



May 30, 2024

Background

Genome Canada invests in four technology platform initiatives

Genome Canada is proud to announce investment in four technology platforms to support genomics technology infrastructure at facilities and networks across Canada to provide researchers access to leading-edge genomics technologies. In collaboration with the Canada Foundation for Innovation (CFI) [Major Science Initiative \(MSI\) 2023-29 competition](#), Genome Canada is investing in four facilities: [CGEn](#), [The Metabolomics Innovation Centre](#), [Centre for Biodiversity Genomics](#) and [GlycoNet](#).

ONTARIO GENOMICS

Platform: Centre for Biodiversity Genomics

Academic Leaders/Institutions: Dr. Paul Hebert (University of Guelph)

Genome Centre: Ontario Genomics

Total Funding: \$1,030,000

The Centre for Biodiversity Genomics (CBG) at the University of Guelph holds global leadership in the development and application of species identification systems based on sequence diversity in short, standardized gene regions (DNA barcodes). Termed DNA barcoding, this approach is hugely advancing both our knowledge of the species that share our planet and our capacity to track shifts in their abundance and distribution.

The CBG delivers two key analytical services (informatics, sequencing) to the biodiversity science community; it analyzes millions of specimens and tens of thousands of samples each year by coupling large sequencers with mainframe computers. The award from Genome Canada's Technology Program will allow the CBG's Innovation Unit to expand its efforts to develop the laboratory protocols and informatics systems required to capitalize on the capabilities enabled by the thumb-sized DNA sequencers developed by Oxford Nanopore Technologies.

Aside from their speed in delivering data, the low cost of these sequencers and their associated flow cells make them ideal for two purposes – accelerating the development of methods for subsequent implementation in the CBG core facility and making it possible to establish a distributed network of sequencing facilities so nations around the world can track



their biodiversity. Because the CBG coordinates the research programs undertaken by the International Barcode of Life Consortium, the advances made by the Innovation Unit in the application of nanopore technology are sure to see rapid uptake on a global scale.

Platform: CGEn

Academic Leaders/Institutions: Stephen W. Scherer (The Hospital for Sick Children), Lisa Strug (BC Cancer Research Centre), Steven Jones (BC Cancer Research Centre), Ioannis Jones (McGill University)

Lisa Strug, Steven Jones, Ioannis Ragoussis

Genome Centre: Ontario Genomics

Total Funding: \$3,363,333

CGEn is Canada's national platform for genome sequencing and analysis, with nodes at The Centre for Applied Genomics at The Hospital for Sick Children (SickKids) in Toronto, the McGill Genome Centre in Montreal and Canada's Michael Smith Genome Sciences Centre at BC Cancer in Vancouver. CGEn is a Major Science Initiative of the Canada Foundation for Innovation (CFI-MSI) providing world-class infrastructure, services, and expertise since being founded in 2015, and enabling novel research and technology development that would otherwise be impossible within Canada. As of March 2022, CGEn has generated over 8,000 terabytes of sequence data for more than 2,900 research labs, companies, and not-for-profits. To remain internationally competitive, CGEn makes considerable efforts in technology development activities to drive forward innovation and formulate new approaches to genomic science. In turn, this ensures that CGEn continues its optimal support of Canada's research and innovation ecosystem, while remaining in a ready-state to respond to large-scale genomic opportunities and challenges.

This project focuses on technology development driven by demand from the scientific community and aligned with CGEn's key existing and emerging service growth areas including (i) Long-read sequencing and associated analysis and interpretation of data, (ii) Single cell genomics to produce data on individual cells from a cell population (iii) Spatial transcriptomics to understand intracellular biology with integrated information, ultimately leading to highly accurate tissue specific cell maps, and (iv) Short-read sequencing focusing on the assessment and validation of new technologies. As a result of these technology developments, CGEn will be able to provide important new genomic services to Canadian and international researchers.



GENOME ALBERTA

Platform: The Metabolomics Innovation Centre (TMIC)

Academic Leaders/Institutions: David Wishart (University of Alberta), Liang Li (University of Alberta), Christoph Borchers (McGill University)

Genome Centre: Genome Alberta

Total Funding: \$1,479,000

The Metabolomics Innovation Centre (TMIC) was founded in 2011 and intends to position Canada as a global leader in metabolomics, the study of the small-molecule interactions that determine how living organisms interact with their environment. TMIC is proud to be Canada's national metabolomics research and service facility, consisting of nine nodes operated by world-renowned scientists at universities in four provinces, with more than \$30 million in cutting-edge analytical equipment, over 40 highly cited bioinformatics tools, and more than 59 validated metabolomics tests. Through these resources, the Centre serves clients in academia, government, and diverse industries, including sectors such as food production and safety, environmental analysis, and precision health. The need for metabolomics services, analysis, and collaborations continues to grow on a yearly basis, and TMIC is excellently positioned to support this need.

Following an in-depth assessment of future trends and with the assistance of Genome Canada's Technology Development funding, TMIC will be developing a variety of new metabolomics tools, including ISO-compliant assays for human and animal health, expanded assays to measure environmental and dietary chemical exposures, novel assays to assess exposure to a wide variety of mycotoxins, and techniques to measure metabolites in low cell-count or even single-cell settings. These new analytic techniques will be supported by TMIC's world-leading expertise in bioinformatics and database development, with several complementary data and bioinformatics tools being developed in coordination. With its expanded technology portfolio, TMIC will continue to be at the forefront of metabolomics innovation and fulfil its mission to serve and strengthen the metabolomics enterprise in Canada for the benefit of all Canadians.

Platform: GlycoNet Integrated Services (GIS)

Academic Leaders/Institutions: Dr. Warren Wakarchuk (University of Alberta)

Genome Centre: Genome Alberta

Total Funding: \$1,030,000

Glycomics is the science of glycans (sugars) in biology. In all living things, glycans are vital to biological processes. Glycans are extremely valuable across a multitude of commercial applications in health, agriculture and bio-based industries. The global market for glycomics therapeutics alone is projected to grow to US\$257 billion by 2028.

GlycoNet Integrated Services (GIS) was launched with the vision of becoming the world's leading glycomics service provider. With a recent investment of C\$10.7 million from the Canada Foundation for Innovation Major Science Initiatives, GIS is mobilizing Canadian



glycomics tools and expertise to equip glycomics researchers and partners with the synthetic, analytical and high-throughput screening tools to undertake transformative glycomics research and innovation.

To maintain Canada's leadership in glycomics, GIS is dedicated to continually expanding its suite of glycomics services. With Genome Canada TechDev funding, GIS will develop and expand glycomics services to include:

- A curated database of glycan-protein interactions that integrates "omics" datasets and biological interactions to enhance drug development using AI and machine learning.
- Novel imaging tools for spatial visualization of glycan structures within living tissues and cells.
- Enhanced domestic enzyme production capacity to enable glycan analysis in support of One Health objectives.
- New cell lines and animal models to acquire glycomics data directly relevant to human biology.

These services will address glycomics unmet needs, increase the number of GIS users, and industry partnerships, support the growth of Canadian glycomics companies, expand the application of glycomics to One Health, and ensure a cutting-edge biomanufacturing and life sciences sector in Canada.