Campus Research

LEADING EDGE

The cream of the top

Canada's prestigious research chairs attract international talent and help further vital research

ALLISON DUNFIELD

The thirst for top researchers has resulted in both the Canada Research Chair, which provides up to $300-million a year for 2,000 chairholders in a variety of disciplines, and the Canada Excellence Research Chair, under which CERCs are granted up to $10-million over seven years to establish research programs. These programs help institutions to attract top international talent and can help them gain an academic edge. Chairholders say the grants give them much-needed time to spend researching their chosen fields and means less time buried in paperwork, applying for grants.

Here are three leading researchers from across the country:

Matthew Farrer and his team at UBC Medical Genetics have identified gene mutations associated with Parkinson's disease. MARTIN DEE/UBC

Matthew Farrer

Canada Excellence Research Chair (CERC) in Neurogenetics and Translational Neuroscience, University of British Columbia, Vancouver.

Matthew Farrer's passion for his research into Parkinson's disease is obvious when he talks about some of his latest studies into the affliction – how a late-onset form of the disease is affecting a large Mennonite family in Saskatoon.

With the help of the family, Dr. Farrer and his team at UBC Medical Genetics identified the mutation in the gene (DNAJC13) associated with typical late-onset Lewy body Parkinson's disease in 2012.

"They've given this gift of DNA clinical information for someone like me to try and understand the condition. It's a humanitarian gift because chances are that anyone in the family who's got the disease right now is actually going to benefit are very slim." Twelve of 57 members of the family who participated have been diagnosed with Parkinson's.

Dr. Farrer came to UBC from the Mayo Clinic in Jacksonville, Fla., where he had established an independent lab in molecular neuroscience. He was attracted to UBC because of its brain research centre and high-calibre imaging program. Once there, he established the Centre for Applied Neurogenetics, a global consortium of scientists studying molecular origins of brain diseases. That team is credited with having identified most of the mutant genes responsible for late-onset Parkinson's. Ultimately, he would like to help find tools that the pharmaceutical community can use to create drugs to slow neurodegenerative diseases and to find new strategies for early detection.

Susanne Lajoie has developed computer simulations that mimic what medical students will encounter in the field. JOY Q. WANG/MCGILL

Soren Rysgaard, student, examine biogeochemical processes in Arctic sea ice, home to micro-organisms and chemical reactions. UNIVERSITY OF MANITOBA

Susanne Lajoie

Canada Research Chair, Advanced Technologies for Learning in Authentic Settings, McGill University, Montreal

As an educational psychology student at California's Stanford University, Susanne Lajoie studied learning differences between psychology and engineering majors. Psych majors were high verbal learners, while engineering majors were high spatial learners. The spatial learners were more efficient, she says.

Her research spurred her to design "tutoring systems," to help neophytes practice real-world technology and gain experience. She later helped a University of Pittsburgh professor create an avionics tutor for F-15 airmen to troubleshoot when something went wrong on the aircraft. After two weeks of training on the system, novices were able to perform as well as those who had been on the job four years, she says.

Fast forward several decades, and Dr. Lajoie is currently a Canada Research Chair at McGill, studying ways to use technology to improve the quality of teaching and learning in science and medicine.

At McGill, Dr. Lajoie's current focus is looking at how medical students learn using computer simulations that mimic what they will encounter in the field. Her "Bioworld" system allows students to help solve patient cases. The goal, Dr. Lajoie says, isn't to come to the correct solution – lots of students are able to do that – but to observe how they are learning and their thought processes.

"We can support learners to learn better and with deeper understanding in exciting ways."

Soren Rysgaard

Canada Excellence Research Chair in Arctic Geomicrobiology and Climate Change, University of Manitoba, Winnipeg

Sea ice is melting in the Arctic at an alarming rate – and the study of this ice may be the key to discovering the region's role in climate change.

To look deeper into this problem, the University of Manitoba has launched a $35-million research program and facility to study climate change, headed by its new CERC, Soren Rysgaard. Part of the funding has resulted in the opening of a specialized floor in the science building for classrooms and labs, along with outdoor tanks in which to grow and study sea ice.

Dr. Rysgaard's love of the North comes naturally. A native of Denmark, he got his first taste while doing a biogeochemistry lab on a trip to the far North, looking at how biology plays a role in chemical reactions. After that, he was hooked.

Dr. Rysgaard is now one of the world's experts in geomicrobiology, which is the study of the role of minerals in microbial processes and microbes in geological processes. Traditionally, he says, it was thought that nothing much was happening within the microbial layers of sea ice high in the North. But it's now known that this ice is teeming with tubes and channels, which are home for micro-organisms and chemical reactions.

"We are trying to understand how all this is related to sea ice and how can these tiny things regulate stuff on a much larger scale." Another part of his studies suggests sea ice is key to removing carbon dioxide from the atmosphere.