Department of Molecular and Cellular Biology

Graduate Seminar MCB*6500

Friday, Jan 27, 2017 in SSC 1511 @ 12:45 p.m.

presented by:

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Isolation and identification of natural inhibitors against Plx2A, a toxin from *Paenibacillus larvae*

American foulbrood (AFB) is a globally destructive honey bee pathogen causing significant loss in commercial apiaries. *Paenibacillus larvae* is the causative agent of AFB, it is a fastidious, Gram-positive, spore-forming bacterium. Prophylactic antibiotics are used to treat the disease; however, they are ineffective at killing the infectious spores and selection for resistant *P. larvae* strains is a growing concern. An alternative is the 'anti-virulence approach', which uses compounds developed specifically to bind bacterial virulence factors, neutralizing or decreasing the virulence of the invading pathogen. Among four toxins identified as key virulence factors in the pathogenicity of *P. larvae* ERIC I, Plx2A was shown to be a mono-ADP-ribosyltransferase toxin that plays an important role in the disease. Gene knockout experiments have shown that it accounts for 60% of the *P. larvae* virulence. In this research, essential oil components derived from plants will be used as anti-virulence compounds to inhibit the enzymatic activity of Plx2A. Essential oils will be extracted by a Bligh and Dyer method, and then fractionated by reversed-phase HPLC. Fractions that are effective at inhibiting Plx2A will be determined via a fluorescence-based assay. The most potential inhibitors will be identified through mass spectrometry. The best inhibitors will be co-crystallized with Plx2A to better understand the molecular basis of the inhibition. Finally, the lead compounds will be tested on AFB-infected larvae by *in vitro* rearing methods. This research will yield natural inhibitors that are effective for treating honey bee diseases, such as AFB.