

MSc and PhD positions in the molecular evolution of ribosomal DNA and its transposons

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Positions for 1 or 2 MSc or PhD students are available in May or September 2017 to study the molecular evolution of ribosomal DNA (rDNA) and its transposons. rDNA is an important multigene family that codes for the structural RNA molecules that make up ribosomes. One unit of rDNA consists of 3 genes encoding ribosomal RNA (rRNA) separated by intergenic spacers. It has been observed that sequence similarity among the members of this multigene family is high within species relative to similarity between copies from different species, even in regions of the repeat unit unit that evolve very rapidly. This phenomenon is known as **CONCERTED EVOLUTION**.

Due to variation in the rate of evolution in different parts of the same repeat unit, rDNA is an excellent model system with which to study the interaction between the molecular processes that cause concerted evolution, and natural selection to maintain the structure and function of the molecule. We use freshwater crustaceans in the genus *Daphnia* as a model organism for this work as they contain unusually long rRNA genes, and show variation in breeding system with some populations reproducing by cyclical and others by obligate parthenogenesis.

We also study the evolution of the autonomous DNA transposon, *Pokey* which has invaded the rDNA of species in the subgenus *Daphnia*, where it has been vertically inherited for over 100 million years. Occupation of rDNA and maintenance of activity over long periods of time is unusual for DNA transposons, which are typically suppressed by their hosts and must undergo horizontal transfer to remain active.

Students should have a general background in molecular biology, genetics and evolution. Practical experience in a molecular biology/genetics lab is beneficial. Students are encouraged to develop their own research topic within the general scope of the research program.

Applicants must be Canadian citizens or permanent residents. Interested candidates should submit a resume, unofficial transcript, a statement of research interests and contact information (email and phone) for three references by email to:

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