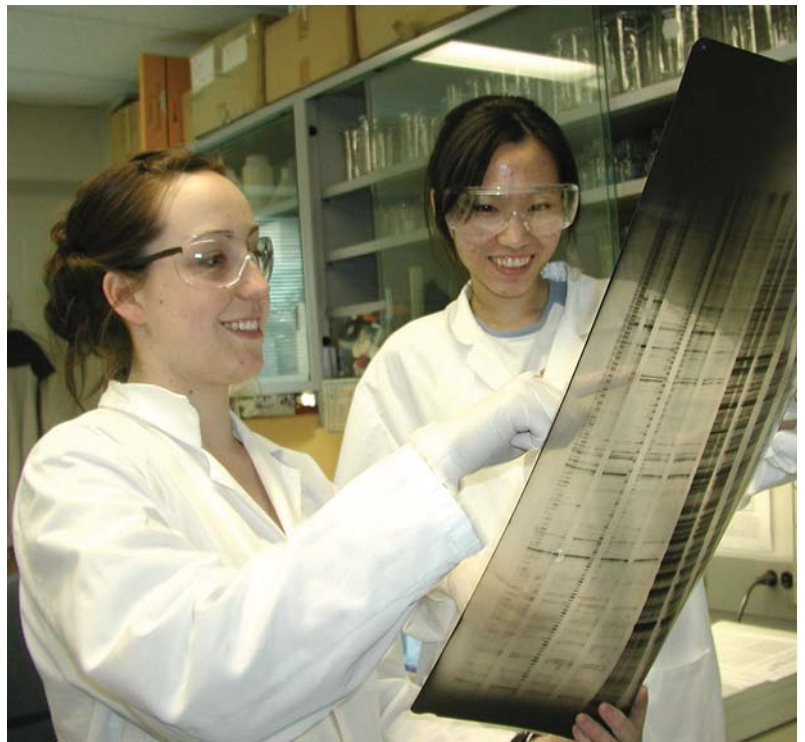


Functional Genomics and Evolution

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A wide array of research in evolutionary biology is underway in Science (faculty in Biology, Computer Science, Applied Mathematics, Statistical and Actuarial Sciences). The research extends from mathematical theory to empirical methods applied at the molecular, cellular, organismal, population, community and ecosystem levels. This curiosity-driven research has led to important discoveries in applied science. Collaboration has become common and indispensable and has seen synergies develop between previously distinct areas such as molecular genetics and life-history evolution.

The combination of collaborative work and shared facilities puts genetic researchers in Science in a good position to be innovative and productive. The Molecular Genetics Unit (MGU) is a core facility supported by eight faculty members who are unraveling the genetic basis of plant and animal development and complex disease. The CFI/OIT funded Molecular Biology Ecology and Evolution facility (MoBEES)



provides a bridge for field biologists who need to use techniques of molecular biology in their research. Both the MGU and MoBEES permit researchers from Western and elsewhere access to essential equipment and many opportunities for collaboration and interaction. The MGU facility has recently been expanded to permit in situ assessments of mutations (MUTASIS lab). SHARCNET (a multi-institutional network for high performance computing) is another essential facility for research in functional genomics and evolution.

We are also focusing on the growing need for basic research in plant biochemistry and molecular biology. Using the Western Biotron facility as a base, we are positioned to be international leaders in the molecular farming of plants in controlled situations. This allows large scale, reproducible, extractions of biomedical agents, energy compounds and other valuable materials. In this area, Western Science has internationally recognized prowess in photosynthesis, natu-

ral plant products, plant physiology, biochemistry, and developmental biology, led by N.P.A. Hüner, a Tier 1 CRC. These strengths are complemented by the Department of Chemistry, which has expertise in synthetic organic chemistry of natural and medicinal products, and the Department of Physiology & Pharmacology, which has expertise in medical pharmacology.

The recent full and continuing sequencing of genomes (including human) has provided an unprecedented opportunity to study organisms at the gene, protein and metabolite levels through collaboration

among molecular biologists, physiologists and biochemists. The data arising from sequencing fundamentally shifts how biological mechanisms are investigated. However, sequence information by itself has little meaning. The remaining problem is to determine the role of the information stored as DNA sequences. The answer to this question will come from a detailed analysis of biological mechanisms, whether they concern generation of animal form in flies, frogs and fish, neurotransmitter transport, flower formation, or human genetics. Such research has direct applications, for example, new methods of pest control or plant redesign, taking advantage of the Biotron. We will continue to strengthen these areas in Science at Western by seeking additional personnel (faculty and students) and infrastructure. In addition to designating a Tier 1 CRC in functional genomics, we will appoint a Tier 2 CRC in landscape genetics. Strategic appointments will be made in mathematical modeling of experimental evolution as well as behavioural genetics, conservation genetics, invertebrate evolution and molecular evolution.



The study of functional genomics and evolution involves faculty in Science, the Schulich School of Medicine & Dentistry as well as other research groups in London. Within the Faculty of Science, mathematical and computational applications have been strengthened by additional faculty appointments including three Tier 2 CRC appointments: L. Wahl in Mathematical Biology, L. Kari in Biocomputing and B. Ma in Bioinformatics. The diversity of expertise across Science has also favoured development of cooperative programs. For example, Biology and Biochemistry have established a new program in Plant Biochemistry and Molecular Biology while Computer Science and Biochemistry have introduced new programs in Bioinformatics, which will provide skilled graduates in these growing biologically-related areas. Similarly, biologists are affiliated as Associate Scientists with the Developmental Biology Group of the Child Health Research Institute in London, and other collaborations exist with researchers from the Schulich School of Medicine & Dentistry. Similar appointments will be pursued to strengthen high quality programs such as Genetics, and to forge stronger links among the Faculty of Science and departments and institutes external to the Faculty, particularly in human genetics.