

# Be Extraordinary.

The Campaign for Western



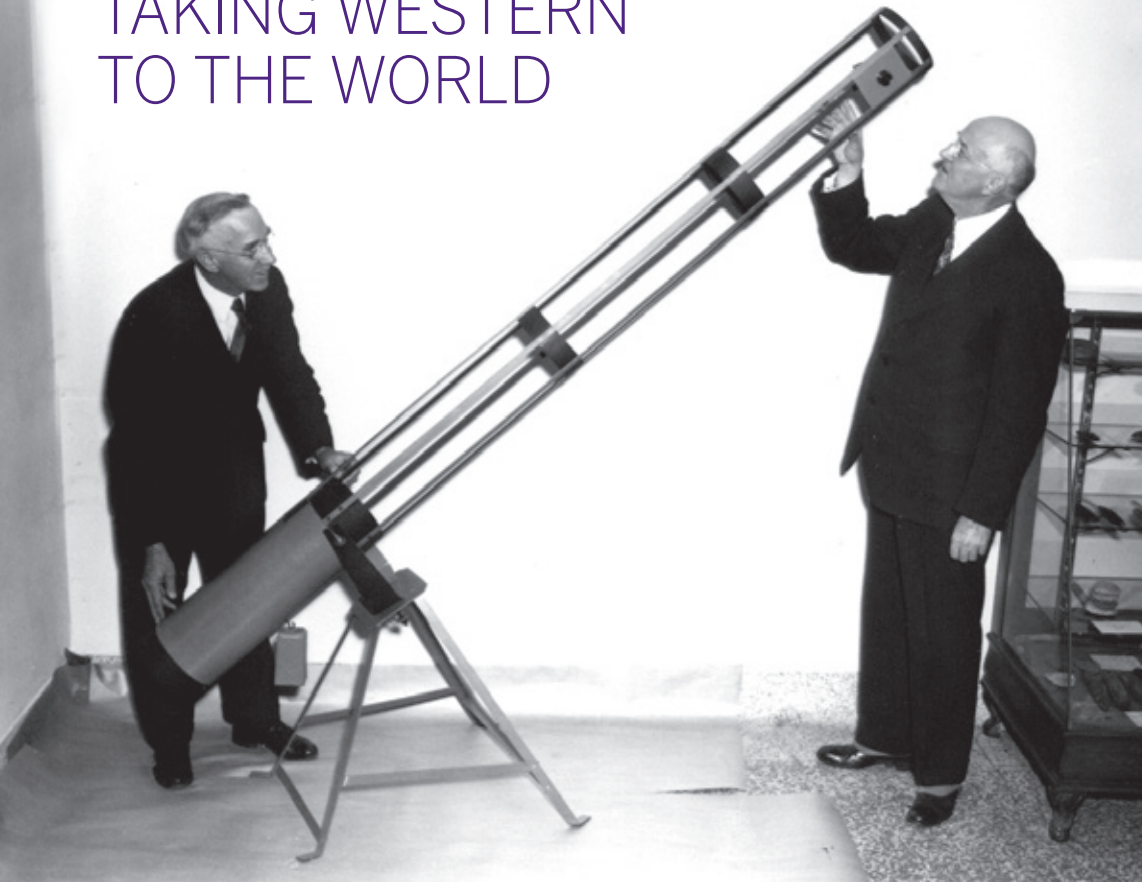
Western

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# Western Research

# BRINGING THE WORLD TO WESTERN, AND TAKING WESTERN TO THE WORLD



As one of Canada's leading research-intensive universities, we are proud of Western's proven history of producing leaders and discoveries that matter globally.



Since 1878, Western has advanced fundamental knowledge, trained global leaders and applied research to the benefit of the public and private sectors. Each has provided tangible social, economic, health and cultural benefits that improve our lives, our communities and our businesses.

Today, Western is home to diverse strengths across the disciplines, and is focused on further leaving its mark on the world by advancing specific clusters of global-scale research strength highlighted within these pages.

We are committed to fostering an environment where innovation, partnership and world-class research thrive. The Western Experience helps provide the brightest faculty, postdoctoral fellows and students with the best-possible opportunity to answer some of the world's most-complex questions. Together, we can have a global impact.

We hope to welcome the world to Western, and, in the process, take Western to the world.

## LONDON, ONTARIO, CANADA

- Canada's 10th-largest city: 489,300 residents
- Central location on NAFTA super highway: Toronto, Detroit and seven major universities within a two-hour drive
- 30%+ of Canada's population lives within a 2.5-hour drive
- Access to 150 million people in Canada and U.S. within a 10-hour drive
- Industry sectors: advanced manufacturing, advanced materials, clean tech, food processing, health sciences, information technologies

## WESTERN UNIVERSITY

- Established in 1878, one of Canada's oldest universities
- Leading research-intensive, comprehensive university with medical school
- \$240 million annually in research expenditures
- Canada's sixth-largest university
- 1,300 faculty members and 35,000 students, including 5,000 graduate students
- 60 Master's and PhD programs
- 12 faculties and schools, and three affiliated university colleges

## A HISTORY OF EXCELLENCE

- 1920: Sir Frederick Banting's hypothesis that led to the discovery of insulin
- 1948: First Master's of Business Administration program outside the United States
- 1948: Discovery of the sex chromatin, now known as the Barr Body
- 1951: Development of the world's first 'cobalt bomb' to treat cancer
- 1958: Discovery of vinblastine, the first of a series of chemotherapy drugs
- 1980s: Development of the Desired Sensation Level for paediatric hearing instrument fitting used worldwide
- 1981: Discovery that surfactant from cows' lungs helps premature infants breathe, saving millions worldwide
- 1982: Successful use of cyclosporine to stop the progress of Type 1 diabetes
- 2007: Discovery of the oldest evidence of life on Earth

# NEUROSCIENCE/BRAIN & MIND



For more than 40 years, some of Western's most internationally recognized research has come from the field of neuroscience.

From understanding childhood development to deciphering the neural basis for cognitive functions, Western is cultivating an integrated approach to studies of the brain that bring together some of the most accomplished minds at the forefront of neuroscience research.

Our researchers are advancing knowledge of the brain – from the single neuron to the full brain – to help us understand mental health, and how we see the world, think about it, speak, plan ahead and make decisions.

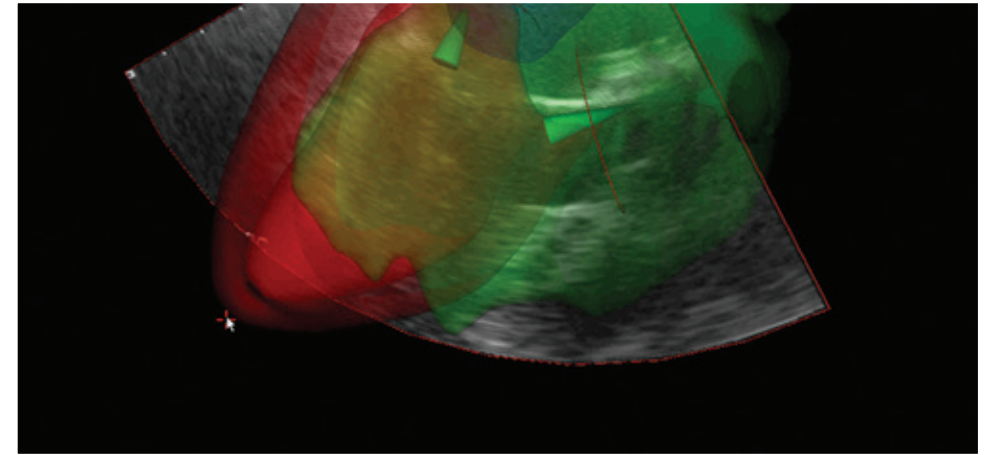
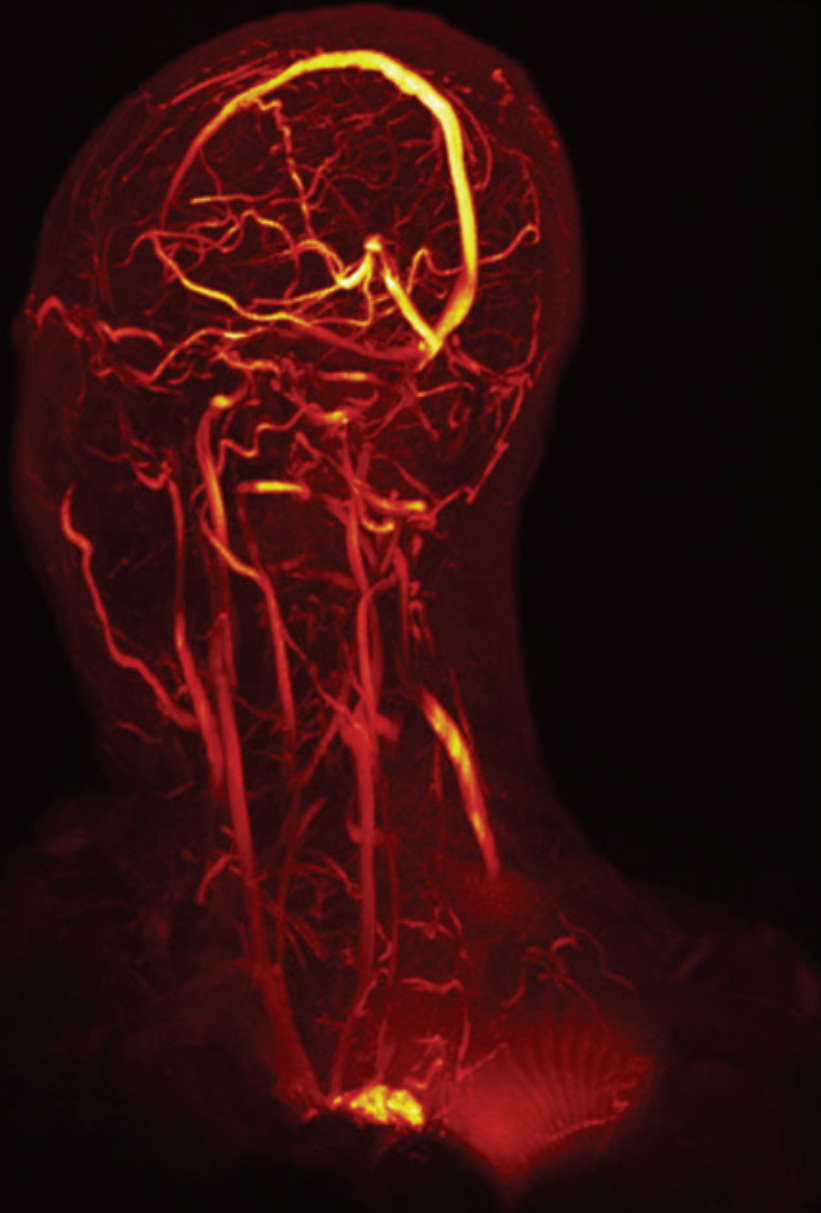
## Key Facilities & Groups:

- Brain & Mind Institute (BMI)
- Centre for Functional Metabolic Mapping
- Biomedical Imaging Research Centre
- Clinical Neurological Sciences
- Rotman Institute of Philosophy

## Impact, Talent & Recruitment:

- Six Canada Research Chairs
- Canada Excellence Research Chair, Adrian Owen, who leads groundbreaking studies related to minimally conscious patients
- The BMI has recruited 40+ new faculty members over the past decade
- 1,000+ papers published by BMI researchers over 15 years
- Postdoctoral exchange program with Cambridge University, King's College London and University College London
- In 1958, Dr. Charles Drake pioneered the world's first surgical treatment for cerebral aneurysms at the base of the brain
- In 1978, Dr. Henry Barnett led the Canadian study demonstrating Aspirin can prevent strokes, opening the door for the use of Aspirin to prevent heart disease

# IMAGING



For more than 30 years, imaging strengths at Western and throughout London, Ontario, have grown from cohesive efforts to connect groups, institutions and platforms across various disciplines.

This has resulted in Canadian leadership and one of the top imaging complements in the world. Western and its partners are transforming the way health care professionals diagnose and treat medical conditions, while improving our understanding, diagnosis and treatment of disease by developing innovative imaging techniques, software and instruments.

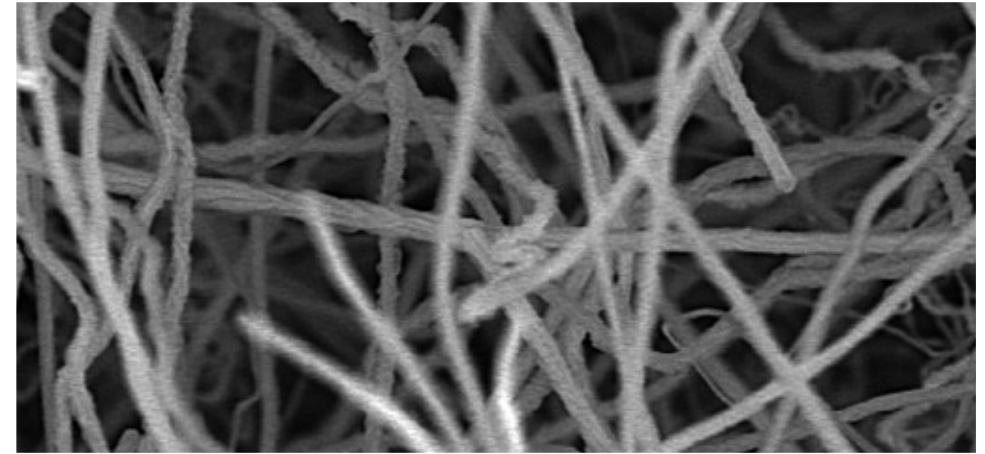
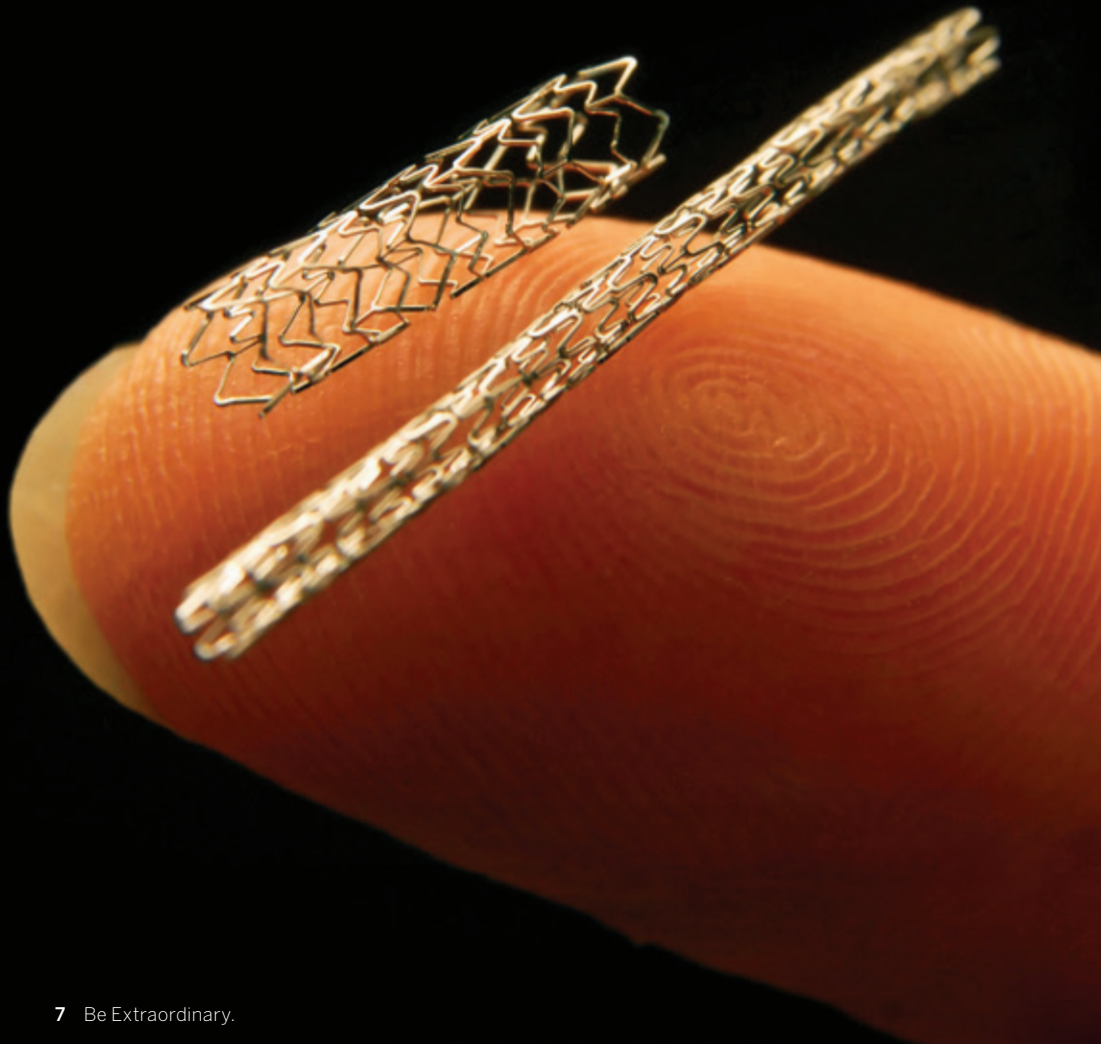
## Key Facilities & Groups:

- Biomedical Imaging Research Centre (BIRC)
- Centre for Imaging Technology Commercialization
- Imaging Research Laboratories at Robarts Research Institute
- Cancer Imaging Group of the London Regional Cancer Program
- Canadian Surgical Technologies & Advanced Robotics (CSTAR)

## Impact, Talent & Recruitment:

- \$100+ million in imaging research infrastructure
- 400 personnel affiliated with BIRC
- 850+ musculoskeletal imaging research papers published over five years
- 300 imaging papers published in 2012
- Seven imaging-related spin-off companies, and 50+ patents, over 20 years
- Conducted Canada's first human brain MRI in 1982, leading to pioneering advances in cardiovascular, orthopaedic and neonatal MRI
- Perfusion CT technology developed in 1999 has been licensed worldwide to GE Healthcare, helping doctors immediately track blood flow to the brain after stroke
- Paula Foster demonstrated for the first time in 2006 that MRI can be used to detect a single cell in a living animal

# MATERIALS & BIOMATERIALS



Western's scientists, engineers and doctors are studying, designing, developing and creating new materials from the nanoscale to the macroscale.

These efforts make various industries more competitive by providing stronger, safer and more efficient medical devices, surface coatings and lightweight materials.

Western is an international leader in materials and biomaterials research, specifically through its work related to the synthesis, characterization and modification of materials, and emerging efforts in chemical biology. Our researchers are designing, developing and creating new materials and biomaterials – notably, lightweight materials – that improve performance, cost-effectiveness, health and environmental impact.

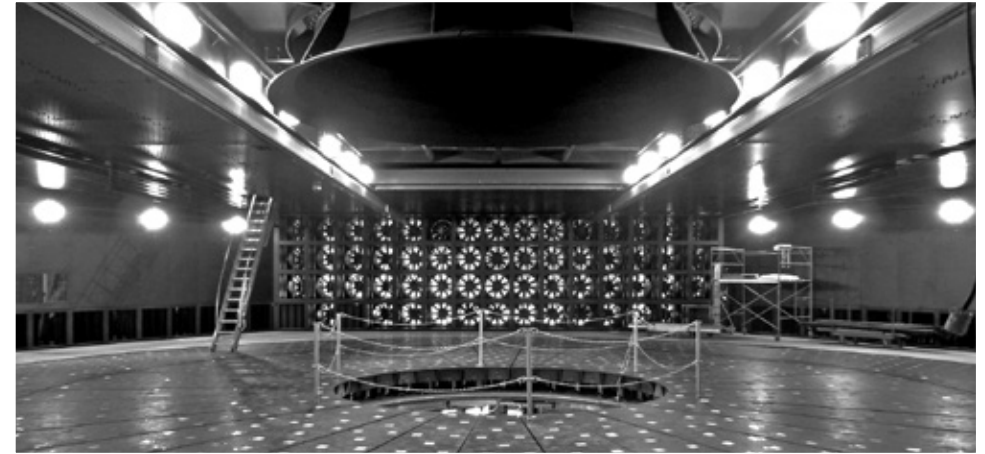
## Key Facilities & Groups:

- Centre for Advanced Materials and Biomaterials Research (CAMBR)
- Fraunhofer Project Centre @ Western
- Surface Science Western
- Nanofabrication Laboratory
- Soochow-Western Centre for Synchrotron Radiation Research
- Tandetron Facility
- Laboratory for Stable Isotope Science

## Impact, Talent & Recruitment:

- 50+ researchers affiliated with CAMBR
- Seven Canada Research Chairs, three Industrial Research Chairs
- Attracted international research and development centres for global leaders, Fraunhofer-Gesellschaft and Lanxess Inc.
- Manage more beamlines at Canadian Light Source than any other university
- 400+ industrial contracts performed by Surface Science Western annually

# WIND ENGINEERING & NATURAL DISASTER MITIGATION



Western built the world's first boundary layer wind tunnel for man-made structures in 1965, and, with four unique facilities, is now home to the most significant complement of wind-related research infrastructure.

Our researchers are also world leaders in knowledge related to the social, political, economic and practical dynamics of environmental disaster mitigation, with specific strengths in wind and earthquake research.

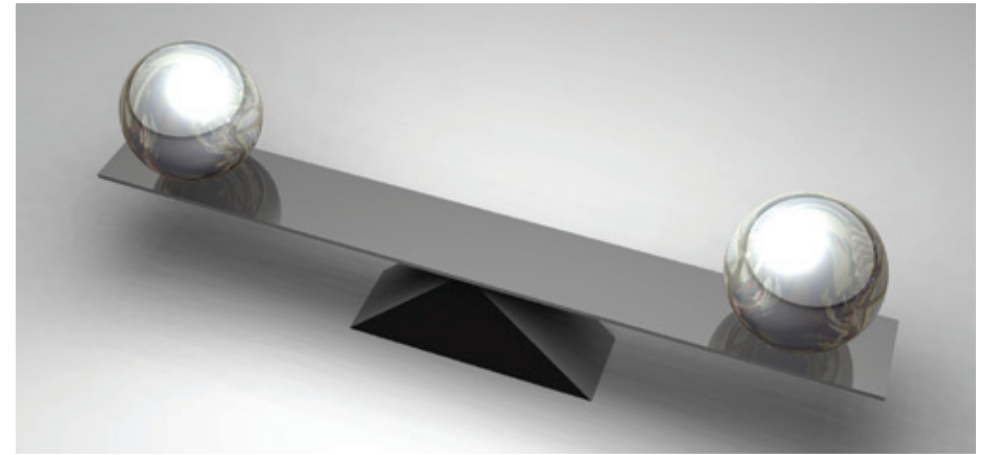
## Key Facilities & Groups:

- Boundary Layer Wind Tunnel Laboratory (BLWTL)
- The WindEEE Institute
- The Insurance Research Lab for Better Homes
- Advanced Facility for Avian Research (AFAR)
- Institute for Catastrophic Loss Reduction (ICLR)
- Geotechnical Research Centre

## Impact, Talent & Recruitment:

- Alan Davenport's discovery that wind tunnels could be used to develop wind loads to make structures safer and more economical led to recognition of the Alan Davenport Wind Loading Chain as the basis for the modern practice of wind engineering around the world
- 1,000+ industrial projects at the BLWTL since 1965, including the World Trade Center, Sears Tower, CN Tower and Confederation Bridge
- 20+ researchers from four faculties
- Two Canada Research Chairs, two Industrial Research Chairs
- Geographer Gordon McBean was lead author of the *Intergovernmental Panel on Climate Change* awarded the 2007 Nobel Peace Prize
- AFAR includes the world's first hypobaric bird wind tunnel, allowing its researchers to study avian flight under simulated altitude conditions

# PHILOSOPHY OF SCIENCE



Based in Western's world-renowned department of Philosophy, the Rotman Institute of Philosophy fosters and supports dialogue and collaboration between philosophers and scientists to bridge the humanities and contemporary sciences.

Its members lead research in history and philosophy of science, bioethics, philosophy of neuroscience, philosophy of physics, philosophy of biology and ecology, philosophy of cosmology, and feminist approaches to science.

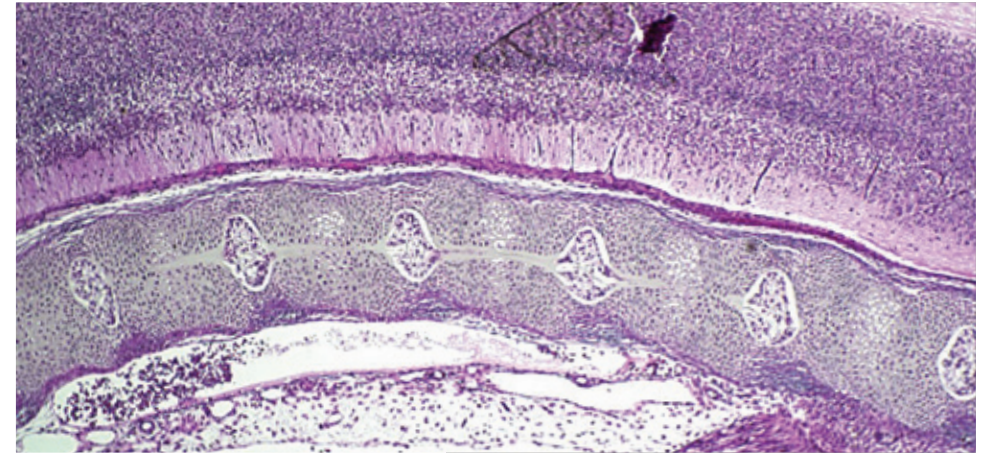
## Key Facilities & Groups:

- Rotman Institute of Philosophy
- Brain & Mind Institute

## Impact, Talent & Recruitment:

- 100+ members of the Rotman Institute
- Two Canada Research Chairs – in Philosophy of Science and Bioethics
- Top tier of philosophy departments globally, building on international reputations in philosophy of science, ethics and history of philosophy
- Strategically aligned with Western's Brain & Mind Institute and the Perimeter Institute at University of Waterloo
- In 2012, Charles Weijer led a team that established the first ethical guidelines for cluster-randomized trials, which will become part of ethics policies and practice around the world

# BONE & JOINT HEALTH



At Western, bone and joint health research is a health science and technology-based cluster that builds on multi-faculty excellence in skeletal biology, bioengineering, medical devices and clinical application.

Our researchers take a trans-disciplinary approach to improving understandings of, and develop novel therapies for, debilitating bone and joint disorders with the goal of maintaining lifelong mobility.

## Key Facilities & Groups:

- Global Bone & Joint Health Innovation Institute
- Fowler Kennedy Sport Medicine Clinic
- Biomedical Imaging Research Centre (BIRC)
- Canadian Surgical Technologies and Advanced Robotics (CSTAR)
- Orthopaedic Surgery Program at London Health Sciences Centre
- Hand and Upper Limb Clinic at St. Joseph's Health Care
- Dr. Sandy Kirkley Centre for Musculoskeletal Research

## Impact, Talent & Recruitment:

- Network of 60+ researchers working in inter-related areas that include arthritis, osteoporosis, orthopaedic surgery, rheumatology, sport medicine, rehabilitation, imaging, dental health, muscle disorders, wound healing, surgical devices and simulation science
- Expertise at all stages of the research lifecycle, including: pre-clinical, clinical, training and knowledge transfer
- Access to \$100+ million in advanced imaging infrastructure
- A landmark 2008 study by researchers at Western and Lawson found common arthroscopic surgery of the knee to be ineffective at reducing joint pain or improving joint function among sufferers of osteoarthritis



# ENVIRONMENTAL SUSTAINABILITY & GREEN ENERGY



With escalating concerns about global energy shortages and climate change, a great deal of attention has turned to advancing green technologies, alternative sources of energy and strategies for reducing human-environment stresses.

In contributing to sustainable long-term development, Western has emerged as a leader in research related to energy deficits, pollution and adaptation that reduces our vulnerability and gains benefits from our environment.

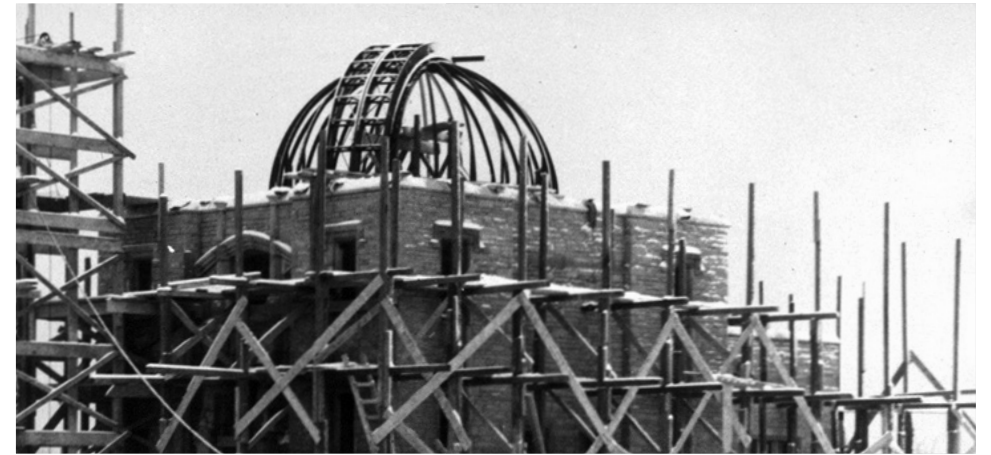
## Key Facilities & Groups:

- Centre for Environment and Sustainability
- Ontario Bioindustrial Innovation Centre
- Biotron Experimental Climate Change Research Facility
- Institute for Catastrophic Loss Reduction
- Institute for Chemicals and Fuels from Alternative Resources
- WindEEE Institute
- Southern Ontario Water Consortium
- Network for Business Sustainability
- Claudette MacKay-Lassonde Pavilion
- Chemical Reactor Engineering Centre
- Research for Subsurface Transport & Remediation

## Impact, Talent & Recruitment:

- 100+ researchers from seven faculties engaged through the Centre for Environment and Sustainability
- Nine Canada Research Chairs, three Industrial Research Chairs
- The international Network for Business Sustainability connects corporations with policy-makers and researchers to integrate sustainability into business practice
- By developing the process of ultrapyrolysis and using a variety of natural biomass products, Maurice Bergougnou discovered 'green oil' during the 1970s and 1980s

# PLANETARY SCIENCE & EXPLORATION



The Centre for Planetary Science and Exploration (CPSX) advances efforts to understand Earth's formation, explore planets and apply technologies and techniques to mining, robotics and health care.

The CPSX's goal is to have the university become the focus for planetary science and exploration research in Canada, and to establish Western as the leading school for space system design.

## Key Facilities & Groups:

- Centre for Planetary Science & Exploration
- NASA Lunar Science Institute (the first international affiliate)
- Canadian Lunar Research Network
- Canadian Astrobiology Network, affiliated with the NASA Astrobiology Network
- Canadian Surgical Technologies and Advanced Robotics

## Impact, Talent & Recruitment:

- 50+ faculty members and graduate students
- Six Canada Research Chairs, two Industrial Research Chairs
- Strategic partnership with MDA, Canada's largest space company
- Partnership with the Canadian Space Agency to provide geology training for Canadian astronauts and planetary science training for managers and engineers
- Canada's only graduate program in planetary science, in the top five internationally
- A new type of meteorite discovered by Peter Brown in 2000 may be the most primitive solar system material ever examined
- Using NASA's Spitzer Space Telescope, Jan Cami and colleagues discovered carbon molecules known as 'buckyballs' in space for the first time in 2010, thereby confirming the existence of the largest molecules known to exist in space