

Biology Seminar



Western
UNIVERSITY · CANADA

12:30 - 1:30 pm
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BGS 0165



Joanna Wilson
Professor
Department of Biology
McMaster University

From genome to function: determining the role of cytochrome P450 enzymes in aquatic species

The cytochrome P450 (CYP) superfamily has been found in all domains of life. CYP enzymes are mono-oxygenase enzymes with well-established and critical roles in chemical defense and the production and metabolism of biological signaling molecules such as hormones. The function and regulation of these genes are well understood in mammals but poorly described in fish and other aquatic organisms. In this seminar, I will describe some of the research we have undertaken to better understand the evolution, regulation, and function of CYPs in both vertebrate and invertebrate species. Through genome mining, we have examined the evolution of CYPs in fish, cnidarians, and the marine polychaete *Capitella teleta*. These studies have discovered a wealth of novel genes with unknown function; so called gene orphans. While fish genomes contain homologs to most CYP genes found in mammals, gene and genome duplications have resulted in distinct gene subfamilies, particularly for those CYP families involved in chemical defense. These studies highlight how little we know about CYP diversity in some branches of the tree of life and raises questions about the range of mono-oxygenase capacities in many aquatic species. One major challenge is to determine the function of these orphan CYP genes. Using zebrafish CYP genes, we have developed a high throughput screening approach to tackle this challenge. This approach could be used for any CYP gene identified in any species, offering an excellent opportunity to determine function *in vitro*. With heterologously expressed proteins, we have identified substrates of zebrafish CYP1A and CYP3 genes; CYP3 gene function appears distinct in fish compared to mammals. Through this work, we hope to uncover the function of CYPs and their physiological relevance for a range of aquatic organisms.

