Department of Molecular and Cellular Biology

Graduate Seminar MCB*7500

Friday, March 24, 2017 in SSC 1511 @ 12 noon

presented by:

Erin Anderson

Investigating intrinsic β-lactamase-resistance mechanisms in *Pseudomonas aeruginosa* Liverpool epidemic strains

The incidence of antimicrobial resistance in bacteria is increasing at an alarming rate and very few novel treatments are being developed. Therefore, there is a pressing need to better understand the mechanisms that promote antimicrobial resistance. *Pseudomonas aeruginosa* is an opportunistic pathogen that primarily infects immuno-compromised individuals. *P. aeruginosa* is capable of forming organized communities known as biofilms, which can be up to 1000 times more resistant to antibiotics than their free-swimming counterparts. Although, recent studies have shown the materials and micro-environment surrounding biofilms provide protection against antibiotic treatments and host defenses, these factors alone do not completely protect bacterial cells. As such, it is believed that biofilm bacteria also exhibit an increase in their intrinsic antimicrobial resistance mechanisms. In recent years, numerous isolates of *P. aeruginosa*, collectively termed 'epidemic' strains, have become clinically prevalent and constitute a very high multi-drug resistance phenotype. However, the mechanisms behind the extremely high resistance of these epidemic strains are still unknown. Therefore, to examine the biofilm and intrinsic resistance profile within these highly resistant strains, I will use a mass spectrometry approach to examine the abundance of a well-studied subset of antibiotic-modifying enzymes, known as the β-lactamases. β-lactamases bind and inactivate β-lactam antibiotics that disrupt the production of the peptidoglycan layer. Selected Reaction Monitoring (SRM) LC-MS/MS will be used to quantify the abundance of confirmed β-lactamases under numerous growth conditions. Knockouts of the β-lactamases will be assessed for reduced antimicrobial resistance profiles and the potential regulation of β-lactamases will be examined.