITY RATE WAS REDUCED BY 19 PERCENTAGE POINTS OVER TWO YEARS. WE SAVED 300,000 CHILDREN."

"What was so exciting was the innovation and resilience," says Parinita Bhattacharjee, the institute's director of program delivery, who also supports work in India and Nigeria.

Dessalegn Melesse, meanwhile, is starting up a \$1-million project funded by the Bill & Melinda Gates Foundation in his home country of Ethiopia. Originally from a small village where few had the opportunity to attend university, he co-authored a paper on the global epidemiology of C-section use that led to changes around the world while he was still an IGPH student.

"Few institutions give such opportunities for students. It's a unique place."

All three researchers hold part-time UM assistant professor appointments in the Rady Faculty of Health Sciences that allow them to work and usually live overseas close to their long-term research partners.

"It's not your objective to shine as a technical support partner," explains Bhattacharjee. Lime-light is for the community and government partners whose questions UM researchers are helping answer.

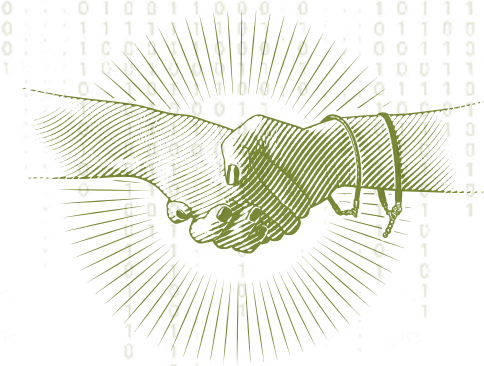
Health planners in Uttar Pradesh used to think that pregnant women needed to be persuaded to visit community health centres until research showed the women were just having trouble getting there.

"We were searching for the wrong solutions," Dr. Vasanthakumar says.

By adding pre-birth care to the childhood immunizations already offered on Village Health and Nutrition Days, Uttar Pradesh made prenatal care almost universal. Vasanthakumar's technical support unit, also supported by the Bill & Melinda Gates Foundation, then added nurse mentors to help local nurses improve their skills delivering babies and identifying complications. Oxytocin began to be administered more consistently to prevent women from hemorrhaging after giving birth but when complications arose, the public health system had few specialists to manage them. So Vasanthakumar's team recommended changing the recruitment rules to lure more than 1,000 specialists away from urban private clinics to the rural public clinics where they're needed most.

RIGHT: Parinita Bhattacharjee presenting to Ugandan delegates on a learning visit to Kenya, facilitated by UM.

BELOW: Photos provided by India Health Action Trust.



WHAT'S SO SPECIAL?

RESEARCHER ACCOUNTABILITY THROUGH A PROGRAM SCIENCE APPROACH:

Community groups and governments decide which health problems they need solved, then the institute uses data to analyze what needs to be done, designs and implements new programs and scales them up over large populations if they're proven to work. Government buy-in from the start means government data is available, reducing time spent on research surveys.

"We're held accountable for results, even if we're not necessarily paying for the interventions," institute executive director Dr. James Blanchard explained during a recent online event.

EQUITY AS A CORE PRINCIPLE:

IGPH is known for its research with sex workers, injection drug users, men who have sex with men and lower-caste women. People who are shunned by society face deadly health risks so focusing on their needs has the greatest impact.

"If you don't do that, pressure is going to drive a lot of the investments into the majority population," Blanchard says.

LONG-TERM PARTNERSHIPS:

Long before the Centre for Global Public Health (the original name for the institute) was established in 2008, the groundwork was laid by innovators Dr. Allan Ronald, Dr. Frank Plummer and Dr. Stephen Moses. UM infectious disease researchers have worked in Kenya for 40 years. The institute's graduate students, postdoctoral fellows and research associates are the third generation of researchers relying on the trusting relationships their mentors built.

The pandemic may have set back progress on newborn and maternal mortality because health workers were diverted to delivering COVID-19 vaccines, Vasanthakumar says. However, the upside was that people who visited the community health centres to get vaccinated will now see them as a place to go for their own health needs.

Virtual DJ nights on Facebook Live and online counselling were other innovations the Kenyan peer support workers Bhattacharjee works with quickly put in place to replace the physical meeting in bars where they did HIV outreach pre-pandemic. Isolation magnified anxiety and depression in a country where gay sex is illegal and families are often hostile.

"FEW INSTITUTIONS GIVE SUCH OPPORTUNITIES FOR STUDENTS. IT'S A UNIQUE PLACE.— IT'S THE KIND OF WORK I BELIEVE IN."

The community groups quickly co-authored a research paper with Bhattacharjee to share their ideas while the COVID pandemic was still in its first year.

IGPH values this kind of creativity, such as when Elsabé du Plessis gave adolescents in Tanzania tablets to privately record their answers to survey questions about reproductive health during her postdoctoral work. Or when PhD student Leigh McClarty used the Equiplot tool developed for global health to help tailor services for Manitobans with HIV.

Both stuck around after those projects ended to continue research with the institute. "They keep hiring people I want to work with," laughs research associate du Plessis, who did her postdoctoral work with the institute's Dr. Ties Boerma, former director of health statistics for the World Health Organization and now Canada Research Chair in Population and Global Health at UM.

McClarty hopes more of the academic world will catch up with the institute's focus on service delivery. "It's the kind of work I believe in." **IR**



SEEING THE BIGGER PICTURE

BY JAHSSME GUILLAUME

HAVE YOU EVER HAD TO EXPLAIN SOMETHING BUT GOT caught up in the details? Or done a lab with a supervisor and still have trouble explaining what exactly you do to other people? Learning to see the bigger picture and relay this to people is important for any aspect of life—and especially for research.

“The poster competition was a great way to take a step back and look at the big picture of my project in general ... instead of all the little steps I do in the lab every day,” says Shoshana Cook-Libin, one of the winners of UM’s recent Undergraduate Research Poster Competition.

Cook-Libin placed first in the Natural Sciences category at the online 2021 Undergraduate Research Poster Competition. She worked

alongside her supervisor, associate professor in the Faculty of Science and Rady Faculty of Health Sciences, Ayush Kumar. Specifically, her work focussed on antibiotic resistance in a pathogen that’s a major cause of hospital-acquired infections in the current healthcare system.

“My goal is that every student should be provided an opportunity to learn about research at UM in the many different facets of its enterprise.”

Each summer, students from all backgrounds of research interest, ranging from the social sciences and humanities to natural and applied sciences participate in a 16-week program from May to the end of August, guided by research mentors. This initiative is known as the Undergraduate Research Awards (URA) and it provides students hands-on research experience in their specialized fields.

“My goal is that every student should be provided an opportunity to learn about research at UM in the many different facets of its enterprise,” says Digvir Jayas, vice-president (research and international) and the sponsor of the program launched in 2012. “Exposure to the transformative experience that research provides to a student’s personal growth and the contribution to society is paramount.”

RIGHT: participants in SET Days over the years



Another initiative launched by Jayas when he was associate vice-president (research) in 2007, is Science, Engineering and Technology (SET) Day. It is held annually and targeted to grade 11 and 12 students and their math and science teachers, in Manitoba. Over the past 15 years, more than 2,500 students have had a glimpse of what being a researcher would be like

“Exposure to the transformative experience that research provides to a student’s personal growth and the contribution to society is paramount.”

at UM. Its impact steadily increased, with students indicating a certainty in which stream they wish to pursue an education as a result of the exposure to the variety of researchers and their areas of expertise.

“The workshops were a great interactive part of SET Day,” said Pauline Sison, a grade 12 student at Maples Met School when she attended the 2020 SET Day and subsequently won the Essay Competition. “It gave us a chance to put ourselves in their shoes and gave us a small look into what the work actually looks like. In the end, I left SET Day with a better understanding of the implications this field has on our world and it inspired me to work even harder so that one day, I could have the same impact that these people have had on us.” **IR**

UNDERGRADUATE RESEARCH POSTER COMPETITION

1,200+
Competitors since 2006



SET DAY

3,000+
Students since 2007

30+
Schools each year



UNDERGRADUATE RESEARCH AWARDS

1,386+
Students awarded since 2012



TRANS- FORMING AGRICULTURE

BY RON FRIESEN

The University of Manitoba Faculty of Agricultural and Food Sciences has received \$5 million in funding to help achieve its goal of becoming one of North America's top crop research training institutions. Half of the matching funds come from Prairies Economic Development Canada (formerly Western Economic Diversification Canada). The money will be used to advance research and training for students and the industry in digital smart farm technology, faculty officials said.



THE FUNDING WILL PRIMARILY GO TOWARD PURCHASING advanced precision equipment for use both in the field and the laboratory. It will support an ambitious plan by the faculty to be a leader in digital agriculture technology by 2026, said faculty dean Martin Scanlon.

Digital technology is already sweeping the industry in what some call a revolution in farming and the faculty aims to be at the cutting edge of the movement, said Scanlon.

“We’re already up there, based on the kind of expertise we have and the kind of research output we produce,” he said. “But we’re in what some people call a fourth industrial revolution associated with data, sensors and digital analysis tools. If those kinds of tools are available to our researchers, who already have a good grounding in agricultural sciences, I don’t see any reason why we can’t attain that aspiration by 2026.”

“AGRICULTURE IS NOW HEAVILY DEPENDENT ON INNOVATION — MACHINE LEARNING, ARTIFICIAL INTELLIGENCE, GATHERING AND TRYING TO BECOME MORE EFFICIENT AND RESOURCE EFFECTIVE IN PROVIDING HEALTHY AND AMPLE FOOD FOR THE WORLD.”

Farming is becoming increasingly data-driven and the faculty’s initiative seeks to develop data-based technology to help producers make better management decisions, added Nazim Cicek, the faculty’s associate dean of research.

“The agri-food sector in Canada and globally is moving toward utilizing more technology,” Cicek said. “Agriculture is now heavily dependent on innovation — machine learning, artificial intelligence, gathering and trying to become more efficient and resource effective in providing



Martin Scanlon, Faculty of Agricultural and Food Sciences Dean

ABOVE: Operating sensing equipment.

RIGHT: State-of-the-art Dairy Farmers of Manitoba Discovery and Learning Complex, located at the Bruce D. Campbell Food and Farm Discovery Centre.

healthy and ample food for the world. To feed the future world and make sure it’s done in a sustainable way, we need to be smarter. We don’t have another planet. We don’t have more soil. We have to become smarter in using those resources. That’s where technology comes in.”

A number of farmers are already using digital technology to generate field work data. But a lot of that data just sits in monitors on tractors without the ability to review it, analyze it and use data layers to watch crops developing in real time. That’s where this new technology comes in, said Cicek.

“We didn’t used to get data back from the field in real time and use it to make different decisions. That has only recently become possible because we now have cheaper and more effective wireless technology to gather all that data and make sense of it. There’s reams and reams of information that can come to a computer from these sensing tools and provide a producer with real time feedback. That’s really the key.”

Scanlon agreed, saying data alone is not particularly helpful to farmers faced with making management decisions.

“You can have streams of data but they may not mean anything to you. It’s just data,” he said. “But if you have innovative analysis techniques, the data can be used to make real-time decisions, like when to spray or not to spray, that makes it useful.”

Cicek stressed that analyzing data to grow crops is only part of what digital technology can do for the agri-food industry. He said it can be applied to make better decisions all the way along the supply chain from the field to the dinner plate.

“ALL DECISION-MAKING HAS TO BE INFORMED BY DATA. PREVIOUSLY IT WAS DONE BY OBSERVATION AND PERSONAL EXPERIENCE”

So far, much of the hype surrounding digital agriculture involves crop production. But things are starting to happen on the livestock side, too. For example, the faculty recently hired a new animal science researcher who is using big data and modern molecular biology techniques to understand what happens when animals ingest particular feed rations and how that leads to better health and feed conversion.

“All decision-making has to be informed by data,” said Cicek. “Previously it was done by observation and personal experience. Now we’ve improved it by bringing in new imaging technology on agricultural machinery, drones, or satellites, which are linked to computers and smart Phones -- things that farmers didn’t have previously. That information should empower them to make better decisions.”

However, Scanlon cautioned that not all tools, even if promising, actually deliver the goods. He said the job of applied science researchers is to “separate the wheat from the chaff” to determine which tools are ready to be deployed and which ones need to go back to the laboratory for further work.

Curtis Rempel, vice-president of crop production and innovation for the Canola Council of Canada, said “One potential barrier to the spread of digital technology is proprietary data capture systems by

hardware and software manufacturers. For widespread adoption a farmer needs the ability to move data across platforms, from weather stations to machinery. Any data that’s been collected but can’t come to multiple hardware and software platforms has the potential to be lost and of little or no value. Farmers do not want to be tied to proprietary data. What’s needed is for data to be written in a common language that can be transferred from one system to another,” Rempel said.

That’s starting to happen now, he added.

“Researchers are working on platforms that allow data to be exchanged with all kinds of equipment. We’re moving to that space now,” said Rempel.

“The thing then is, what are you going to use that data for? How are you going to look at your fields from a data perspective to make better decisions for your farm?”

“You have to realize your field is not homogeneous. Your eye can only tell you after the fact what’s been happening. The data gives you the ability at planting time to say, okay, there’s 10 acres here that never gave me a return on investment. So why am I planting the same seeding rate? I should be cutting back on my seeding and fertilizer rates. I’ll save on input costs and my average yield in the field will go up. And my profitability will go up too.”

Rempel, who is also an adjunct professor in the Department of Food and Human Nutritional Sciences, said the university is the ideal venue for this work because it’s where farmers, agronomists and researchers can sit down together in one room to discuss matters.

“It’s exactly the place where we can take theoretical data and make it practical by working together in one space at the university to answer all of these questions.” **IR**

University of Manitoba Research Speaker Series and Events



CAFÉ SCIENTIFIQUE

Join us ONLINE to learn about the latest developments in an array of research topics. These Café Scientifiques bring together experts with non-researchers—you, me, neighbours and friends—to talk about their research and the questions it raises.

All discussions begin at 7:00 p.m. (CT) and end by 8:30 p.m. Pre-registration is not required.

VISIT
umanitoba.ca/cafescientifique

CENTRE ON AGING

The Centre on Aging at UM, with its partners generates, supports and promotes interdisciplinary research on aging at Manitoba universities to improve the lives of older adults, their family, caregivers and communities. They host many events, including a speaker series that allows researchers in the field of aging to share insights into their academic research and discuss current issues.

VISIT
umanitoba.ca/aging

NCTR DIALOGUES

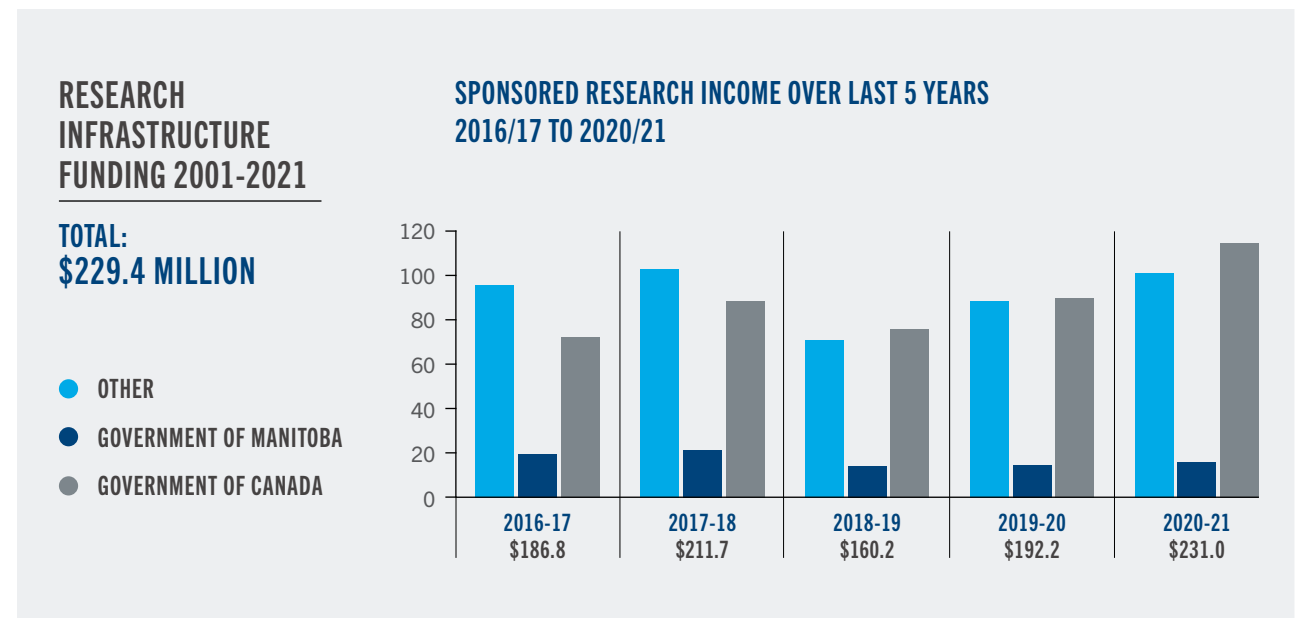
The National Centre for Truth and Reconciliation (NCTR) is holding a discussion series with Survivors, Elders, researchers and Indigenous allies on various truth and reconciliation topics. This online discourse provides the public and educators with important discussions on truth and Reconciliation with Survivors, a discussion very few may be privy to in a pre- or post-pandemic world.

VISIT
nctr.ca

By the Numbers

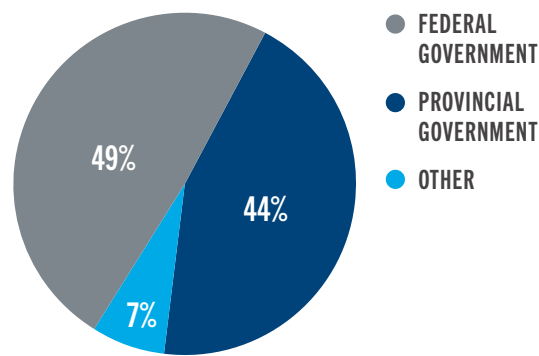
To learn more about the impact of the University of Manitoba, visit umanitoba.ca/economicimpact

85	64	50	32	18
Endowed and sponsored research chairs – including an allocation of 50 Canada Research Chairs, a Canada 150 Research Chair, a CERC and a CERC Laureate	Royal Society of Canada Fellows (53) and College Members (11)	Research centres, institutes, groups, shared facilities	Canadian Academy of Health Sciences Fellows	Canadian Academy of Engineering Fellows



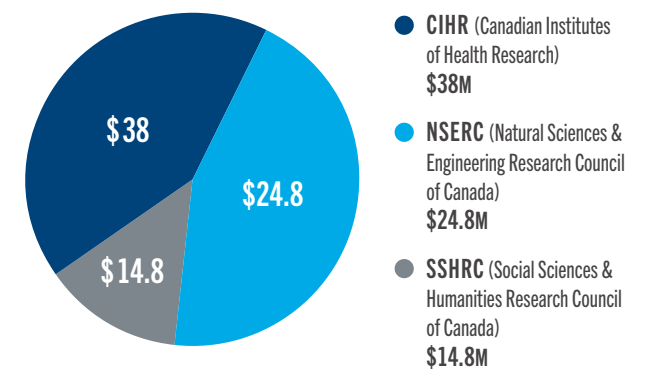
SPONSORED RESEARCH INCOME 2020/21

TOTAL: \$231.0 MILLION



TRI-COUNCIL FUNDING 2020/21

TOTAL: \$77.6 MILLION



The Ocean Sea-Ice
Mesocosm at the Churchill
Marine Observatory.
See story on page 12.



Research**LIFE**