



UNIVERSITY OF MANITOBA

ResearchLIFE

WINTER 2017 | VOLUME 1

FOLLOWING THE NOSE

CAN A LIVING FOSSIL ADAPT
TO CLIMATE CHANGE?

FIXING INDIAN TAX LAW

Honouring the Treaties

AN ACCESSIBLE LIGHTNESS OF BEING

Designing for accessibility

CHRONIC INFLAMMATION

Getting to the
root of it

MESSAGE

FROM THE VICE-PRESIDENT
(RESEARCH AND INTERNATIONAL)



This issue of the magazine is focused on something near and dear to my heart: graduate student research. These students carry out the majority of research in a post-secondary environment, under the guidance of their faculty advisors. They also garner local, national and international scholarships,

internships and fellowships that support the research they conduct, ultimately contributing to the research enterprise.

Post-secondary research is critical to economic growth, productivity, global competitiveness and innovation. In 2014, according to Statistics Canada, Canadian universities performed \$13 billion in research and development (R&D), accounting for 40 per cent of all R&D done in Canada. Of that, \$1 billion in research was for businesses, to help build their competitive advantage. Another \$1.2 billion in research was conducted for the not-for-profit sector, which has nearly tripled since 2000.

U of M draws in more than \$160 million annually of sponsored research income (funding), mainly from sources outside our province.

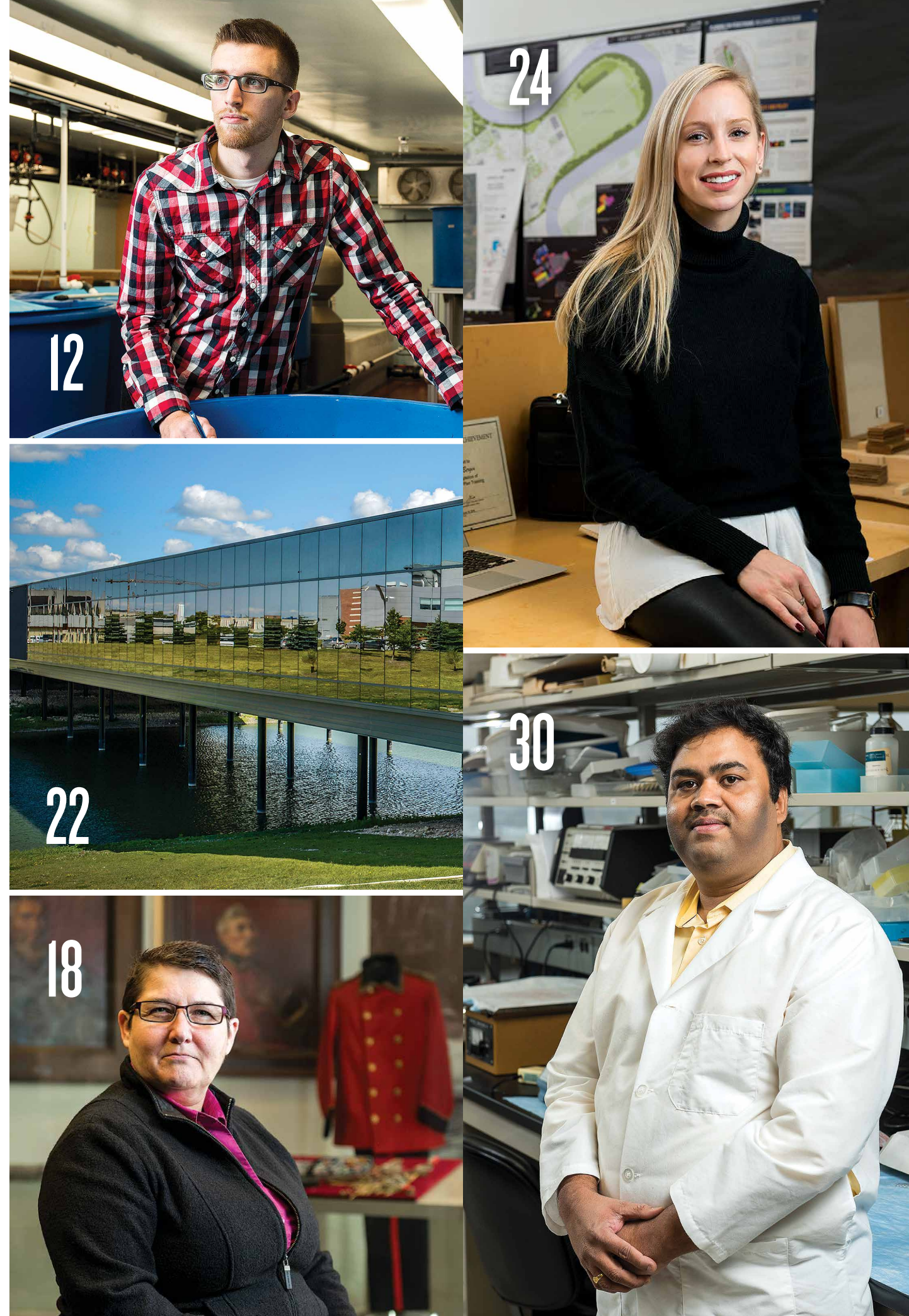
We are training highly qualified individuals to meet the needs of employers in a global marketplace. These students who are themselves accomplished researchers in their own right, are making headway on societal challenges like: climate change, Treaty rights, accessible environments, chronic diseases and resolving conflicts.

I invite you to immerse yourself in the research shared in this issue. It is only a fraction of what our students are investigating and questioning every day on campus, in our city, our province and abroad.

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

On the cover:

Baby Lake Sturgeon swim in schools in their growth chamber at the U of M. Photo by David Lipnowski. See feature on page 12.



UNIVERSITY
OF MANITOBA

WINTER 2017 | VOLUME 1

- 4 **HAPPENINGS & KUDOS**
An array of research news & events
- 9 **CENTRES & INSTITUTES**
Rising Star
- 10 **INSIGHTS** Ian Wishart,
Minister of Education and Training
- 12 **FOLLOWING THE NOSE** **FEATURE**
Learning from Lake Sturgeon
- 17 **VIEWPOINT**
Governance of Small-scale Fisheries
- 18 **FIXING INDIAN TAX LAW** **FEATURE**
Honouring the Treaties
- 22 **IDEAS TO INNOVATION**
Power Innovators
- 24 **AN ACCESSIBLE LIGHTNESS OF BEING** **FEATURE**
Designing for Accessibility
- 28 **SPOTLIGHT ON STUDENTS**
Peace Leadership
- 30 **GETTING TO THE ROOT
OF CHRONIC INFLAMMATION** **FEATURE**
- 34 **ON THE HORIZON**
Events in early 2017
- 35 **JUST THE FACTS**
Graduate Students, by the numbers

ResearchLIFE

RETURN UNDELIVERABLE
CANADIAN ADDRESSES TO:
UNIVERSITY OF MANITOBA
Office of the VP
(Research and International)
207 Administration Building
Winnipeg, MB Canada R3T 2N2
Tel: 204-474-7300
ResearchLIFE@umanitoba.ca

VICE-PRESIDENT (RESEARCH
AND INTERNATIONAL)
Digvir S. Jayas

EDITOR Janine Harasymchuk

ART DIRECTION
Carisa Laternus Romans

DESIGN Diverge Design
ISSN# 1918-144

CONTRIBUTORS:

Lena Betker, Curt Cherewayko, Joana Correia, Garrick Kozier, Helen Fallding, Janine Harasymchuk, Rachel Ines, Mariianne Mays Wiebe, Maureen Matthews, Sean Moore, Ian Wishart

PHOTOGRAPHY:

Cover and throughout: David Lipnowski. Katie Chalmers-Brooks, Joana Correia, Adam Dolman, Charles Egerton, Dan Gwozdz, Garrick Kozier, Mike Latschislaw, Fred Munson, Arunprasanth Sakthivel

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.



U of M's newest cohort of Vanier scholars are tackling subjects as varied as Indigenous languages, HIV infection, geothermal energy and Lou Gehrig's disease.

The four graduate students—Chantale Cenerini, linguistics; Colin Graydon, medical microbiology; Kayla Moore, civil engineering and Mamneet Manghera, immunology—are recipients of Vanier Canada Graduate Scholarships (each receive \$150,000 over three years). These awards, considered the Canadian equivalent of the United Kingdom's Rhodes Scholarships, help recruit and retain top doctoral students from across the country and around the world.

"These students have demonstrated tremendous dedication to their fields and to their communities," said Todd Mondor, acting vice-provost, graduate education and dean of graduate studies. "Not only are they exemplary researchers and outstanding leaders, they serve as an example and inspiration to others."

1 **CHANTALE CENERINI, LINGUISTICS**

Cenerini's research is playing a part in the revitalization of Indigenous languages in Canada; her doctoral studies focus on understanding and supporting the vitality of Michif, the language of the Métis people. As a Métis woman, she aspires to be a role model and inspiration to Indigenous women through her research and academic success and through her participation in Indigenous cultural events.

"One of the things I like best about my PhD program is to be able to contribute to something meaningful not only to academia, but also, more importantly, to communities whose languages I am working with."

There has been an awakening to the need for better, healthier, nation-to-nation relationships in Canada, a goal which cannot be achieved without giving deference to language, and I am happy to play even just a small part in this journey," she says.

Cenerini is a skilled polyglot; fluent in French and English, she has knowledge of the Cree language, is literate in Spanish, has functional skills in Italian and has studied German. She has volunteered as a catechist at Saint-Norbert Parish, a soup kitchen worker at Souls Harbor Rescue Mission, and a resource person at Centre Flavie-Laurent Centre, a low-income resource centre.

Graduate students (l-r):
Chantale Cenerini, Colin
Graydon, Kayla Moore,
Mamneet Manghera
photo: Adam Dolman

2 **COLIN GRAYDON, MEDICAL MICROBIOLOGY**

Graydon has been incredibly productive with his research in medical microbiology, investigating how LAG-3, a protein that suppresses certain components of the immune system, blocks the body's response to diseases. He is studying LAG-3 from the perspective of HIV infection, but what is discovered may have implications in tuberculosis, cancer, autoimmunity, allergy, and vaccine research.

"As a passionate learner, I delight in being immersed in a field as intensely interesting and immensely complex as immunology," says Graydon.

"My favourite aspect of immunology is its broad nature. I see science as exploration, no different than geographical exploration. The complex and broad nature of immunology leaves so much to be discovered, and many new maps to be drawn. Being a small part of that discovery in a community of explorers is very gratifying."

Although his work with the Health Sciences Graduate Student Association is quite demanding, Graydon says he spends most of his free time with friends, including playing rugby and guitar. His volunteer experience includes working as a scout leader, fundraising for a building project in Ecuador and working on HIV/AIDS and Hepatitis C community outreach.

3 **KAYLA MOORE, CIVIL ENGINEERING**

For her undergraduate degree, Moore studied environmental science at the Clayton H. Riddell Faculty of Environment, Earth, and Resources at the U of M. She concluded her bachelor's degree with an international exchange at Flinders University in Adelaide, Australia. She is passionate about sharing her expertise through service to her rural community as the president of the Cherry Point Cottage Owners' Association and as a member of the Oak Lake Aquifer Management Board.

Her doctoral research in civil engineering will investigate the solute transport in saline aquifers and application to geothermal energy as a potential power source in the Canadian prairies. Moore lives along Oak Lake and spends a lot of time boating and floating in the summer, and fishing in spring and winter.

"Fortunately, the work I do allows me to pursue my passion for research, while still living primarily in rural Manitoba. It's an amazing opportunity," Moore says.

She plays hockey and fastball with Westman Fusion, out of Reston, Manitoba and says it's as much a therapy session as a game most of the time.

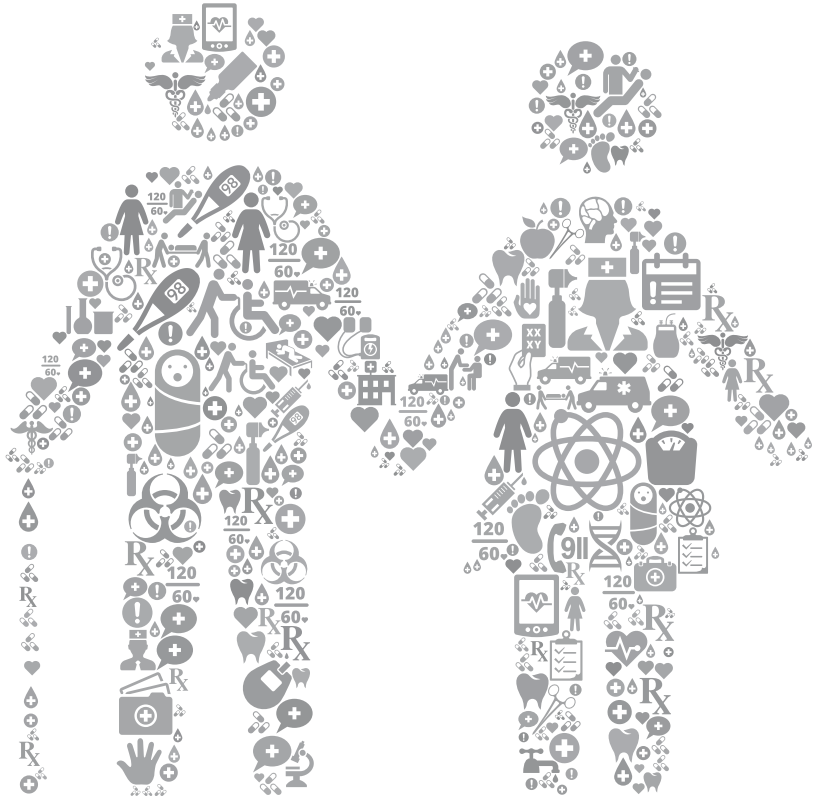
4 **MAMNEET MANGHERA, IMMUNOLOGY**

With a perfect GPA of 4.50, Manghera has an extensive list of academic awards, distinctions, prizes and scholarships, including the Governor General's Gold Medal and Sir Gordon Wu Graduate Scholarship in 2015. Her research looks closely at how pieces of human DNA made up of retroviral genomes (called endogenous retroviruses) contribute to neuropathology in Lou Gehrig's disease (ALS). She notes that doing medical research provides her with a sense of purpose and direction in life, especially having witnessed first-hand the devastating effects of the neurological disease ALS in her community.

"I found my purpose and passion in medical research aimed at elucidating the mechanisms behind ALS neuropathology."

It is extremely rewarding and satisfying to know that the work I do in the lab has the potential to bring a positive change in the health of individuals living with ALS," she says. **RM**

SHAPING THE LANDSCAPE OF AGING RESEARCH



Brooke Beatie (top), Megan Siemens (below), master’s students in psychology



THE GLOBAL POPULATION IS AGING at an unprecedented rate. For the first time in Canada, the number of seniors aged 65 and over now outnumber children under the age of 15. As aging related issues move to the forefront, the Centre on Aging has played a role in promoting and supporting aging research since it was established in 1982. One focus of their support is to provide annual scholarship and fellowship awards to student researchers focused on aging issues.

Brooke Beatie and Megan Siemens—both master’s students in psychology—received the Jack MacDonell Scholarship in Aging and the Esther & Samuel Milnot Scholarship, respectively.

Beatie’s research focuses on age differences in mental health help-seeking and service utilization. Siemens recently defended her thesis titled: “The Effect of Aging on the Use of Featural and Geometric Cues During Reorientation in a Virtual Environment.”

Maia Kredentser, a PhD candidate in clinical psychology, received the Centre on Aging Betty Havens Memorial Graduate Fellowship. Her research is on psychological issues in end-of-life care for patients with chronic and terminal illness and their caregivers.

Since 1986, 88 students have been awarded nearly \$214,000 in various scholarships funded by the centre’s awards.

To learn more about aging research visit: umanitoba.ca/aging

MASTER CONDUCTOR

KATHLEEN (KATY) HARMER is the 2016 recipient of the Marcel A. Desautels Faculty of Music’s Philipp and Anna Wiebe Scholarship. Each year, the scholarship is awarded to a master’s student who has achieved a minimum degree grade point average of 3.5, has a strong interest in choral music and has demonstrated outstanding musical and leadership abilities in choral conducting.

Harmer says she can’t remember a time when she wasn’t involved in choir of some kind and has always preferred singing in a group to singing solo. Her love for conducting was ignited during her undergraduate degree in music at the University of Western Ontario.

“It is a whole new way to interact with music, and one that I really enjoy.”

As a student in the Master of Music in Conducting program, Harmer’s schedule is packed with singing and conducting choir rehearsals: she sings in three of the faculty’s choirs—University Singers, Women’s Chorus, and the Cantata Singers—meets



weekly with her advisor Elroy Friesen, and has regular practice sessions with other choral conducting students to discuss conducting gestures and try new techniques. Her course work is comprised of vocal techniques—learning how to teach singing to a group of people—and diction—learning how to properly pronounce the music she’s conducting.

“I can’t imagine my life without music in it, and completing a masters will allow me to go out into the community, share my passion with others, and try to instill in them a love of music and singing together.”

“I don’t know exactly where my career will go from here, but I know that it will be musical!” — Desautels Faculty of Music

LEARNING FROM CAREGIVERS



“I APPROACH A SMALL BUNGALOW on a busy street with the intention of conducting an interview about the changes in everyday activities of a married couple who are living with dementia,” says Barbara Tallman, a PhD candidate in the Applied Health Sciences program, at a recent Café Scientifique.

“As the door opens, I am generously greeted by a friendly large boxer. The older woman who answers the door shoos the dog away and invites me into her unexplainably comfortable home.”

Tallman uses stories to share the problems that people with dementia and their family caregivers have, and to give healthcare providers a broader range of strategies to assist couples in living with dementia in the community. She defines “couples” as a person with dementia and their family members or intimately involved others.

“The couples’ everyday life is a venue to see how each person adjusts, where they struggle and how they come to understand and live with their circumstances,” says Tallman.

This Café also highlighted two additional PhD candidates in the same program: Jane Karpa and Scott Kehler.

Karpa is exploring the families’ experiences living with acquired brain injury (ABI), something that has reached worldwide epidemic proportions. The individual experiences the ABI, but the impact on the families’ lives and how they make sense of their experiences living with ABI is the focus of her research.

Kehler studies, among other things, the impact of physical activity in adults who are frail. See page 9 for a profile of his research.

To view a video of this Café Scientifique presentation visit: umanitoba.ca/cafescientifique

SUPPORTING MANITOBA’S GRAD STUDENTS

Research Manitoba supports Graduate Scholarships and Studentships to qualifying master’s and PhD students, who will go on to careers as independent researchers, in industry or within the academic research enterprise.

Meet two 2016 recipients: Jessica Summers, a master’s student in the Faculty of Arts’ Department of

Psychology, who received a Graduate Scholarship and Yufei (Andy) Chen, a PhD candidate in the Rady Faculty of Health Sciences’ College of Pharmacy, who received a Graduate Studentship.



JESSICA SUMMERS

WHAT SHE EXPLORES: The positive effects mindfulness has on persons with developmental disabilities and the staff who care for them at St. Amant, a non-profit organization supporting Manitobans with developmental disabilities and autism. Mindfulness means to be present in the moment while being aware of your thoughts and emotions.

HOW HER RESEARCH WORKS: She studies the impact of a training program called Mindful Practice for Direct Support Providers.

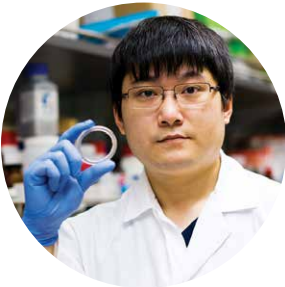
WHAT SHE MEASURES: Staff behaviour changes and improved client happiness and reduced challenging behaviours.

WHY IT’S SO IMPORTANT: Mindfulness training for staff has the potential to positively influence the well-being of clients who rely on them for help with everyday tasks, from bathing to going to the grocery store.

WHAT INSPIRES HER: The desire to improve the quality of life for persons with developmental disabilities through mindfulness training.

WHAT SHE PLANS ON DOING NEXT: After finishing her master’s degree in psychology and her Board Certified Behaviour Analyst certification, Summers hopes to pursue a PhD in Applied Behaviour Analysis while working as a behaviour analyst.

ALSO TO HER CREDIT: Summers holds an honours degree in psychology from the U of M and is the student representative for the Manitoba Association for Behaviour Analysis. She presented her research at the 2015 Canadian Conference on Developmental Disabilities and Autism, and was awarded the 2016 Shannon L. Hamm Memorial Scholarship, Psychology Graduate Fellowship and Research Manitoba Graduate Scholarship.



YUFEI (ANDY) CHEN

WHAT HE EXPLORES: Ways to reduce the risk of HIV transmission.

WHAT HE FOCUSES ON: Medical devices known as intravaginal rings (IVRs) that offer an inexpensive alternative to condoms and could be key in the global fight to eradicate the deadly disease.

HOW THE DEVICE WORKS: Drug-releasing IVRs are inserted to reduce the woman’s risk of contracting HIV during intercourse.

WHY IT’S SO IMPORTANT: Women are biologically

two times more likely than men to become infected with HIV through unprotected heterosexual intercourse.

HOW HE IS MAKING A DIFFERENCE: He designed and developed an IVR that can deliver a sustained and controlled release of an immunomodulatory drug called hydroxychloroquine that may prevent HIV transmission.

ALSO TO HIS CREDIT: Chen completed a Bachelor of Science in Pharmacy Engineering from Jilin University in China before coming to the U of M to earn his master’s degree in pharmacy. Chen is the vice-chair of the U of M’s American Association of Pharmaceutical Scientists Student Chapter and a board member of the Canadian Chapter of Controlled Release Society. He also received the 2012 Manitoba Health Research Council Coordinated Studentship and the 2015 Leslie F. Buggy Graduate Scholarship in Pharmacy.



RIISING STAR

BY GARRICK KOZIER

WHEN YOU GROW UP in Winkler, Man., you eat, sleep, and play hockey. That’s just what you do. And that’s just what Scott Kehler did. He’s now gone from saving pucks to saving lives.

Kehler is a current PhD candidate in the Applied Health Sciences program and holds a Sir Gordon Wu Scholarship. His research is dedicated to improving the long-term health outcomes of elective-surgery cardiac patients by researching the benefits of pre-surgery physical activity and exercise. It’s an area referred to as “Preoperative Rehabilitation,” or PREHAB.

A glimpse into the study: there’s typically a four-month waiting period for elective cardiac surgery. The current standard of care does not include a referral for exercise therapy and/or educational sessions during this pre-surgery time. Some patients might be told by their healthcare providers not to engage in physical activity. Other patients might simply be afraid to exercise during this time.

“We see this time as a window of opportunity to challenge the dogma of being physically inactive pre-surgery,” says Kehler.

The goal is to demonstrate the efficacy of PREHAB—especially in patients considered to be frail. Frail patients typically recover more slowly from heart surgery. This frailty is mostly due to muscle weakness and inactivity. Therefore, an exercise program before their operation may have long-term and potentially life-saving benefits.

Duhamel, the director of the Health, Leisure, and Human Performance Research Institute in the Faculty of Kinesiology and Recreation Management—who is also Kehler’s supervisor—calls Kehler’s exploration into this area unique and novel.

“His master’s work (a PREHAB feasibility study that demonstrated preoperative physical activity improved functional walking ability in patients) leveraged this \$620,000 CIHR PREHAB team grant [research is conducted out of the St. Boniface Hospital Albrechtsen Research Centre]

Scott Kehler a current PhD candidate in the Applied Health Sciences program and holds a Sir Gordon Wu Scholarship.

to comprehensively explore it with the goal of informing the current standard of care,” says Duhamel, who is lead researcher on the project. “His biggest impact is his application of kinesiology in a health research world and it’s really setting him apart. In that respect, he’s established himself nationally.”

Kehler is also making blips on the international radar. His research recently earned him an invite to Copenhagen, Denmark to attend the prestigious and exclusive Saltin International Graduate Course in exercise physiology in health and disease.

“He’s been a part of three CIHR Strategic Training Initiative in Health Research programs specifically designed to develop the next generation of outstanding scientists. There’s been a lot of investment put into Scott by the university and beyond. He holds a CIHR

“His biggest impact is his application of kinesiology in a health research world and it’s really setting him apart. In that respect, he’s established himself nationally.”

Frederick Banting and Charles Best Canada Graduate Scholarship, and he has extensive, high-level training in knowledge translation,” says Duhamel.

“The different perspectives on health care and evidence informed practice I’ve been exposed to by being a part of the HLHPRI and the U of M as a whole has had an impact on my way of thinking about finding solutions,” says Kehler.

A significant aim of the HLHPRI is to facilitate, conduct, and disseminate research of the highest quality to advance understanding of health, leisure and human performance.

“A really great way to answer a question is to look at it from as many different lenses as you can. The institute strives to facilitate partnerships and connections with health care experts across the university and beyond to create answers that have impact,” Duhamel says.

INSIGHTS: HONOURABLE IAN WISHART MINISTER OF EDUCATION AND TRAINING

Honourable Ian Wishart was first elected as the MLA for Portage la Prairie in 2011. In 2016, he was re-elected and was appointed as Minister of Education and Training.

Wishart graduated from the Faculty of Agricultural and Food Sciences at the University of Manitoba. Since then, he has served as president and vice-president of Keystone Agricultural Producers, as executive member of the Canadian Federation of Agriculture, and as a board member of the Manitoba Crop Insurance Board and the Manitoba Water Council.

He and his wife Leslie have two children and live on a fourth-generation family farm north of Portage la Prairie.

Ian Wishart talking with students at the 3rd Annual Children's Peace Walk, August 2016.



AS MINISTER OF EDUCATION AND TRAINING, I recognise the key role that a strong research community can play in building a thriving province. Through research we gain a better understanding of matters important to humanity and society, discover new knowledge, and facilitate the dissemination and application of knowledge. Expanding research opportunities within the province will help increase our capacity to advance economic, social, cultural and environmental interests in Manitoba. Advancing research capacity in Manitoba is also paramount to integrating evidence-based decision-making and to public policy development.

The Government of Manitoba takes various approaches to support and enhance research capacity in the province. First and foremost, the government supports our post-secondary

It also coordinates and oversees major provincial research programs, and promotes partnerships between researchers and other partners in the province and across Canada.

Collaboration and partnership are becoming an essential aspect of research initiatives. In order to strengthen the province's innovation ecosystem we need to maximize knowledge exchange between various sectors, including governments, post-secondary institutions, businesses and not-for-profit organizations. In fact, post-secondary institutions and researchers in Manitoba are striving to expand their networks with those in other parts of Canada and internationally. Many researchers actively reach out to businesses, practitioners in various sectors, and community organizations to establish partnerships. Furthermore, businesses and community organizations, who have not been traditionally considered as

researchers, are increasingly engaging in research activities, and are seeking partnerships with researchers and academic institutions. The Manitoba government is committed to supporting and facilitating such collaborations and partnerships.

One of the areas that I see a great potential is to further foster partnerships

between the research community and the private sector. Manitoba must strive to remain competitive as an innovative economy, which is essential in the face of the changing socio-economic needs we are experiencing. Key players in the private sector are increasingly realizing that the path to innovation must involve a strong research community. I anticipate more private sector investments in every aspect of research, including innovative research initiatives and entrepreneurial application of research findings. I look forward to working with our academic and business communities to ensure that graduates from our post-secondary institutions have the skills and knowledge to succeed in the knowledge-based economy. Leveraging this expertise will serve to improve Manitoba's economic prosperity.

I recognize that building research capacity requires concerted efforts among the Manitoba government, post-secondary institutions, other research institutions, and partners from various sectors in the province. As Minister of Education and Training I am committed to participating, facilitating and supporting such partnerships and collaborations. **IR**

“ONE OF THE AREAS THAT I SEE A GREAT POTENTIAL IS TO FURTHER FOSTER PARTNERSHIPS BETWEEN THE RESEARCH COMMUNITY AND THE PRIVATE SECTOR. MANITOBA MUST STRIVE TO REMAIN COMPETITIVE AS AN INNOVATIVE ECONOMY.”

institutions. Research and graduate studies are a significant aspect of university education in Manitoba. In recent years, colleges are also striving to boost their research capacity.

Faculty members and graduate students in Manitoba's post-secondary institutions have been key drivers in advancing research, with research-based, graduate-level programming. Universities in Manitoba offer graduate programs in a wide range of disciplines, including arts, science, business, health, agriculture, education, and fine arts. The graduate programming in the province is continuously growing in its depth and breadth, attracting strong graduate students from across Canada and internationally. Graduate students, in particular, represent emerging researchers who bring innovative ideas and perspectives to the research community in Manitoba.

Research Manitoba is a critical tool that the provincial government utilizes to enhance the research capacity in Manitoba. The scope of its mandate includes research in health, natural and social sciences, engineering and the humanities. Research Manitoba provides grants and awards for initiatives conducted by graduate students, new or established researchers.



THE NOSE FOLLOWING

A PHD CANDIDATE IS ABOUT TO BEGIN A SERIES OF NOVEL EXPERIMENTS INVESTIGATING HOW CLIMATE CHANGE WILL IMPACT THE OLFACTORY-MEDIATED BEHAVIOUR OF A FRESHWATER FISH. THE RESULTS WILL EITHER GIVE A SLIVER OF HOPE, OR PROVIDE NEW REASONS TO BE FRIGHTFUL OF OUR IMPACT ON NATURAL SYSTEMS.

BY SEAN MOORE

David Lipnowski

Luke Belding just finished setting up his experiment in the basement of the Duff Roblin Building. A large fan roars over the sound of water trickling through a network of tubes connecting huge plastic tanks full of fish. After testing his setup, Belding will begin a series of experiments this summer that will be the first to explore how free swimming, newly hatched larval Lake Sturgeon deal with rapidly changing environments. Particularly, how they will respond to increasing CO₂ and temperatures scientists predict for 2100, which, since sturgeon can live to be 100, the fish being born today will experience.

N SIMPLISTIC TERMS, the experiments will pit an animal unchanged for roughly 200 million years against human-induced climate change. It will explore how environments influence an animal’s physiology and behavior during early development, providing us insights into if and how the Lake Sturgeon’s adaptive capacity can keep pace with a rapidly changing environment.

Belding is the first to undertake such a study on this living fossil and his ambition stands out all the more because, even though he is pursuing his PhD in biology, he has not led experiments in the past.

He was considering entering veterinarian school when he decided he would rather study sharks. He loved the ocean—he grew up playing and exploring in tide pools in Cape Breton—so he switched his focus to marine biology. But controlled experiments on sharks are expensive, difficult and rare, and Belding couldn’t find a suitable lab to join after finishing his master’s at Northeastern University in Boston.

Then he thought of Lake Sturgeon. They are ancient like sharks, yet barely studied. He called around to labs.

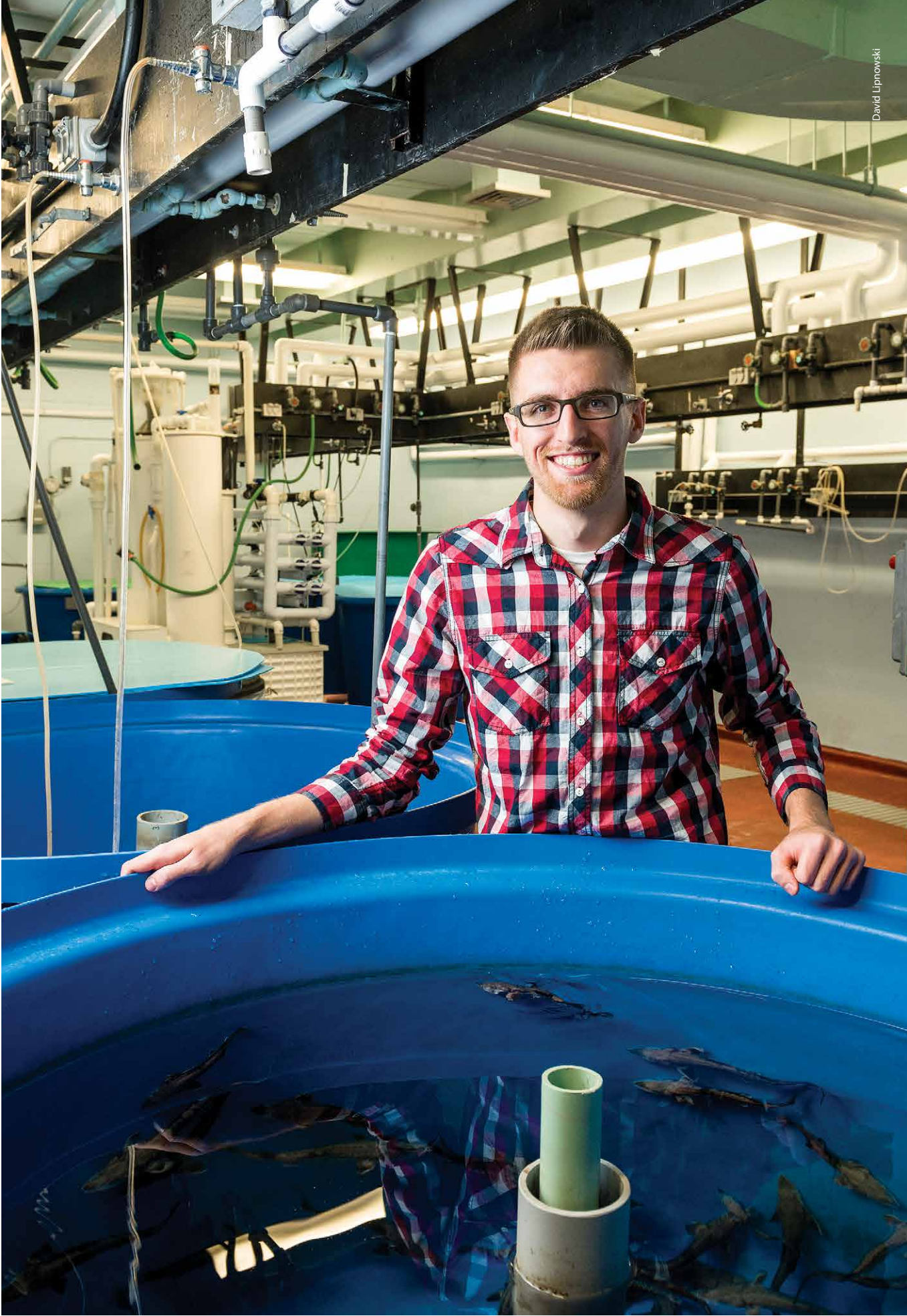
“I contacted Gary Anderson here at the U of M and told him what I have been doing and what I wanted to do and he was super interested. And now I’m in Winnipeg, as far away from the ocean as possible,” Belding says with a laugh.

What professor Anderson liked about Belding’s approach was his idea to combine both behavioural and physiological measurements of sturgeon.

RIGHT: Luke Belding
Luke Belding, biological sciences graduate student, checking on the Lake Sturgeon in growth chambers.



Although Lake Sturgeon can grow up to 10 feet long, they start small. The fish pictured above are roughly 5 months old and between 5-10 cm long.



“This is a more challenging approach but much more rewarding, as linking both behaviour and physiology of the organism provides a more holistic understanding of how the environment might shape the biology of the fish,” Anderson says.

If sturgeon are negatively affected, that is ominous.

“It will not be a good sign,” Belding says. “If an ancient fish like this is negatively impacted by the CO₂ we’re pumping into the atmosphere, after they’ve gone through 200 million years of climate change, then it goes to show we are causing irreparable damage.”

“THIS IS A MORE CHALLENGING APPROACH BUT MUCH MORE REWARDING, AS LINKING BOTH BEHAVIOUR AND PHYSIOLOGY OF THE ORGANISM PROVIDES A MORE HOLISTIC UNDERSTANDING OF HOW THE ENVIRONMENT MIGHT SHAPE THE BIOLOGY OF THE FISH.”

But, at least through Belding’s experimental paradigm, the fish may show no signs of being affected, suggesting that these fish have the ability to respond to this type of change. If that is the case, his research will unveil a corridor of doors others can open.

THE RIGHT STREAM OF THOUGHT

Belding thought up a rough concept of his current experimental design in 2009 while working on his undergraduate degree.

“We read a paper for class about climate change and fish and I said, ‘That sounds like a bad thing for fish.’ And I’m super interested in fish so I started brainstorming ideas,” Belding says.

He never conducted any undergraduate research, though, and his master’s was course-based.

In 2014 he read a paper that was basically his idea from 2009: researchers monitored how sharks behaved when scent cues were introduced into their tank.

“I read it and was like, ‘Goddammit! They beat me to it.’ But it did also encourage me. It really did. I was like, ‘Holy crap, someone else had the same idea as me, ran the experiment, and produced results I expected.’ So I knew I was on the right track and should continue with my other ideas.”

Thanks to funding from professor Anderson’s Industrial Research Chair, supported by Manitoba Hydro and NSERC, Belding will now explore how different rearing environments may affect the neurophysiological response and olfactory-mediated behaviors of sturgeon.



David Lipnowski

Lake Sturgeon
(*Acipenser fulvescens*)
have survived for millions
of years in fresh-
water environments
in North America.

The more CO₂ in the water, the more acidic it becomes and studies on coral reef fish show this inhibits the animals’ ability to sense and thus respond to cues: impacting their ability to find food, avoid predators and respond to signals from neighbouring fish. But coral reef fish are newcomers compared to sturgeon, who have seen ice ages come and go and live in freshwater systems, which have temperatures and chemistries that fluctuate wildly compared to the ocean.

“IF WE’RE AFFECTING THE PLANET TO THE POINT THAT A SPECIES THAT HAS BEEN AROUND FOR HUNDREDS OF MILLIONS OF YEARS IS UNABLE TO FUNCTION NORMALLY, WE MAY BE HAVING A LARGER EFFECT ON THE PLANET THAN WE PREVIOUSLY THOUGHT.”

Will sturgeon suffer the same consequences as coral reef fish? Sturgeon are notoriously robust as juveniles and adults, but no one knows about the larval stage. If we rapidly change the rearing environment for a Lake Sturgeon during early development, can it respond, and if so, how?

SMIFFING OUT ANSWERS

To answer these questions, Belding will raise sturgeon in various treatments, each with different temperatures and CO₂ levels, and then using a two chamber choice test to assess behavioural responses, he will introduce various scent cues, such as food or predator cues. If all is well and Lake Sturgeon are not affected by the treatments, the sturgeon will spend more time near the food cue and avoid the predator cue. Based on all previous research, Belding suspects he will find the opposite.

These experiments will be coupled with electro-olfactogram recordings, where he will apply the same cues to the Lake Sturgeon’s olfactory organ and record the neuronal activity. In so doing, he will be able to connect how early rearing environment influences the fish’s ability to smell environmental cues and how that results in the observed behavior of the fish to the same cues.

Belding also hopes to further investigate a mysterious cell. In 2016, Lauren Shute, an undergraduate student in Anderson’s lab, published a study describing a unique cell she discovered in the skin of larval Lake Sturgeon. Its purpose is unknown but she surmised it probably either emits a pheromone for communication with other Lake Sturgeon or it releases some foul compound to deter predators.

Anderson’s lab is now working with others to sequester the cell’s chemical products. Once gained, they will study what role they have. Then Belding plans to see if 2100’s increased CO₂ and temperature affects this unique system too.

“There are a lot of people outside of the scientific community saying climate change isn’t happening or won’t affect anything,” Belding says. “But if we’re affecting the planet to the point that a species that has been around for hundreds of millions of years is unable to function normally, we may be having a larger effect on the planet than we previously thought.”



GOVERNANCE OF SMALL-SCALE FISHERIES: A WAY OF LIFE THAT CANNOT BE IGNORED

BY: JOANA CORREIA

FISHING IS A WAY OF LIFE that connects us all. From fishing practices that are passed on from generation to generation, to social and cultural aspects embedded in our history, fishing is one of the oldest ways to extract a renewable resource. More than 90% of global fisheries are small-scale artisanal fisheries (small-scale fisheries for subsistence or local, small markets, generally using traditional fishing techniques and small boats. They occur around the world (particularly in developing nations) and are vital to livelihoods and food security).

Fisheries governance systems tend to be hierarchical with top governors (state or national governments) investing only in large-scale industrial fisheries. This single investment predominantly allows for both national and international exploitation to take place. Over the years, there has been a global trend of fisheries overexploitation, as national and international industrial fishing practices have become the foundation for governance. Without the consideration of other fishing practices, such as the more common artisanal fisheries, small fishing communities are unprepared for the current increase in their local fishing efforts.

In Fuzeta, a southeastern Portuguese fishing village, as the governance of their octopus fishery was examined, it was clear that the fishers’ way of life was being ignored by the state (top governor). Since the 15th century, this has been an extremely important artisanal fishery where everyone within the community is involved in the process, from hand-making the octopus traps to the first sale.

With no management plan in place and no governance framework designed to recognize the octopus fishery as a way of life, the people of Fuzeta are concerned about their future. They recognize what following a hierarchical system did to their local practices: Fuzeta’s

fishers had gone from working from home with everyone being able to depend on fisheries, to travelling very long distances as a result of the state’s investments, to catch fish on the other side of the Atlantic Ocean. They travelled in very poor conditions to Newfoundland, until the cod fishery was completely depleted and closed indefinitely in 1992.

After surviving the harsh conditions of such long and dangerous trips, and losing many of its fishers at sea, they began to operate under the EU-Morocco fisheries agreement, initiated in 1995, and fish for

Over the years, there has been a global trend of fisheries overexploitation, as national and international industrial fishing practices have become the foundation for governance.

20 years, local fishers have had no other option but to fish mainly for octopus. As one of the elder fishers puts it, “This is all we have now, it is our survival, there is nothing else.”

Providing support for such communities as well as adequate fisheries governance system is a hard task that requires a holistic perspective, where governance is understood as an integrated process occurring at multiple scales, which is in fact what connects us all.

A global collaborative research network called Too Big To Ignore (toobigtoignore.net) and the community-based resource management projects from U of M’s Natural Resources Institute funded Correia’s study.

hake (deep-sea members of the cod family, found on the continental shelf and slope to depths over 1,000 metres).

The international agreement expired in late 1999 and was not renewed for the south of Portugal. In the last



Joana Correia is completing her master’s degree at the Natural Resources Institute in the Clayton H. Riddell Faculty of Environment, Earth, and Resources. She holds an undergraduate degree in marine biology and dual Canadian and Portuguese citizenship. Her co-supervisors are Derek Johnson (anthropology) and Fikret Berkes (Natural Resources Institute). Correia was preparing to embark on a research expedition to Antarctica in December 2016: the Australian-led Homeward Bound expedition is a project that brings together 78 young female scientists from around the world to connect, network and become leaders who will in turn promote women and girls in science.

FIXING INDIAN TAX LAW



David Lipnowski

HONOURING TREATIES COULD FUEL THE INDIGENOUS ECONOMY

BY HELEN FALLDING

More than 140 years after Chief Jacob Berens signed off on Treaty 5, his great-great-grand-daughter is reminding Canadians that treaties can be a springboard for economic revitalization.

MYRA TAIT'S reminder comes in the form of a master's thesis devoted to tax law. "Tax is surprisingly sexy," Tait discovered after working as a summer research assistant for former

law dean Lorna Turnbull, who studies the impact of tax policy on women.

Section 87 of the Indian Act exempts the property of First Nations and their citizens from taxation but Tait says the Canada Revenue Agency interprets that exemption in a very narrow and often confusing way.

In practice, it means that First Nation citizens usually pay income tax unless they're working for a First Nation or "you never leave the reserve and you're maybe making moccasins," Tait says. "Where's the incentive for economic development if I actually want to do something bigger than eke out a living?"

While Tait was in law school, the Federal Court of Appeal improved the situation slightly with a ruling that commercial fishing by two Norway House men was tax exempt even though they fished off-reserve. But the judges said “It is easier to say what the purpose of section 87 is not, than to state positively what it is.”

TAIT TOOK THAT AS AN INVITATION to explore the purpose of the Indian Act tax exemptions, which might not be so mysterious after all. The Act passed one year after her treaty was signed and long before Canadians paid income tax. Surely one of the Indian Act’s main purposes was to implement the treaties, including verbal agreements that were part of nation-to-nation treaty negotiations, Tait argues.

The essence of the treaty relationship is that treaty Indians were to live under their own law and settlers under theirs, she says. “Treaty Indians would not be subject to taxation by the Canadian government.”

Treaties were also designed to facilitate peace and trade, Tait says – the kind of trade that is only possible when both parties maintain a healthy economy.

TAIT BELIEVES TAX EXEMPTIONS SHOULD TRAVEL WITH THE INDIVIDUAL, AS HER HUNTING RIGHTS DO WHEN SHE IS OFF RESERVE.

Tait believes tax exemptions should travel with the individual, as her hunting rights do when she is off reserve, providing an incentive for First Nation citizens to start businesses in places where they are more likely to be viable. That would require the federal government to expand section 87 Indian Act provisions to better reflect the purpose of the treaties. Such changes could propel First Nations into a totally different economic situation, which Tait argues should be more palatable to Canadians than paying for more jails and other consequences of widespread poverty.

Details of how an individual’s exemptions would apply in a neighbouring treaty area could be worked out between First Nations, Tait says.

Tait’s thesis supervisor Turnbull says what we tax, how we tax and who we tax reflect our values as a society. “Myra’s work invites us, maybe even requires us, to incorporate the values embedded in the treaties—especially the value of nation-to-nation agreement making—in the tax provisions the Canadian legal system has imposed on members of Indigenous communities.”

Tait’s understanding of treaties is enriched by her work with Mamawipawin, a research space on the Fort Garry campus focused on constitutional law and Indigenous politics. That work has taken Tait to Australia and New Zealand, where a former air force base in Hamilton was returned to the Maori 20 years ago as part of a land settlement. That land is now home to a Maori-run shopping mall worth hundreds of millions of dollars.

BELOW: Embroidered Jacket made by Nancy Berens, the wife of William Berens, Chief at Berens River from 1917 until 1947. This jacket is made of smoke tanned moosehide and beautifully embroidered with silk. It was made in 1912 for the Reverend Percy Jones, a friend after whom Nancy and William named one of their sons. The jacket was donated to the Manitoba Museum in 1980.

photos: David Lipnowsk



RIGHT: On the left, the silver Treaty No. 5 Medal given to Chief Jacob Berens after completing the negotiations of the Treaty at Berens River, Sept 20th, 1875.

On the right, the silver medal Jacob Berens received in 1901 from the Duke and Duchess of Cornwall and York, later King George V and Queen Mary, on the occasion of the first Royal visit to Western Canada. The medal commemorates the relationship generated by Treaties between the Crown and Canadian First Nations peoples. The medals signify Crown promises to honour Treaties whereas the adjacent pipe signifies Indigenous agency in Treaty making and underlines the First Nations peoples understanding that the Treaties constituted a sacred promise.



“Why couldn’t that happen in Winnipeg?” Tait asks, pointing to the Kapyong Barracks land that got bogged down in court after Manitoba First Nations requested it as partial fulfilment of outstanding Treaty 1 promises.

Some of those who argue that Tait’s tax policy reform suggestions are unfair may be suffering from historical amnesia, she says. Was it fair that her ancestors were legally prevented from selling

“MY HOPE IS TO REVITALIZE THE TREATY RELATIONSHIP DISCUSSION. IT SHOULD INFUSE EVERY ASPECT OF THE INDIAN’S LIFE JUST LIKE THE INDIAN ACT ALWAYS HAS.”

their farm products or that they received inferior and harmful education? Canadian courts also have an aversion to the possibility that any Indian businessperson might grow wealthy. In fact, one of the tax law cases Tait quotes in her thesis warns against opening the door “to wealthy Natives living on reserves across Canada to place their holdings into banks or other financial institutions situated on reserves... without attracting any income tax on their profits.”

If more wealthy people did live on reserve, it might instead open the door to First Nations levying their own taxes for the benefit of the community, Tait says.



ABOVE: Chief’s Coat. Red wool coat with navy and gold trim, epaulettes and buttons with the words “Dominion of Canada Indians”. This coat was given to Jacob Berens the day the Treaty was negotiated in Berens River, September 20th, 1875 and kept by the Berens family for 132 years before they offered it to the Manitoba Museum so that the story of Treaty 5 could be told.

“We’ve completely forgotten about the treaty relationship,” she says. “I don’t see anybody talking about taxes and treaties.”

Like Senator Murray Sinclair, Tait thinks Canadians have a rare second chance at Reconciliation through renewal of the treaty relationship. “Implementing treaties is not for wimps.”

Fortunately, Tait is no wimp. She farmed for a couple of decades and juggled her undergraduate degree with raising children on her own. Her four brainy and artistic kids were only recognized as Indian after Canada got rid of a law about five years ago that discriminated against their grandmother.

Tait is co-editing a book with political studies professor Kiera Ladner titled *Surviving Canada: Indigenous Peoples Celebrate 150 Years of Betrayal* that includes a contribution from activist singer Buffy Sainte-Marie. Tait hopes Mamawipawin (originally set-up with funding from the Canada Foundation for Innovation and Province of Manitoba) will be able to secure long-term funding, since there’s so much more work to be done.

“My hope is to revitalize the treaty relationship discussion. It should infuse every aspect of the Indian’s life just like the Indian Act always has.” **✎**

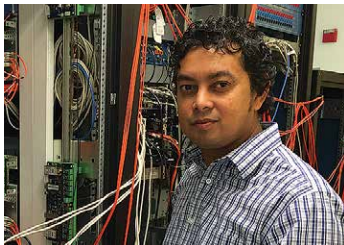
POWER INNOVATORS

BY JANINE HARASYMCHUK

DOZENS OF U OF M graduate students participate in research and development at RTDS throughout the year, gaining valuable experience and an applied educational advantage. One such student is electrical and computer engineering recent PhD graduate, Dinesh Gurusinghe.

“I have been involved in ongoing research on novel synchrophasor applications [an important tool that can help minimize large scale blackouts] and the need for testing them in real-time environments to identify various practical implementation issues,” says Gurusinghe. “This research facilitated two-way technology and knowledge transfer and provided hands-on training in an industrial R&D environment.”

Gurusinghe’s research is supported by RTDS Technologies as well as the Natural Sciences and Engineering Research



Dinesh Gurusinghe, electrical and computer engineering graduate, now employed at RTDS Technologies.

RIGHT: RTDS Technologies—one of 18 tenants in Smartpark—is a shining example of the university/industry research collaboration advantage. RTDS serves the world’s major electrical utilities, equipment manufacturers, research institutions and universities.

Council of Canada (NSERC). RTDS not only provides initial training – closely guiding the research through regular progress meetings – but also engages with students throughout the research. “It is fun and exciting when research works as I planned,” says Gurusinghe.

“This research facilitated two-way technology and knowledge transfer and provided hands-on training in an industrial R&D environment.”

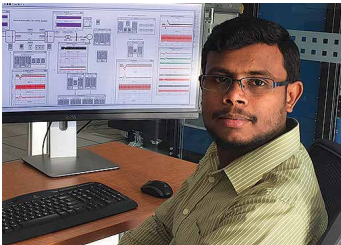
“The most exciting part is when I come up with ideas and ways to implement and to test them.

Some of the discoveries I make are already implemented as generic applications in real-time simulator, however, if I have an opportunity I would like to implement them in the actual power system at least as a pilot project.”

ARUNPRASANTH SAKTHIVEL recently completed his PhD and is now employed at RTDS as a simulation specialist.

“In my PhD research, I developed a systematic procedure to tune controller parameters of Modular Multilevel Converter based Voltage Source Converter (MMC-VSC) systems,” says Sakthivel. MMC-VSC systems are attractive for integrating wind and solar farms to the power system and providing better control of power flow in the transmission network. There is an urgent global need in the industry for a proper procedure to tune VSC controllers.

“I used the RTDS as the simulation platform for my research,” continues Sakthivel. “My research was funded in part by the RTDS Technologies Inc.



through the MITACS accelerate scholarship [and by a Manitoba Graduate Scholarship and Mark and Dorothy Danzker Scholarship].” As part of his MITACS/RTDS funding, he spent four months in every year of his PhD studies working as an intern. “The research

“The fun part of my research is performing real-time simulation studies of power systems.”

guidance received from the staff was very valuable to the successful completion of my research.”

Sakthivel says that detailed behaviour of any complicated power system can be mathematically modelled and accurately simulated using advanced computer simulation tools such as RTDS.

Sakthivel’s development of a novel control tuning procedure was published in a popular power system journal, *IEEE Transactions on Power Delivery*. He expects the power system industry to adopt this tuning method for practical applications. The power system simulation models he developed are used by researchers at the U of M. **RI**



ABOVE: Smartpark, the university’s research and technology park—located on the edge of the Fort Garry campus—has been building a community of innovators since 2002. Created to foster university and industry research collaboration and innovation, and nurture a culture that helps keep highly-skilled students and researchers in Manitoba, the 100-acre park is now home to 1,100 employees and 415,000 square feet of research facilities.

LEFT: Arunprasanth Sakthivel RTDS simulation specialist.

MANITOBA’S POWER ADVANTAGE

Winnipeg is an internationally recognized centre of expertise in power system simulation. This reputation is based on the work of the Manitoba HVDC Research Centre, RTDS Technologies Inc. and the Power Systems Group in the Faculty of Engineering.

RTDS Technologies Inc. is a spin-off company from the HVDC Centre and is the world’s first manufacturer of Real Time Digital Simulators (RTDS) for the power systems industry.

RTDS is essentially a massively parallel computer capable of solving, in real time, the equations which govern the behaviour of power systems and their control apparatus. The University of Manitoba was the first university in the world to be equipped with an RTDS™. Today, more than 150 universities around the world use the RTDS in their programs.



AN ACCESSIBLE LIGHTNESS

ONE GRAD STUDENT'S
BOND WITH A SPECIAL
TEENAGER LED HER TO
RESEARCH IN ACCES-
SIBILITY PLANNING
AND DESIGN

BY MARIANNE MAYS WIEBE

OF BEING



Always a high achiever, Krystyl Bergen felt exhausted and a bit aimless after completing an undergraduate degree in environmental design. She needed to recuperate and regroup. She applied to do graduate studies in city planning—but the summer before returning to studies, rather than seek a design job in her field like most of her graduating cohort, she accepted a nanny job for a teen with a disability. The relationship bond she formed brought new purpose and direction to her studies, all applicable to a burgeoning field of research in Canada: accessibility planning and design.

THE IDEA WAS JUST TO HAVE a summer off, says Bergen—“a great experience and a chance to hang out with this wonderful girl.” She had no idea the relationship was going to have the impact it did. “She has influenced my life a lot.... We’d go walking and I’d see things that would challenge her. Simple things, that shouldn’t have been an issue, oversights in design. It really changed my perspective.”

Accessibility in planning and design suddenly became a very concrete problem to Bergen. As she points out, a disability can happen to anyone at any time. And because we are all aging, gradually issues of accessibility will affect nearly all of us.

Currently in Canada, one in six of us have a disability—our aging population means that by 2030 that number will go up to one in five, or 20 per cent of the population.

“It’s very interesting,” she says. “I did my undergrad[uate degree] in environmental design, which made me more aware of designed spaces, and it made me more aware of design and community intention, of why design is the way it is—but not necessarily what’s done to accommodate people that are using the space.”

A research breakthrough came when she started looking beyond the familiar principles of universal design and to accessibility legislation.

The term “universal design”—used more commonly in the U.S.—had its genesis in certain kinds of product design, says Bergen. Examples are the universal remote control and the can opener.



The can opener started with an idea to accommodate those with limited hand mobility. And everybody liked it, she notes. It was a universally-accepted product that accommodated everyone. “The concept starts with something that accommodates people beyond the typical, able-bodied person,” she explains.

Universal design, also known as inclusive design, generally applies to design in buildings, products and environment that works for all,

“SHE HAS INFLUENCED MY LIFE A LOT.... WE’D GO WALKING AND I’D SEE THINGS THAT WOULD CHALLENGE HER. SIMPLE THINGS, THAT SHOULDN’T HAVE BEEN AN ISSUE, OVERSIGHTS IN DESIGN. IT REALLY CHANGED MY PERSPECTIVE.”

regardless of ability. But it doesn’t typically include an overview of how systems work together for greatest accessibility.

“Accessibility planning and design applies to a larger scope than just a defined internal or external space or product. It’s about how a system works together to provide accessibility,” she explains.

Adds Bergen, “I had [looked] into universal design and inclusive design, but neither were related to planning—overall planning. And that’s when I came to the legislation [and accessibility planning].... It’s the way things have evolved in Canada.”

Spurred by her research on the Accessibility for Manitobans Act (AMA), which followed similar legislation in Ontario and passed into

Krystyl Bergen in her design studio in the Faculty of Architecture.

law in Manitoba in December 2013, she shifted her focus to accessibility planning. Under the new law, organizations are required to develop plans with strategies to identify, prevent and remove barriers to accessibility.

The AMA will be implemented over time and includes five main standards with individual timeframes, to be addressed in order: customer service, employment, information and communication, transportations and built environment. The implementation deadline for the first standard is 2017.

She’s drawn to the holistic nature of accessibility planning, with its underscoring of comprehensive community health and inclusion. With a mother who’s a health care provider, Bergen herself considered nursing and is very interested in matters of health and wellness.

To narrow her focus, she decided to limit her research to accessibility planning at the university, which, like other organizations in the province, was preparing to implement the first accessibility standard.

As she puts it, “The university is like a small-scale city. It’s got every resource here.... and pretty much everything that can be applied to campus planning can be applied to city planning.”

She likes the community dynamic of students, faculty and other employees, all at large, sprawling campuses with a mix of new and old buildings, some of which

will need to be retrofitted for accessibility. Another interesting factor, she says, is winter environmental conditions: snow and ice cause major problems for mobility and need to be taken into account in planning.

There are also common misperceptions about the populations that utilize university campuses, and accompanying attitudinal barriers to accessibility—which she sees as a major focus for further research.

For instance, she says, “We know we have this aging population [using] our facilities, and so it’s important for design to go beyond just your average 20-year-old able-bodied student. And the university is [also] a community facility—people come here for swimming lessons, and many other things. It really should be a space that is open and accessible to all.”

“IT’S BROUGHT EVERYTHING I’VE ALWAYS WANTED TO DO TOGETHER, IT’S BROUGHT FURTHER MEANING TO ME FOR THE WAY SPACES ARE DESIGNED.”

With 30,000 students and about 10,000 faculty and staff, however, there’s a good chance that accommodation is required for those who are here, and not just the extended community that comes to visit, she says.

Her research methods include literature reviews and policy analysis for how accessibility is defined compared to how it’s experienced, and how compliance can be monitored and reinforced. She will also conduct walking interviews in order to provide an experiential component and to re-establish the experience that sparked her passion for the subject and provided her with an accessibility lens.

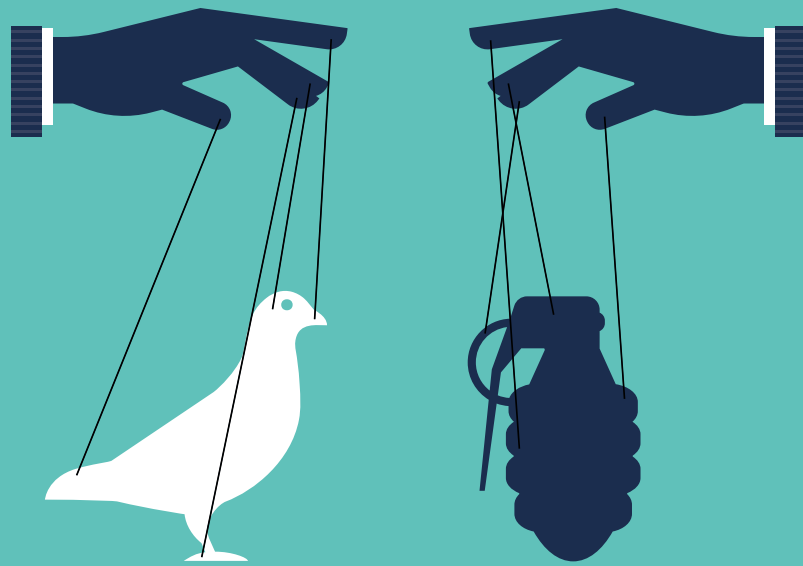
Her hope is that others will be persuaded—and moved—as she was by the need for, and the wisdom of, accessibility planning.

“It’s brought everything I’ve always wanted to do together,” she notes. “It’s brought further meaning to me for the way spaces are designed.” She points out an uneven wheelchair ramp. “Even the fact that there is a ramp in here but it has a huge bump. Even when accommodations have been made, it’s not always in a way that’s helpful to people.”

“Walking through some daily activities of students walking on campus and identify[ing] ... barriers, I want to give people the sense of these barriers [so that they can] see and feel what those barriers are like,” she says. ■

PEACE LEADERSHIP

BY LENA BETKER



THE PEACE AND CONFLICT STUDIES (PACS) program celebrated its 10TH anniversary with its first ever international graduate student conference this fall. Peace Leadership: International Peace and Conflict Studies Graduate Student Conference, held October 21 and 22 at the University of Manitoba and University of Winnipeg, was the result of a lot of hard work and dedication by a team of graduate students in the PACS program.

T WAS PHD CANDIDATE AZIZ RAHMAN who had the initial idea to host a conference, seeing it as a way to showcase the program and the work of current and past PACS graduate students.

“We haven’t had any conferences in the department since it started, so I thought, ‘Why not have something done by students?’”

When Rahman took his proposition to the PACS department in autumn 2015, they were immediately onboard. The planning committee started meeting in February 2016 and solidified a conference theme: peace leadership. To the group’s knowledge, there has never been a conference linked to this subject.

“Both terms—peace and leadership—are very abstract concepts, yet with some real-life implications,” says Christina Reinke, a candidate in the department’s joint master’s program with the University of Winnipeg, and a member of the conference’s planning committee. “We wanted to explore these implications of leadership. We often know what we don’t want in leaders and in leadership, but what does peace leadership actually look like?”

Not only is the theme of peace leadership unique for a conference, it’s also an underdeveloped area in scholarship in general: very little literature exists on the topic. Taking this in stride, the team created their own theoretical framework for peace leadership called the “ICE Model,” which is an acronym for Innovation, Communication and Empowerment—three pillars they believe to be essential to successful peace leadership. They used the ICE Model to guide the conference, calling on interdisciplinary submissions relating to innovative, communicative and empowering processes for transforming, managing and resolving conflicts at all levels of society. The response



Aziz Rahman, Chairman of PACSSA Conference Committee and PhD student in Peace and Conflict Studies at Mauro Centre for Peace and Justice.

RIGHT: Participants present after the last session at the University of Winnipeg.



to the theme was incredible: originally meant to be a one-day event, the committee received so many submissions that they decided to add a second full day of speakers.

“I saw the passion from the students. People expressed their minds, they reflected on the issues critically, they shared insights on what they learned and shared new ideas.”

Andrew Thompson, adjunct assistant professor of political science at the University of Waterloo, and senior fellow with the Global Security and Politics program at the Centre for International Governance Innovation, opened the conference with a key note address titled, “Peace Leadership in Uncertain Times.” Panels on a diverse array of topics followed, ranging from youth extremism and youth activism to refugee issues. PACS graduate students presented their work alongside

LEFT: Key Note Speaker: Andrew Thompson, adjunct assistant professor of political science, University of Waterloo.

LEFT: (L-R) Indigenous peace-building session with presenter Peter Genger and moderator Mary-Anne Clarke, both PACS PhD students.

LEFT: (L-R) Sean Byrne, director of the Mauro Centre for Peace and Justice, and Paul Cormier, a graduate of the PACS PhD program, in discussion.

colleagues from across the globe, including Nigeria, Russia, Sri Lanka, Uganda and the U.S.

Obasesam Okoi, a PhD candidate in the PACS program, was proud to present his paper on the role of engineers in world peace in a panel titled Arms, Disarmament & War Technologies. “It allowed me to introduce a new idea in the world and contribute to the literature in the field,” he says. The real highlight of the conference for Okoi, though, was seeing the engagement of the attendees. “I saw the passion from the students. People expressed their minds, they reflected on the issues critically, they shared insights on what they learned and shared new ideas.”

Reinke agrees, “It was so exciting to see people come from all over the world to discuss issues around peace leadership. It was also neat to see how all the participants were really involved and interested in the various panels and presentations. Their interest was contagious and I am so glad that we were able to provide the space and opportunity for the exchange of ideas.”

Inspired by the resounding success of the conference, positive feedback from attendees and encouragement from the PACS department, the team is already thinking ahead to next year’s conference. They’ve also decided to proceed with a special edition journal where they’ll publish the work that was presented at the conference. “The support from the students, the department and the community was remarkable. It was a miracle, I’d say,” says Rahman. ■

UNDERSTANDING THE ROOT CAUSES OF CHRONIC INFLAMMATION



VIDYANAND ANAPARTI'S RESEARCH IS LEADING TO A NEW UNDERSTANDING ABOUT THE ORIGIN OF CHRONIC INFLAMMATORY AILMENTS SUCH AS ASTHMA AND ARTHRITIS

BY CURT CHEREWAYKO

Newton's third law states that any particular action will have an equal and opposite reaction. That law pertains to the physics of motion, but can also be applied to physiology: exert any external force on the body—be it diet, climate or stress—and its likely to respond in some way. As a “law,” Newton's law suggests a level of predictability, but the way the body responds isn't always predictable.

David Lipnowski

TAKE THE IMMUNE system for example: it's the body's primary defense mechanism, but it is sometimes prone to overreact.

An over-reactive immune system is believed to result in inflammatory illnesses such as asthma and arthritis.

Vidyanand Anaparti has spent the last six years trying to understand the underlying causes of chronic inflammation and the complex physiological processes that manifest it. In October 2015, Anaparti completed his PhD at the University of Manitoba's department of immunology where he examined the role of a group of neuronal receptors.

BELOW: Anaparti loading protein samples in each of the wells [this is called gel electrophoresis, a technique used to separate proteins in a sample based on the molecular weight and charge on the protein].

photos: David Lipnowski

At one time, these neuronal receptors were thought to be exclusively found in the brain but have since been discovered in the lungs. In the brain, these receptors, known as N-methyl-D-aspartate (NMDA) receptors, are located on the surface of neurons, which are the primary channels for sending and distributing information related to learning and memory. Information moves through the brain when one neuron releases an amino acid known as glutamate and another neuron receives it via the NMDA receptors on its surface. The disruption or deterioration of these neuron channels or their NMDA receptors can lead to neurological ailments such as dementia, Alzheimer's and Parkinson's. While the

WITH FURTHER RESEARCH, HIS FINDINGS COULD HELP LEAD TO NEW TREATMENTS FOR ASTHMA.

role of NMDA receptors in the brain is understood, little was known about why these same receptors are located in the lungs or what role they play.

Using mice models, Anaparti's PhD research showed that NMDA receptors are located in airway smooth muscle cells, where they mobilize and receive calcium. Airways are specialized tube-like structures that allow air to pass back and forth in the lungs. Airway smooth muscle cells surround these airways and help in the contraction and relaxation of airways. When a receptor receives calcium, the mineral is distributed throughout these cells in the lungs, causing airways to contract or relax.

With further research, his findings could help lead to new treatments for asthma, which is an immunological ailment that causes inflammation in the lungs. This inflammation causes airway smooth muscles in the lungs to contract, making it difficult for those suffering from asthma to breathe.

Anaparti's five years of research into lung-based neuronal receptors was almost derailed two years into the program, when Prof. Redwan Moqbel, the principal investigator for his project, died after a protracted battle with cancer. Moqbel's death left the project in limbo with grant financing halted.



ABOVE: Different wells in a gel electrophoresis.

“By that point of time, I had completed all requirements for the PhD program and was at a crucial juncture in my research,” said Anaparti. “Moqbel’s demise was a huge loss, both at a personal and professional level. The lab was decommissioned, project funds withdrawn, and my research came to a complete standstill. It was the biggest moment of crisis in my life. Nobody knew what action to take,” said Anaparti.

Andrew Halayko, a professor of physiology and internal medicine and a member of Anaparti's PhD

“THERE IS STILL A LOT TO BE UNDERSTOOD ABOUT RHEUMATOID ARTHRITIS, BUT IT DOES APPEAR TO BE HEREDITARY. I HAVE A DAUGHTER AND I DON'T WANT HER TO SUFFER FROM THE SAME DISEASE.”

committee, became his new co-advisor and gave him access to his lab for continuing with his research. Anaparti had to reorient his research project goals, as originally planned with Moqbel. Instead of human tissue samples, he now had to work with mice models in Halayko's lab.

Anaparti partly attributes his resilience and adaptability to the seven years of private sector lab experience that he gained in India, his country of origin. He worked there between 2002 and 2009 for three different biotechnology companies before arriving in Canada in 2010 to begin his PhD research. Five of those private sector years were with Imgenex India, where he helped setup a lab for developing antibodies using a hybrid-cell cloning process.

In September 2015, on the heels of his PhD research, Anaparti was awarded a postdoctoral fellowship at the

U of M: where he is now examining the role that epigenetic processes—external factors that influence gene expression—have in the development of rheumatoid arthritis in Indigenous populations.

Indigenous peoples are at a three-fold risk of developing rheumatoid arthritis, which is a disease in which the immune system mistakenly attacks the membranes that line the body's joints, resulting in pain and inflammation. Little is understood about why this happens and what role existing genetic traits have in the development of rheumatoid arthritis versus external factors such as diet, stress, lifestyle and infections.

“We all carry some genetically susceptible traits for many diseases, but do we end up with those diseases? Most often, no,” said Anaparti. “Typically, our body is resilient enough to withstand those susceptible traits. There is more to the enigma of rheumatoid arthritis than simply saying genetics.”

His postdoctoral fellowship research on rheumatoid arthritis is a slight departure from his PhD research on neuronal receptors in the lungs. But there is a common thread: both veins of his research are attempting to understand the origin of chronic inflammation, whether it occurs in the lungs (in the case of asthmatics) or in the joints (in the case of people suffering from arthritis).

One of the motivations that drives his research is at a personal level.

“My wife is suffering with rheumatoid arthritis. I see her suffer day in and day out,” said Anaparti.

“There is still a lot to be understood about rheumatoid arthritis, but it does appear to be hereditary. I have a daughter and I don't want her to suffer from the same disease.”



UNIVERSITY OF MANITOBA SPEAKER SERIES

THE UNIVERSITY OF MANITOBA HOSTS SEVERAL SPEAKER SERIES, BOTH ON AND OFF CAMPUS, ENGAGING AND INFORMING THE COMMUNITY ABOUT ONGOING RESEARCH AND ISSUES OF INTEREST.



CAFÉ SCIENTIFIQUE

Join us in talking and learning about different health topics and related research. These Café Scientifiques bring together experts with non-researchers (you, me, neighbours and friends) in a relaxed atmosphere at McNally Robinson Booksellers, to talk about their research and the questions it raises. Come and join the discussion!

UMANITOBA.CA/CAFESCIENTIFIQUE



THREE MINUTE THESIS (3MT®)

Hear our innovative, trailblazing graduate students explain their research—in three minutes or less. Challenging? You bet it is. It takes years for a thesis to be researched and finalized, never mind condensing it and presenting in front of our panel of judges and a live audience. Cheer on the competitors and vote for the people's choice winner!

UMANITOBA.CA/3MT



VISIONARY CONVERSATIONS

What is more powerful than a good conversation? Join us on campus or in the community: Come learn, debate and discuss alongside experts and community leaders.

UMANITOBA.CA/VISIONARYCONVERSATIONS

OUR GRADUATE STUDENTS, BY THE NUMBERS

3,700 Graduate students (master's and doctoral)	1,118 International graduate students	136 Graduate programs: 49 doctoral, 86 master's and one diploma program
93 Canada Graduate Scholarships - master's. Funded by three federal granting agencies: • Natural Sciences and Engineering Research Council of Canada (NSERC) • Social Sciences and Humanities Research Council (SSHRC) • Canadian Institutes of Health Research (CIHR)	49 Research Manitoba graduate studentships and scholarships (awarded in 2016)	27 Canada Graduate Scholarships- doctoral (current) funded by NSERC, SSHRC and CIHR
12 NSERC Postgraduate Scholarships-doctoral (current)	11 CIHR Canada Graduate Scholarships-master's	14 SSHRC Doctoral Fellowships (current)
7 Vanier Canada Graduate Scholarships-doctoral (current)		



Master of social work student **Eun Kyeong** (left) and Centre on Aging supporter **Harry Paine** (right) build intergenerational connections through research and discussion of aging issues.

Research**LIFE**

Embroidered Jacket
made in 1912, of smoke
tanned moosehide and
beautifully embroidered
with silk (*see page 20*).