

Singapore Society for Microbiology and Biotechnology 51st Annual General Meeting



Date: 2 May 2024, 2.00-5.00pm

Venue: NUS Yong Loo Lin School of Medicine, Department of Microbiology and Immunology, 5 Science Drive 2, Level 2 Seminar Room, Singapore 117597

Registration link: [CLICK TO REGISTER](#)

Programme:

2.00pm – Talk by Prof Matthew Chang, Dean's Chair Associate Professor in Biochemistry and Synthetic Biology, NUS

2.30pm – Talk by Prof Alain Filloux, Centre Director of the Singapore Centre for Environmental Life Sciences Engineering (SCELSE), NTU

3.00pm – Talk by Keith Tan, Sales Director for SCIENION Asia business, SCIENION GmbH

3.30 – Tea Break

4.00pm – SSMB 51st Annual General Meeting (for members only)

Synthetic Biology: From Biomanufacturing to Living Medicine

Prof Matthew W. Chang

NUS Synthetic Biology for Clinical and Technological Innovation (SynCTI), National University of Singapore, and the Singapore National Centre for Engineering Biology (NCEB)



Abstract

Synthetic biology is an interdisciplinary field that merges the principles of engineering with biological sciences to create genetically engineered systems with novel capabilities. By leveraging modular, standardized, and interchangeable components, this discipline applies the concepts of standardization, modular design, and abstraction. This methodology not only makes the development of new biological systems more predictable and efficient but also transforms the process into a systematic and reliable practice. Recent efforts to integrate an engineering perspective within synthetic biology have shown that adopting these principles can greatly enhance the development of novel biological constructs. The practical applications of synthetic biology are wide-ranging, encompassing areas such as biomanufacturing, environmental sustainability, and healthcare. This talk will focus on our recent work on the development of synthetic cells endowed with novel functions. It will also dedicate special attention to how Singapore's ecosystem is driving synthetic biology research forward. <http://synCTI.org/>

Biography

Matthew Chang is Director of the Singapore National Centre for Engineering Biology, Singapore Consortium for Synthetic Biology, Wilmar-NUS Corporate Laboratory, and NUS Synthetic Biology for Clinical and Technological Innovation, and Dean's Chair in Medicine and Associate Professor of Biochemistry and Synthetic Biology at the Yong Loo Lin School of Medicine at the National University of Singapore. His research focuses on studying the engineering of biology to develop autonomous, programmable cells for biomedical and biomanufacturing applications. He co-founded the Global Biofoundry Alliance and the Asian Synthetic Biology Association and serves as Co-Chair of the World Economic Forum's Global Future Council on Synthetic Biology.

SSMB 51st AGM :

The *Pseudomonas aeruginosa* type VI secretion system loads and fires antibacterial toxins

Prof Alain Filloux

Centre Director of the Singapore Centre for Environmental Life Sciences Engineering (SCELSE)

Professor, School of Biological Sciences and Lee Kong Chian School of Medicine, Nanyang Technological University



Abstract

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 summarise regulatory pathways that are instrumental to the control of biofilm formation and T6SS activity but then mostly focus on the search of novel T6SS toxins that can guide towards the identification of antimicrobial targets.

Biography

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. Alain Filloux is an expert in bacterial infection biology, with the aim of translating fundamental and basic research into strategies for preventing and treating bacterial diseases. He has profound expertise in bacterial biofilms, bacterial virulence factors and protein secretion systems, and bacterial communication and signalling.

To date, he has published 180 peer reviewed papers and has been an invited speaker at more than 85 major international conferences, including Gordon Research Conferences (GRC) and American Society for Microbiology meetings. Alain Filloux has been the editor-in-chief of FEMS Microbiology Reviews, and npj Biofilms and Microbiomes, a partnership between the Nature Partner Journals and NTU, with SCELSE as the journal's scientific partner. He holds editorial positions at Frontiers in Cellular and Infection Microbiology, microLife, and the Journal of Biological Chemistry. He has also been elected Fellow of the European Academy of Microbiology, the American Academy of Microbiology, and the Royal Society of Biology.

SSMB 51st AGM :

Industrial Talk: Single-cell approaches in microbiology - Sorting and isolation of any type of cells, from microbial to human, using image-based dispensing technology

Keith Tan

Sales Director for SCIENION Asia business
SCIENION GmbH



Abstract

Cellenion offers solutions and technologies for controlled cell dispensing with applications in the fields of single cell, small particle and single cellular aggregates isolation. Our systems allow high throughput, image-based automated dispensing of single cells, small particle and/or cell aggregates onto any substrates of choice.

Together with a range of dedicated consumables and software, our solutions enable miniaturization of sample preparation prior to downstream analyses. With no dead volumes and outstanding recovery rates, Cellenion's platforms offer unique capacities for applications including small particle isolation, cell line and 3D cell models development for drug discovery, single-cell omics and rare cells isolation. Cellenion operates from Lyon in France. The company is a subsidiary of SCIENION GmbH and its products are sold by SCIENION worldwide.

This talk will introduce an image-based dispensing technology. Starting with technology descriptions and associated performances, we will then provide an overview of its main applications:

- Sorting and isolation of all types of cells, microbial (bacteria, archaea, yeasts, protists, fungal spores...) but also plant and animal cells
- Microbial single cell omics approaches, including single-cell Whole Genome Sequencing (scWGS), transcriptomics (scRNA-Seq) and proteomics (scMS): Proof of concept on soil microbiota
- Automation of culture-based approaches for high throughput generation of isolates (culturomics) or clones (bioengineering): Proof of concept on vaginal microbiota

Biography

Keith Tan has 20 years of commercial experience working with various multi-national companies in the life sciences industry. He is currently the Sales Director for SCIENION Asia business and is passionate about technological advances providing unprecedented opportunities to analyse the complexities of biological systems at the single-cell level.