

Pavel Hrouzek's group

Title of the project: Screening of cyanobacterial metabolites for anti-virulence activity

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For how many student/s: 1-2

Description of the project:

Overuse of antibiotics is one of the factors involved in the emergence of drug resistant pathogens. The understanding of how inter-cellular microbial communication (Quorum sensing, QS) is involved in bacterial pathogenesis has revealed potential for alternative strategies to treat bacteria-mediated diseases (LaSarre, B. et al., 2013). QS regulate coordinated responses across a bacterial population. In many cases, the responses elicited by QS signals contribute directly to pathogenesis through the synchronized production of virulence determinants, such as toxins and proteases. It has been theorized that, if the signal communication that coordinates these pathogenic behaviors was blocked, bacteria would lose their ability to mount an organized assault on the host and thus their ability to form organized community structures with antibiotic resistance would be compromised. QS inhibitory (QSI) compounds inactivate QS by different quenching mechanisms including enzymatic inactivation of the signal molecule, inhibition of signal biosynthesis and inhibition of signal detection (Saurav, K. et al., 2017).

In this study we are interested in screening of large set of cyanobacterial strain extracts for the isolation of novel antimicrobials that are based on the QSI mechanism of action. During this short project student will be trained to work with various genetically modified bioreporter strains. Further, liquid chromatography- high resolution mass spectrometry/mass spectrometry (LC-HRMS/MS) will be used to find out the chemical diversity in the cyanobacterial extract. Once the potent strains are characterized various anti-virulence (for example: anti-biofilm, protease, pyocyanine etc..) assay will be performed to characterize the most potential strain with its mechanism of activity. The student will also be able to learn other basic microbiological techniques (for example: culturing, media preparation, anti-microbial assay etc.,).

Requirements:

- Ability to speak and write in English
- Ability to understand basic microbiology
- Cover letter which contains the motivation of the student