Infectious Diseases Labs
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Horizontal Technology Coordinating Office
EPIDEMIC PREPAREDNESS

Prof Alain Filloux

SCELSE,
Nanyang Technological University, Singapore

Thursday 19 October 2023
1:00pm to 2:00pm (SGT)

Venue: Codon A & B Matrix L5

The Pseudomonas aeruginosa type VI secretion system loads and fires antibacterial toxins into microbial preys to manipulate communities's organisation and composition

Bacteria thrive by adapting to a wide variety of ecological niches. This includes commensals that are a part of the host microbiota or bacterial pathogens colonising a host. In any environment, resources can be scarce and the competition for survival a serious challenge. The structure of a polymicrobial population steadily establishing in a niche relies on competition and cooperation. For example, cooperation arises from the ability of a species to catabolise complex nutrients sources that is then used by other species. In contrast, competition aims to eliminate cheaters and foes and relies on a variety of fighting strategies. Polymicrobial communities can be highly complex, and for example up to 40,000 species can coexist within the human gut. These populations can adopt a biofilm lifestyle which contributes stability and resilience. Due to the complexity of cell-cell interactions, the development of polymicrobial communities is notoriously difficult to predict but has many implications in ecology, industry, and medicine.

The type VI secretion system (T6SS) is an antibacterial weapon that is used by numerous Gram-negative bacteria to gain competitive advantage by injecting toxins into adjacent prey cells. Predicting the outcome of a T6SS-dependent competition is not only reliant on presence-absence of the system but instead involves a multiplicity of factors. *Pseudomonas aeruginosa* is a dreadful opportunistic pathogen involved in several acute and chronic infections. It possesses 3 distinct T6SSs and a set of more than 20 toxic effectors with diverse functions including disruption of cell wall integrity, degradation of nucleic acids or metabolic impairment. The potency of single T6SS toxin varies significantly from one another as could be measured by monitoring the community structure, with some toxins acting better in synergy or requiring a higher payload.

This presentation will focus on the role of regulatory pathways that are instrumental to the control of biofilm formation and T6SS activity and how this contributes to coordinate bacterial behaviour and resilience. The talk will also review the search of novel T6SS toxins that can guide towards the identification of antimicrobial targets.

Professor Alain Filloux completed his master's degree in cellular and molecular biology, and PhD in molecular biology and microbiology from Aix-Marseille University, France. He is centre director of the Singapore Centre for Environmental Life Sciences Engineering (SCELSE) and holds appointments at both the School of Biological Sciences and the Lee Kong Chian School of Medicine at Nanyang Technological University (NTU), Singapore. Prior to his appointment, Alain Filloux was a visiting professor in NTU since 2017. In his previous post at Imperial College London, UK, he had a chair in Molecular Microbiology at the Department of Life Sciences and was the deputy director of the MRC Centre for Molecular Bacteriology and Infection.

Hosted by : Dr Stefan Oehlers

Webinar is open to all. No registration required

Questions? Contact us at **seminars@idlabs.a-star.edu.sg**