



*The University of Western Ontario*

Faculty of Science

Department of Applied Mathematics

# APPLIED MATHEMATICS COLLOQUIUM

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Date: Tuesday, October 21, 2008

Time: 2:30 pm

Location: Middlesex College, Room 204

## **EVOLUTION OF SEX AND RECOMBINATION**

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### **Abstract:**

Understanding the evolutionary advantage of the sexual mode of reproduction is one of the most intriguing problems in Evolutionary Biology. While a pluralistic view of the evolution of sex and recombination has been suggested by some, here we take a simpler view and try to quantify the conditions under which sex can evolve given a set of minimal assumptions. Since real populations are finite and also subject to recurrent deleterious mutations this minimal model should apply generally to all populations. We show that the maximum advantage of recombination occurs for an intermediate value of the deleterious effect of mutations. Furthermore we show that the conditions under which the biggest advantage of sex is achieved are those that produce the fastest fitness decline in the corresponding asexual population, and are therefore the conditions for which Muller's ratchet has the strongest effect. We also show that the selective advantage of a modifier of the recombination rate depends on its strength. Quantifying the range of selective effects that favors recombination then leads us to suggest that, if in stressful environments the effect of deleterious mutations is enhanced, a connection between sex and stress could be expected, as found in several species.