



The Microbiology Letters

Issue 11 | October 2016

Introducing New Graduate Students

This year, the graduate field welcomes six new graduate students. Peter and Monique are currently rotating in Dr. Ilana Brito's lab, and are invested in exploring the human microbiome. Peter previously spent three years working at the University of Illinois, collecting samples from hot springs in Yellowstone and Kamchatka Russia, and two years at the University of Texas studying invasive ant species. His current rotation focuses on development of protocols to apply fluorescently activated cell sorting (FACS) to study horizontal gene transfer in natural microbial communities. In the future, Peter looks forward to pursuing research involving fine scale interactions that affect microbial community dynamics. Monique is excited about applied medical microbiology, with particular interest in disease pathology and immunology. Monique is using her experiences from her time at University of Maine to investigate horizontal transfer of antibiotic resistance genes in the gut microbiome. Her previous work focused on innate immune recognition of *Candida albicans* and germline regulation of tumor suppressor genes. Finally, Elliot, previously a graduate student in Cornell's Department of Natural Resources, will be continuing his work exploring echinoderm microbiota in Dr. Ian Hewson's lab. His previous work focused on the diversity and composition of sea star viral and bacterial consortia, which he will use to guide his future graduate work. We will be introducing Shannon, Anna, and Rachel next month – stay tuned!

Spotlight: Helmann Lab

The overarching goal of the Helmann Lab is to understand how bacteria sense, respond and adapt to their ever-changing environment, utilizing *Bacillus subtilis* as a model for the low GC Gram-positive bacteria. The lab mainly focuses on responses to metal limitation/excess and cell envelope active compounds and antibiotics.

Transition metal ions (Zn^{2+} , $Cu^{2+/+}$, $Fe^{3+/2+}$, Ni^{2+}) are essential for life and participate in a wide range of biological functions. Thus, metals must be kept at a high enough concentration to allow survival. Yet, since metals can compete with each other for protein binding, each metal must not be present in excess to avoid mismetallation. The mechanistic basis for this toxicity is poorly understood. Pete Chandransu, a postdoctoral researcher in the lab is interested in uncovering how metals, specifically Zn^{2+} , inhibit microbial growth and kill microorganisms. To identify targets of Zn^{2+} toxicity, he performed a genetic selection to identify mutations that would increase Zn^{2+} resistance. Subsequent analysis of the recovered mutants suggests that Zn^{2+} toxicity is due to intracellular heme accumulation, which results from the mismetallation of PerR, a Fe^{2+}/Mn^{2+} sensing transcription factor. This work is currently in submission. Hopefully, his work will guide the development of new strategies to increase the effectiveness of metal-based antimicrobials.

Heng Zhao, a 5th-year graduate student in the lab, is working on multiple projects related to cell wall homeostasis and trying to dissect essential steps in the synthesis of peptidoglycan, an essential macromolecule for most bacterial species. In his recently published work (PMID: 27528508), he used an optimized CRISPR-dCas9 based transcriptional repression system (CRISPRi) and demonstrated the essentiality of two UPP (undecaprenyl pyrophosphate) phosphatases used in lipid II recycling. The lipid II cycle is one of the most frequently targeted processes for antibiotics. So his work might promote developing new antimicrobial strategies. While he is very much looking forward to graduate next year, Heng said, emotionally it would be very hard for him to leave the Helmann Lab big family.



Achievements:

Elliot Jackson – Defended his Masters

Kalia Bistolas – Passed her A-exam

Publications!

Shin JH, Helmann JD. Molecular logic of the Zur-regulated zinc deprivation response in *Bacillus subtilis*. *Nat Commun*. 2016 Aug 26;7:12612.

News Highlights

1 Semifinalists for the Procter and Gamble Award have been selected:

Valentina (Azul) Pinochet-Barros - John Helmann lab

PfeT, a P1B4-type ATPase, Effluxes Ferrous Iron and Protects Bacillus subtilis Against Iron Intoxication

Evgeniya Nazarova - David Russel lab

vRv3723 coordinates uptake of fatty acids and cholesterol by Mycobacterium tuberculosis through modulation of the mce transport complexes

May Taw - Matthew Delisa lab

Directed evolution of the Twin-Arginine Translocation pathway for enhanced export of proteins

Congratulations on moving on to the next level of the competition!

2 Excellent talks at Microbiology at Cornell Symposium!

more information at: <http://micro.cornell.edu/news/symposium>



More pics & updates
on Facebook

Field of Microbiology Students

Upcoming Events



Oct. 8th
Fall Break



Oct. 10th
Microbiology Symposium



Oct. 25th
Coffee Hour