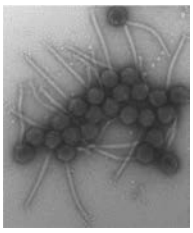
GUEST SPEAKER SEMINAR

Molecular Genetics
UNIVERSITY OF TORONTO

# Barbara Vivash Award in Molecular Genetics

**Seminar and Award Presentation**

*2014-2015 Recipient: Dr. Joseph Bondy-Denomy*



## CRISPR meets its match: Bacteriophages inactivate CRISPR-Cas function

Most organisms on the planet face the threat of being infected and killed by a virus. Bacteria are no different in this respect and often preyed upon by viruses called phages. In response, bacteria have developed an adaptive immune system called CRISPR-Cas, which protects cells from phage infection and has recently been repurposed into a revolutionary gene-editing tool. In a remarkable feat of evolution, however, phages infecting *Pseudomonas aeruginosa* produce proteins that interfere with CRISPR-Cas immune functions. Interestingly, many "anti-CRISPR" proteins have been identified to date, and they are completely distinct from each other, inhibiting CRISPR-Cas function through diverse mechanisms. For example, one anti-CRISPR inhibits nuclease recruitment, thus converting the CRISPR-Cas system in *P. aeruginosa* into a transcriptional repressor. In my lab at UCSF, we are interested in the mechanisms and efficiency of anti-CRISPR proteins, identifying new CRISPR-Cas interacting proteins and discovering novel roles for CRISPR-Cas in bacterial pathogens. I will present new data regarding our characterization of the efficiencies of different anti-CRISPRs, with a focus on understanding what the evolutionary consequences are for phages that rely on them. Further, in *P. aeruginosa* we have shown that a virulence factor master regulator controls the expression of the CRISPR-Cas system, suggesting an alternative role for this system. We are currently working to identify the molecular mechanisms behind this regulation and putative alternative function for CRISPR-Cas. By studying CRISPR-Cas function and mechanism in bacterial systems, we hope to understand the effect of CRISPR-Cas on microbial physiology, phage biology, and potentially enhance downstream application development.

Host: Dr. Howard Lipshitz

**Date:** Monday January 25th, 2016
**Time:** 4:00PM
**Place:** Medical Sciences Building, Room 4171, 1 King's College Circle