McGill University's

Macdonald Campus

McGill

DISCOVER

RESEARCH | INNOVATION | EDUCATION | OUTREACH

DISCOVER

McGill's Macdonald Campus

Where nature meets science and technology

650 hectares (1,600 acres) of research facilities, farmland, greenspace, fields and forests, with the only operating dairy farm on the Island of Montreal

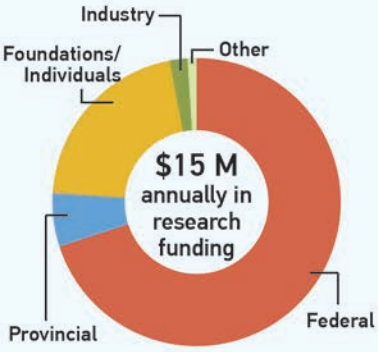
100 +
Tenure-track faculty

Principal investigators in **180** grants

- 8 Canada Research Chairs
- 12 Distinguished Professorships
- 7 Named Chairs, Professorships and Scholars
- 4 Members of the Royal Society of Canada

500+ papers published annually

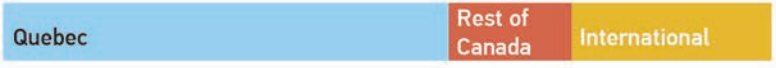
Research



- ENVIRONMENT & ECOLOGY
- CLIMATE CHANGE
- SOIL & WATER
- ENGINEERING
- FOOD SAFETY
- FOOD SECURITY
- HUMAN NUTRITION
- NOVEL FOODS
- CROP PRODUCTION
- LIVESTOCK PRODUCTION
- BIO-BASED PRODUCTS
- FARMING INNOVATIONS
- HEALTH & WELL-BEING

Students
2,100

From
100+ countries



Mother tongue: 41% English | 24% French | 35% Other

VIACHESLAV ADAMCHUK
Bioresource Engineering

DISCOVER

ENGINEERING THE FUTURE

Bioresource engineer Dr. Viacheslav Adamchuk develops new sensing technologies capable of mapping soil and plant attributes while moving across an agricultural field. This **precision agriculture** approach allows farmers to treat specific field and crop areas according to need, which minimizes environmental degradation and increases farm profitability.

- Inspired by biological systems where optimized structural properties are integrated with structural reconfiguration, sensing, actuating and self-healing, Dr. Hamid Akbarzadeh Shafaroudi's research is on bio-inspired **advanced multifunctional materials** and 3D-printed structures. Applications range from lightweight smart structures to sustainable energy scavenging for the automotive, aerospace, energy, agriculture and construction sectors.

- Dr. Marie-Josée Dumont's research is truly transformational. She works in the characterization of industrial feedstocks and agricultural wastes, to identify the potential of these materials to transform into **bio-based materials** such as polymers, surfactants, bio-based fuels and platform chemicals, for commodity and specialized applications.

> *"It is important to look at agricultural crop production as a system and identify weaknesses requiring resolution. Within the large array of available technologies, there is often already a component that can be adapted for every production scenario."*

MARK LEFSRUD
Bioresource Engineering

DISCOVER

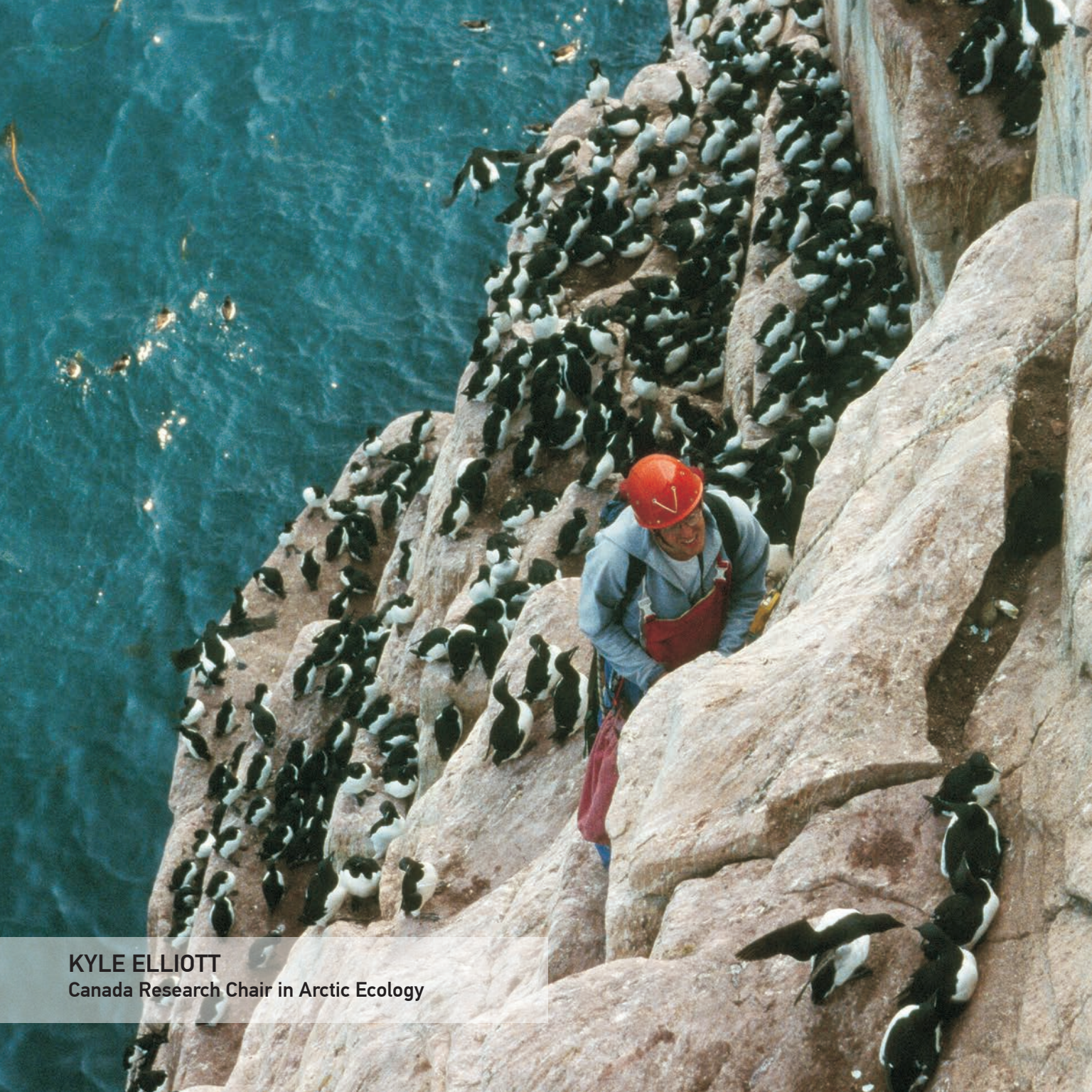
THE FUTURE OF AGRICULTURE

- Dr. Jaswinder Singh enhances quality traits, stress tolerance and **bioenergy capability of crop plants** using current genomic, molecular breeding and biotechnological tools. He is an internationally recognized innovator in the use of transposon tagging (bookmarking) in cereal crops. His recent discovery of a key gene that acts as a switch to determine how a particular plant responds to high humidity and excess rainfall opens up new directions for research in seed dormancy.

- The primary goal of Dr. Mark Lefsrud's research is the improvement of plants for human consumption (food security), and energy (biofuels). He is looking at ways to move the production of fresh fruits and vegetables closer to the consumer, using **vertical farming and innovative greenhouses**, with a focus on energy reduction and the selection of species and cultivars for this specific growing environment.

- Plant scientists Dr. Anja Geitmann, Canada Research Chair in Biomechanics of Plant Development, Dr. Martina Strömvik and Dr. Jean-Benoit Charron, in partnership with the Université de Sherbrooke, have established the Eastern Canadian Plant Phenotyping Platform (ECP3) research program to develop **new crop cultivars** and precision agricultural tools and management practices adapted to climate change in Eastern Canada.

> *"We are deeply rooted in the 10,000-year-old practice of agriculture and resource management, and yet utterly contemporary and forward thinking in our approach to merging disciplines and working together to solve thorny problems."*



KYLE ELLIOTT
Canada Research Chair in Arctic Ecology

DISCOVER

ENVIRONMENT

- Dr. Kyle Elliott, Canada Research Chair in Arctic Ecology, and Dr. Murray Humphries, McGill Chair in Northern Research, use bio-logging—a technology which enables direct and continuous time and space measurements—to monitor changes in the abundance and health of **wildlife populations** and northern seabirds and their impact on **traditional food security**.

- Dr. Niladri Basu, Canada Research Chair in Environmental Health Sciences, conducts research in **toxicology and human health** to identify and address the risks associated with contaminants in the environment. His research supports public health actions and policies that improve environmental quality and human health in Canada and internationally.

- Research in Dr. Elena Bennett's lab centres on the simultaneous management of multiple **ecosystem services** (food, freshwater and fibre, places for recreation, flood control and climate regulation) to maximize benefits and mitigate declines.

> *"Monitoring and tracking wildlife species that are key sources of traditional food for Northern communities lets us measure the impacts that environmental change and resource development have had, and will have, on wildlife and human populations."*

JAN FRANKLIN ADAMOWSKI
Bioresource Engineering

DISCOVER

WATER

- Dr. Jan Adamowski's research in the areas of statistical hydrology and **water resources engineering and management** is truly international, with collaborations in over 30 countries. His particular focus is on the development of artificial intelligence and participatory water management systems.

- Dr. Chandra Madramootoo, internationally recognized water expert and founding director of the Brace Centre for Water Resources Management, studies water management, **irrigation and drainage** in agricultural environments, as well as the impacts of water management practices on **greenhouse gas** emissions. His research focuses on the design, development and testing of technologies and field practices that can conserve water, and increase food and nutrition security under water-limiting conditions.

- Dr. Zhiming Qi's research ranges from field experimentation to computer modelling. He investigates hydrological processes, environmental quality and crop yields under various management practices and climate scenarios and develops **computer models** to address emerging concerns such as carbon sequestration and **climate change**.

> *With growing water scarcity and concerns about climate change, new technologies must be developed to conserve our limited freshwater supplies while increasing crop productivity.*

SALWA KARBOUNE
Food Science & Agricultural Chemistry

DISCOVER

FOOD INNOVATION

- Dr. Salwa Karboune leads the Consortium de Recherche et d'Innovation sur la Transformation Alimentaire [Consortium for Research, Innovation and Transformation of Agrifood]. The group aims to reinforce the competitive capacity of businesses in Quebec's **food transformation** industry by increasing their ability to conduct research and development and to launch new technological innovations and products that meet market demand.

- Dr. Valérie Orsat is an internationally recognized expert in **functional foods and nutraceuticals**. Her current research explores the development of processing methods for enhanced production, extraction and encapsulation of bioactive compounds for functional foods.

- Dr. Vijaya Raghavan studies and develops post-harvest and **post-production processes** and technologies for the drying and storage of produce and crops. His research has been successfully applied to address the issues of food security and safety in India, where an estimated 30% of crops and produce are lost post-harvest due to damage and spoilage.

> *Every day, decisions are made about food—what to buy, to prepare and to consume—decisions that are personal, social and emotional! Food brings challenging multi-disciplinary sciences together—the future of the food industry is a result of what we do today.*

SAJI GEORGE
Canada Research Chair in Sustainable Nanotechnology for Food and Agriculture

DISCOVER

FOOD SAFETY

- Canada Research Chair in Sustainable Nanotechnology for Food and Agriculture, Dr. Saji George's research is aimed at understanding the relationship between nanomaterial properties and their hazardous and beneficial biological outcomes with the ultimate goal of developing sustainable nanotechnology applications for current and future challenges in food safety and security. His overall goal is to develop guidelines for safe use, tools for regulatory oversight, and **safety-assured nanotechnology for food safety and security**.

- Dr. Ashraf Ismail takes packaging beyond its traditional role as a barrier to protect food. He develops active-packaging films that, over time, release natural substances with antimicrobial activity to enhance the **safety** of fresh meats and frozen vegetables.

- There is growing concern about the relationship between long-term exposure to chemical residues and chronic diseases such as cancer, endocrine disorders and Alzheimer's—food is suspected to be a major source of exposure. Dr. Stéphane Bayen explores the occurrence, physicochemistry and bioavailability of **food contaminants** from the field to the consumer.

> *With the globalization of the food chain and rising consumer expectations for high-quality and safe products, novel technologies for use in food safety monitoring and food product development are paramount.*

GRACE MARQUIS
Human Nutrition

DISCOVER

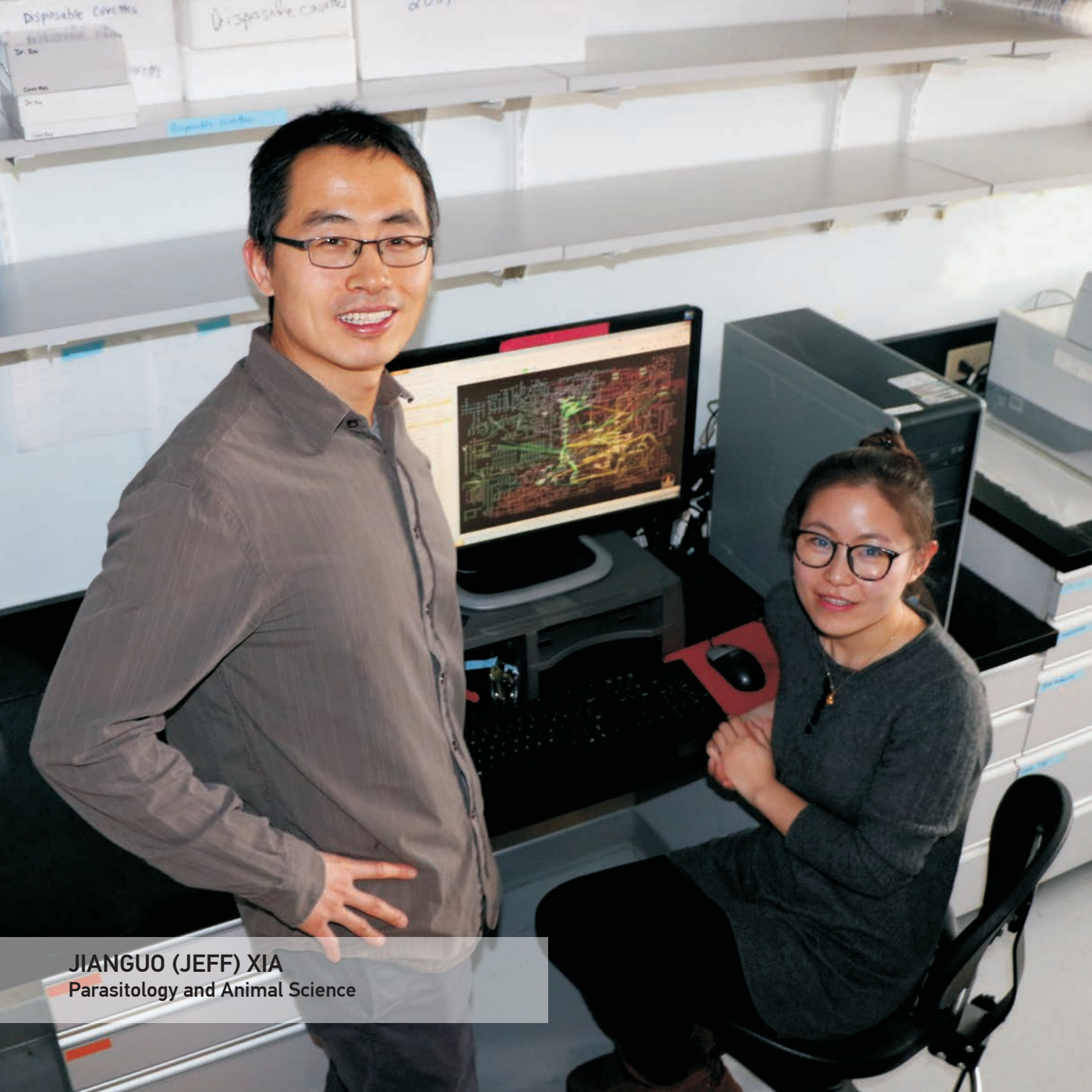
FOOD AND NUTRITION

Dr. Grace Marquis works to improve the **nutrition** of young children in poor rural communities of Africa. Based on local knowledge, her research group develops alternative strategies that will support health and growth, and can be sustained by rural families, especially women, living in poverty.

- Taking a public health approach and a global perspective to the issues of food insecurity and hunger, Dr. Hugo Melgar-Quiñonez, Margaret A. Gilliam Faculty Scholar in Food Security and Director of the **McGill Institute for Global Food Security**, helped to develop the FAO's Food Insecurity Experience Scale (FIES). The tool is used in more than 150 countries around the world to measure food insecurity through people's experiences.

- Working with community organizations in Montreal, Northern Quebec, Nunavut and the Caribbean, Dr. Maureen Rose and her students provide community nutrition programs and workshops ranging from budgeting to food choice, shopping, preparation, and preservation skills. The goal of these programs is to improve **local food security**, improve health outcomes and eradicate hunger, poverty and social isolation.

> *Food insecurity is a complex phenomenon. In addition to almost one billion people without enough calories available to meet their daily energy consumption requirements, hundreds of millions suffer from vitamin and mineral deficiencies that put them at a higher risk for disease and mortality.*



JIANGUO (JEFF) XIA
Parasitology and Animal Science

DISCOVER

HEALTH AND WELL-BEING

- Dr. Jianguo (Jeff) Xia, Canada Research Chair in Bioinformatics and Big Data Analytics, leverages bioinformatics, statistics and **big data** to understand the effects of biological, environmental and nutritional factors on health and disease.

- Dr. Armando Jardim investigates medically important infectious organisms using a multidisciplinary approach to identify and characterize proteins and potential protein targets that may be employed to develop new **antiparasitic chemotherapeutic agents.**

- Collaborators Dr. Marilyn Scott and Dr. Kristine Koski explore how parasites influence their hosts and the implications for their host populations, focusing on **maternal and infant health** to better understand the role of maternal infections, including sub-clinical mastitis, as contributors to poor fetal and infant growth.

- Clinician-scientist Dr. Anne-Sophie Brazeau focuses on strategies to **improve health behaviours** of individuals with type 1 and type 2 **diabetes**. She co-leads a multi-million dollar, multi-institutional study that aims to reduce hypoglycemic risk in patients with type 1 diabetes.

> *Collaborative, interdisciplinary team-based approaches drive the speed of research to improve health, nutrition, food security and access to safe water for the world's vulnerable populations and Canada's Indigenous Peoples.*

ELSA VASSEUR
NSERC/Novalait/Dairy Farmers of Canada/Valacta Industrial Research Chair in Sustainable Life of Dairy Cattle

DISCOVER

A UNIQUE AND INNOVATIVE PARTNERSHIP

Research in the Faculty of Agricultural and Environmental Sciences (FAES) spans five continents. As an international leader, the Faculty partners with some of the world's most influential organizations, such as the World Health Organization and the Food and Agriculture Organization of the United Nations, the National Institutes of Health and the International Union of Nutritional Sciences.

McGill's Industrial Research Chair in Sustainable Life of Dairy Cattle is a joint venture funded by the Natural Sciences and Engineering Research Council of Canada (NSERC), Novalait, Dairy Farmers of Canada, and Valacta (Quebec-Atlantic Dairy Production Centre). Led by Dr. Elsa Vasseur, the McGill team researches all aspects of **dairy cattle welfare** and works with industry partners to transfer knowledge to producers and other stakeholders.

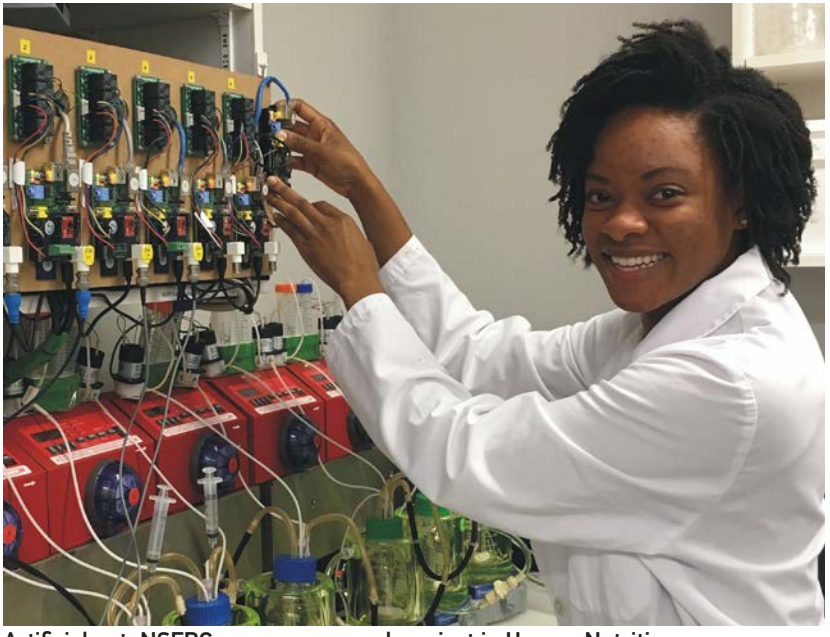
> *We are putting the animal at the centre of sustainability. By looking at the impact of all the management choices made on the farm, we can suggest solutions that will not only extend the cow's productive life, but that will be acceptable to both producers and consumers.*

DISCOVER

OUR PROGRAMS

The FAES offers programs that are challenging, innovative and unique, in an equally unique learning environment. With living laboratories such as the Morgan Arboretum, the Molson Nature Reserve and the Macdonald Campus Farm, and high tech labs such as the Food and Nutrition Laboratories at their fingertips, professors can take science and technology outside the classroom and enhance the learning experience.

Courses in all programs have a "hands-on" component, and students are encouraged to avail themselves of all the experiential learning opportunities that are offered—internships, innovation and entrepreneurship programs, funded undergraduate research, and field courses.



Artificial gut, NSERC summer research project in Human Nutrition

UNDERGRADUATE
Environment
Life Sciences
Agro-environmental Sciences
Wildlife Biology
Plant & Animal Sciences
Bioresource Engineering
Human Nutrition
Food Science
Agri-business & Agricultural Economics
Microbiology & Biotechnology
Global Food Security

GRADUATE & POST-DOCTORAL
Post-Doctoral Fellows, PhD,
MSc, Graduate certificates

COLLEGE-LEVEL
Farm Management and Technology

EXPERIENTIAL LEARNING
Internships
Entrepreneurship & Innovation Program
Field Study Semesters
Exchange Programs
Undergraduate Summer
Research Programs

DISCOVER

HELPING GREAT IDEAS GROW

The entrepreneurial spirit has always been present on the Macdonald Campus, but in recent years, students have taken this spirit to a new high. With the mentorship of faculty, the Entrepreneurship and Innovation Program, and start-up financing from various alumni-supported funds, students have excelled in all their endeavours. Ideas have ranged from the development of novel food products for local and international markets to sustainable uses of food waste.

Chloé Anderson, BScFSc'15, MSc'17, one of the team members behind **TiraVerde**, a start-up that redefined healthy-indulgence snack products by using avocado and functional ingredients to enhance flavour and contribute nutritional benefits.

Louis-Philippe Dessureault, BSc(AgEnvSc)'18, and **Marc Brettschneider**, pictured above in the lab of their new facility, transform sources of organic post-consumer and agricultural waste to grow high-value, nutritionally dense and delicious gourmet mushrooms in a carbon-neutral fashion.

Les Cultures Myco-Rise

YUMi Organics (originally **yumiBOX**), founded by registered dietitians **Zoey Li**, BSc(NutrSc)'17, and PhD candidate **Mengyin Hong**, BSc(NutrSc)'12, offers practical nutrition solutions to achieve a healthy lifestyle by making it easy, simple and delicious to eat whole grains. The team is now one of the first in Canada to launch a new Overnight Oats product that will be available in retail stores and on e-commerce.

YUMi Organics

Anja Geitmann, PhD
Dean and Associate Vice-Principal (Macdonald Campus)
Faculty of Agricultural and Environmental Sciences
Canada Research Chair (Tier 1) in Biomechanics of Plant Development

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A BIT OF HISTORY

In 1906, Sir William C. Macdonald made possible the construction of Macdonald College, then valued at $1.5 million, which he subsequently deeded to McGill University, along with a $1-million endowment fund for its ongoing operation. The College opened its doors to its first students in 1907. It housed three schools—Agriculture, Household Science and Teachers—reflecting Sir William's conviction that "farm, home and school" were the three pillars of society. More than 100 years later, the 650-hectare campus is home to the Faculty of Agricultural and Environmental Sciences, the School of Human Nutrition, the Institute of Parasitology, and the McGill School of Environment, as well as numerous Research Centres and Networks.

Macdonald is one of McGill's greatest assets—the imposing original buildings and landscape of Macdonald Campus are monuments to the vision of Sir William Macdonald and form an important heritage site for Canada. While much has changed in the past 110 years, the Faculty remains committed to excellence in teaching, research and service to ensure that humanity's present and future food, health and natural resource needs are met while protecting the environment.

McGill University's
Macdonald Campus

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Environmental Sciences
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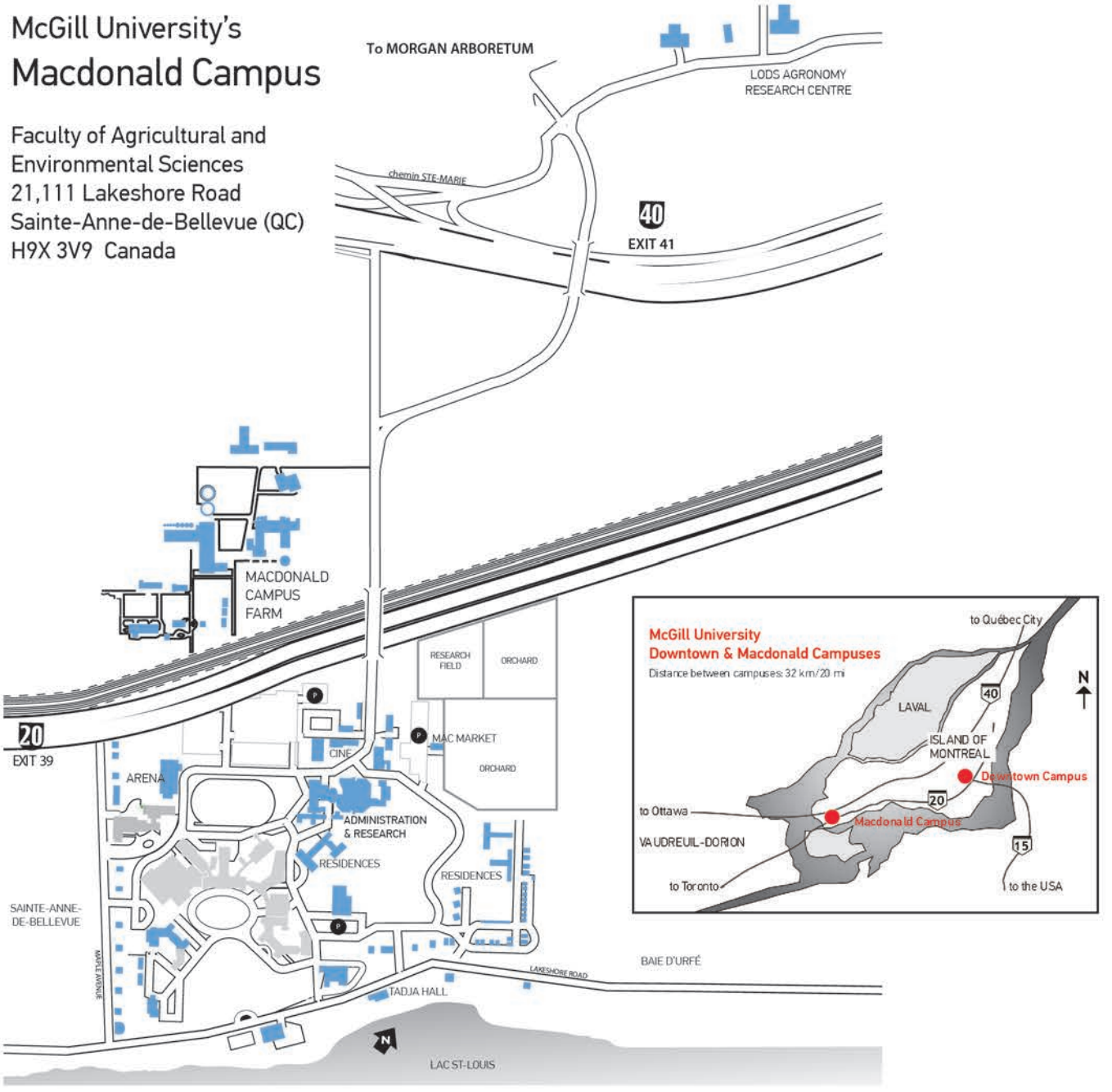

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