Microbiology Job Talk (January 17, 2018, 10am, IB250)

Robert Quinn

Title of Talk: Lungs, Germs, and Steel: Fighting the Cystic Fibrosis Lung Microbiome

Abstract: The human microbiome is a consortium of microorganisms living on and in our bodies. These microbial symbionts contribute to our health and homeostasis, but sometimes the microbiome becomes perturbed resulting in chronic disease. Understanding how changes in our microbiome can lead to disease has immense implications for human health. The focus of my research has been on the cystic fibrosis (CF) lung microbiome. CF patients experience intermittent flares of symptoms called exacerbations that contribute significantly to their morbidity and mortality, but have an unknown cause. Using mass spectrometry-based metabolomics, nucleic acid sequencing and novel microbial culture techniques, I will provide evidence that exacerbations are caused by a change in the lung microbiome driven by pH and oxygen. During disease flares, the lung microbiome changes its core physiology to anaerobic fermentation and produces damaging metabolites. I will also demonstrate how the bioinformatic tools developed for this research are so advanced that microbiome data can now be produced in clinically relevant timeframes. I have been applying metabolomics and microbiome sequencing as a precision medicine approach for CF with sample-to-data turnaround times as fast as 48 hours. By combining multi-omics tools with microbial ecology theory, my work has been providing a new understanding of how the lung microbiome causes disease and is leading a path to revolutionizing clinical microbiology with modern multi-omics methods.

Biography: Dr. Quinn grew up in Bancroft, Ontario and received his undergraduate and masters degrees from the University of Guelph in Microbiology. During this time, he studied the skin microbiome of Chinook Salmon migrating up the Credit River here in Mississauga. Dr. Quinn then moved to Louisiana to pursue a PhD with Dr. Andrei Chistoserdov at the University of Louisiana where he studied a novel disease of the American lobster called Epizootic Shell Disease. For his postdoctoral research he left the aquatic microbiology field and moved to human disease after receiving a fellowship from the Cystic Fibrosis Research Inc. to study the microbiology of CF lung disease. He worked in the laboratory of world renowned microbial ecologist Dr. Forest Rohwer at San Diego State University studying how the lung microbiome contributes to exacerbations of CF and developed a novel hypothesis about the role of anaerobic bacteria in these events. Dr. Quinn was then recruited to the laboratory of Dr. Pieter Dorrestein at the University of California at San Diego to apply novel mass spectrometry-based metabolomics methods to his interest in human and animal microbiomes. He is currently an Associate Project Scientist in the Dorrestein lab working on integrating microbiome and metabolomic data with Dr. Dorrestein and Dr. Rob Knight at UCSD.