

SCELSE

Singapore Centre for Environmental Life Sciences Engineering



28 AUG 2025 (THU)

11.30 am - 5.30 pm | SCELSE @ NTU

Programme

11.30 am	Registration
12.15 pm	Welcome address by Prof Alain Filloux, SCELSE Centre Director
12.20 pm	Path to PhD by Ms Sumathi Lechimanan, Assistant Manager, Student & Academic Services
12.30 pm	Fireside chat with SCELSE experts
1.20 pm	Networking Lunch with Professors
2.40 pm	Lab tours 1
3.40 pm	Microbiology seminars: chaired by A/Prof Janelle Thompson
3.45 pm	<ul style="list-style-type: none">Talk 1: Microbial solutions for economic & climate resilience in food production <i>Dr Andrew Laloo, SCELSE-NUS Research Fellow</i>Talk 2: Microbiomes influencing ocean health <i>Dr Jeslyn Poo, SCELSE-NTU Research Fellow</i>Talk 3: Biofilms in chronic infection: A biophysical perspective <i>Dr Binu Kundukad, SCELSE-NTU Senior Research Fellow</i>
4.40 pm	Lab tours 2
5 pm	End

Your journey into the Microbial world



Welcome to SCELSE's Open House, an opportunity to delve into the unseen world of microbes that shape our health and environment. As you explore our booths, you will embark on a journey through five themes that reflect the breadth of SCELSE's research. Meet **The Invisible Architects**, microbes building complex and resilient communities called biofilms, and find out how they can either support or disrupt our health and environment. Uncover how microbes become **Host Hackers** and explore how microbes interact with the human body in both harmful and beneficial ways, from evading immune defences during infection to supporting skin health. **The Microbial Menu** theme invites you to explore the good, the bad, and the edible sides of microbiology, from food spoilage to probiotics for gut health and sustainable food production. Dive into the theme of **Hot Springs to High Seas: Exploring Microbial Frontiers**, revealing the abundance and significance of microbial life in marine settings, hot springs, and wastewater treatment systems. Finally, discover how we decode genomic diversity in the theme **From Genomes to Algorithms**, where cutting-edge sequencing and computational tools unlock the secrets of microbial communities and their hosts or environments.

Each booth showcases how multidisciplinary science at SCELSE advances our knowledge of the microbial world. Start anywhere, chat with our scientists, and get ready to be amazed by the microbial world!



01

Wheel of Microbial Fortune

Start your Open House experience with a spin! While you wait to register, try SCELSE's Wheel of Microbial Fortune. With so many booths to explore, this quick activity helps point you toward the booth you should visit first.



02

Registration

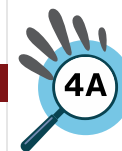
Register at SCELSE Level 1 to kickstart your Journey into the Microbial World! Pre-registered guests will receive a special redemption card, which can be used to collect an exclusive goodie bag at the SCELSE Level 1 redemption counter. Don't miss out, fun surprises and useful keepsakes await!



03

Overview of SCELSE

Take a minute to learn what SCELSE is all about and explore the fascinating world of biofilms and microbiomes. Check out our posters to see where biofilms and microbiomes can be found and why these microbial communities matter for health and the environment. A quick stop to set the stage for the rest of your visit.



THEME 1: THE INVISIBLE ARCHITECTS

4A

Microbial biofilm - A visit to the House of Bacteria



Prof Staffan Kjelleberg
Advisor, SCELSE
Director, Singapore National
Biofilm Consortium
Emeritus Distinguished
University Professor, NTU



Dr Wong Lan Li
SCELSE-NTU
Research Fellow



Dr Yvonne Hii
SCELSE-NTU
Research Fellow

A microbial biofilm matrix is like a sticky, slimy layer made by microorganisms to house and protect themselves. Imagine a group of tiny organisms, like bacteria, creating a mixture of gooey substances including proteins, polysaccharides or nucleic acids that act like glue to hold them together.



This slimy matrix helps them stick to surfaces and stay close to each other, preventing them from being easily washed away. It's the basis for the plaque that forms on your teeth or the slimy coating on the inside of a water bottle if it's not cleaned regularly.

Visit us to learn more about how we study the composition of these matrices, combining knowledge from biology, chemistry, and biophysics, and how this understanding helps us to harness and control the microbial inhabitants.

4B

Understanding bacterial cell envelope biology and its impact on intrinsic antimicrobial resistance



A/Prof Chng Shu Sin
Associate Director, SCELSE-NUS
PI, Biofilms & Health cluster



Dr Tan Wee Boon
SCELSE-NUS
Research Fellow



Ruby Sun Hao
SCELSE-NUS
PhD student

Many bacterial species build an additional layer of protective membrane, called the outer membrane, surrounding the cell. The outer membrane blocks the entry of antibiotics, thus conferring intrinsic antimicrobial resistance.

Find out how we are using multiple scientific disciplines to unravel the fundamental biological basis of how bacteria build and maintain their outer membranes. A variety of approaches, including but not limited to biochemistry, genetics, structural biology, and chemical biology are allied to study the molecular mechanism of protein complexes that build and maintain the stability of the outer membrane in model organisms like *Mycobacterium smegmatis* and *Escherichia coli*.

The fundamental knowledge we generate fuels future development of antibiotics, for example, targeting the outer membrane directly or bypassing the outer membrane to kill the cells.

5C

Exploring bacterial lifestyles



Prof Cynthia Whitchurch
Research Director, Biofilm
Biology cluster, SCELSE
Professor, School of
Biological Sciences, NTU



Dr Seetanshu Junnarkar
SCELSE-NTU
Snr Research Fellow



Dr Sharan Prakash
SCELSE-NTU
Research Fellow



Dr Micaela Mossop
SCELSE-NTU
Research Fellow



Alicia Pek
SCELSE-NTU
Visiting PhD student

Are you fascinated by microbial strategies like host evasion, biofilm formation, or phenotypic switching? Come dive into the hidden world of microbes and discover how they collaborate, adapt, and survive. Our poster showcases:

- Biofilm Expansion powered by the versatile slime of extracellular DNA (eDNA)
- The stealthy persistence of gut pathobionts—typically harmless gut bacteria that can turn against us under certain conditions
- Microbial shapeshifting—is it a superpower or an Achilles heel?

Whether you're exploring new research angles or looking for your next project, this is your chance to engage with cutting-edge ideas and connect with fellow researchers. Stop by our booth and see how microbes are rewriting the rules of survival.

5A

THEME 2: THE HOST HACKERS

Exploiting *Pseudomonas aeruginosa* to prevent biofilm formation and tackle antibiotic resistance



Prof Alain Filloux
Centre Director, SCELSE
Research Director, Biofilms
& Health cluster



Dr Sujatha Subramoni
SCELSE-NTU
Snr Research Fellow



Dr Kay To
SCELSE-NTU
Research Fellow



Dr Casandra Tan
SCELSE-NTU
Research Fellow



Dr Goh Yufen
SCELSE-NTU
Research Fellow



Peggy Yap
SCELSE-NTU
PhD student



Law Qiu Ting
SCELSE-NTU
PhD student

Discover the secrets of biofilms at our booth! Biofilms are clusters of microbes that attach to surfaces and are shielded by an extracellular polymeric substance (EPS) matrix, a sticky and slimy layer composed of various macromolecules.

This extracellular matrix acts as a protective layer for bacteria against antimicrobials and environmental stress, making infections harder to treat. However, the mechanisms that drive matrix formation are complex, making it challenging to devise preventive strategies against the formation of this protective barrier. Visit our booth to explore how biofilms impact health, how bacteria gain an advantage within these communities, and the technologies being developed to tackle biofilm formation.

5D

SCELSE-L'Oréal Joint Laboratory



Prof Cynthia Whitchurch
Research Director, Biofilm
Biology cluster, SCELSE
Professor, School of
Biological Sciences, NTU



Dr Marcus Lee
SCELSE-L'Oréal Joint Lab
Research Fellow



Samantha Quah
SCELSE-L'Oréal Joint Lab
Research Associate
/PhD Student



**Karaiyagowder Govindarajan
Deenadayalan**
SCELSE-L'Oréal Joint Lab
Research Associate



Hashmath Fatimah
SCELSE-L'Oréal Joint Lab
Research Assistant

Let's explore exciting research at the SCELSE-L'Oréal Joint Laboratory, where we delve into the fascinating world of skin microbiomes and see how microorganisms contribute to playing a part in promoting skin health.

We utilise state-of-the-art laboratory-scale microbiome models, cutting-edge microscopy imaging techniques, and advanced molecular methods to understand the skin microbiome's role in promoting healthy skin and hair, and to create innovative and targeted solutions for treating skin and hair conditions.

If you are interested to learn more about what we do, come talk to our friendly team and we'll be happy to share more!

5B

Host-*E. faecalis* interactions in wound infection and infective endocarditis



Prof Kimberly Kline
Visiting Academic
Department of Microbiology &
Molecular Medicine, Faculty of
Medicine, University of Geneva



Dr Haris Antypas
SCELSE-NTU
Snr Research Fellow



**Frederick
Reinhart Tanoto**
SCELSE-NTU
PhD student

Take a peek into the secret relationships of microbes and their hosts. Invading bacteria and host defenders are in a constant tug-of-war to win the battle of infection. Some bacteria are experts at hijacking the human body. What strategies do bacteria use to win this battle? And how can we ensure the victory of host defences instead?

Our group specialises in dissecting the role and mechanisms of bacterial virulence factors in establishing wound and heart infections. We employ *in vivo* infection models, as well as various *in vitro* cellular and molecular techniques (e.g., microscopy, next generation sequencing, and *in vitro* cell infection models) in our investigation. Join our tactical specialist team as we uncover bacterial virulence strategies and pave the way for host victory!

6A

THEME 3: MICROBIAL MENU: THE GOOD, THE BAD & THE EDIBLE

Microbial synthesis for sustainable aquaculture and the circular bioeconomy



Prof Stefan Wuertz
Deputy Centre Director
(Education & Training)
Research Director, Environmental
Engineering cluster



Dr Ezequiel Santillan
SCELSE-NTU
Snr Research Fellow



Dr Anika Cokro
SCELSE-NTU
Research Fellow



Dr Anisa Cokro
SCELSE-NTU
Research Fellow



Dr Woo Yissue
SCELSE-NTU
Research Fellow



Dr Soheil Neshat
SCELSE-NTU
Research Fellow

Revolutionise aquaculture with our innovative approach using microbial community-based protein to replace traditional fishmeal. Our research showcases the pivotal role of microbes in creating a sustainable, circular bioeconomy. By transforming food processing wastewater into high-quality single-cell protein (SCP), we're using microbes to turn waste into valuable resources, enhancing the efficiency of food production systems, and addressing critical challenges in protein sustainability and food security.

6B

Studying biofilms from “farm to fork” to reduce food waste



Asst Prof Laura Nolan
PI, Environmental
Engineering cluster, SCELSE
Assistant Professor, School
of Biological Sciences, NTU



Dr Zhao Xue
SCELSE-NTU
Research Fellow



Lee Hsin Yee
SCELSE-NTU
Research Assistant



John Harold Nataño
SCELSE-NTU
PhD student



Jerrie Feng
SCELSE-NTU
Visiting PhD student

Almost 10% of the world's population do not get enough to eat. Despite this, around 20% of all food produced for human consumption worldwide is wasted. One major contributor to this wastage is microbial food spoilage. These microbes grow on food and food chain surfaces in complex structures called biofilms. While we know which microbes cause food spoilage, we know very little about how they form biofilms in the food chain prior to spoilage occurring. We are studying spoilage microbe biofilm development from “farm to fork” using a range of cutting-edge approaches. We are then working to use this understanding to develop new ways to reduce food spoilage and extend food shelf life, which will contribute to a reduction in global food waste.

6E

Establishment of plastic-associated microbial community from superworm gut microbiome



A/Prof Cao Bin
PI, Biofilm Biology & Environmental
Engineering clusters, SCELSE
Associate Professor,
School of Civil and Environmental
Engineering, NTU



Dr Sakcham Bairoliya
SCELSE-NTU
Visiting Research Fellow



Dr Liu Yanan
SCELSE-NTU
Visiting Research Fellow

Gut microbiomes of plastic-munching superworms offer promising avenues for plastic biodegradation. Due to the complexity of worm maintenance, direct application is impractical. Instead, we established stable plastic-associated biofilm communities via a two-stage enrichment: feeding *Zophobas atratus* worms with different types of plastics (HDPE, PP, and PS), followed by in vitro incubation of their gut microbiomes. While plastic feeding minimally affected bacterial diversity, it significantly altered community composition and enriched potential degraders. In vitro incubation induced more pronounced shifts, further enriching plastic-degrading taxa. Functional inference and plastic characterization confirmed enhanced degradation potential. Deterministic ecological processes, especially selection, drove community succession. Our findings demonstrate that worm-derived microbial communities can be harnessed to develop biotechnologies for plastic waste processing.

6C

Synbiotic formulations for nutraceutical applications



Prof Joachim Loo
PI, Environmental
Engineering, SCELSE
School of Materials Science
& Engineering, NTU



Zhao Zhongtian
SCELSE-NTU
Visiting PhD student



Clive Ng Yi Jie
SCELSE-NTU
Visiting PhD student

Did you know that some bacteria can enhance gut health? Our team is developing a synbiotic system based on the *Bacillus subtilis* SOM8 bacterial strain isolated from sesame oil meal. This strain demonstrated potent antipathogenic activity, high tolerance to gastrointestinal stressors, and key probiotic traits including antioxidant and bile salt hydrolase activity. Safety evaluations confirmed low cytotoxicity, absence of mobile genetic elements, and intrinsic resistance only to streptomycin. Additionally, SOM8 produces EPS-SOM8, a levan-like exopolysaccharide with β -2,6 and β -2,1 linkage, resistant to digestion and selectively fermented by beneficial microbes such as *Bifidobacterium longum* DSM20219. In vitro gut models revealed that EPS-SOM8 modulates microbiota composition and enhances short chain fatty acids production. These findings highlight the dual probiotic and prebiotic potential of *B. subtilis* SOM8 for microbiome-targeted applications.

6F

Decoding a cute diarrhoea in the community



A/Prof Yann Boucher
PI, Meta-o-mics & Microbiomes
cluster, SCELSE
Associate Professor, Saw Swee Hock
School of Public Health, NUS



Rachel Lim
SCELSE-NUS
Research Assistant



Su Shiqi
SCELSE-NUS
Research Assistant

Always getting food poisoning or stomach flu? Or knows someone who does? Let's find out what is really going around!

Acute diarrhoea affects thousands in Singapore every year; many cases go unexplained, with the exact cause often unknown.

Here, we aim to address these knowledge gaps to uncover the real culprits behind food poisoning. By analysing stool samples, collecting lifestyle and dietary information, we can identify bacteria, viruses, and parasites that are responsible for diarrhoea.

Be part of an important discovery. Join this study and contribute your sample; you can help uncover the causes of illness in Singapore and contribute valuable insights for improved prevention and public health strategies.

Take the first step! Sign up today and help make a difference!"



Scan for more information

6D

Functional foods for gut health modulation



Prof Patricia Conway
Visiting Professor, SCELSE



Edric Sim
SCELSE-NTU
PhD student



Lim Ye Joon
SCELSE-NTU
PhD student

You are what you eat! Join us to discover how your diet, among many factors, affects your gastrointestinal health and wellbeing!

Our group has harnessed the metabolic potential of microorganisms to develop several novel functional foods, including fermented oats beverages and black soldier fly larvae hydrolysate protein. We have shown that these foods have the potential to modulate the gut microbiome for the improvement of gastrointestinal health and wellbeing.

Find out how we collaborate with Singapore National Biofilm Consortium (SNBC) and industry partners such as Protenga, Adisseo, and Haleon to develop and investigate functional foods that modulate the microbiome for improved gut health.

THEME 4: HOT SPRINGS TO HIGH SEAS: EXPLORING MICROBIAL FRONTIERS

7A

Wastewater surveillance and extremophile monitoring for public health



A/Prof Janelle Thompson
PI, Environmental
Engineering cluster, SCELSE
Associate Professor, Asian
School of Environment, NTU



Dr Desmond Chua
SCELSE-NTU
Research Fellow



Jiao Lijing
SCELSE-NTU
Visiting PhD student

As we transition into the post-COVID-19 era, our team is constantly exploring how we can further utilise the wastewater surveillance used to detect local outbreaks, to monitor novel viruses. We employed qPCR and target enrichment sequencing, combined with both read- and assembly-level analyses, and identified a wide range of viruses on a university campus. We also detected unknown viruses as a proof of concept that wastewater surveillance can support Disease X monitoring.

We leverage genomic surveillance, from urban wastewater to extreme environments, to uncover microbial diversity, detect emerging viruses, and understand ecosystem responses.

Find out how our research is also investigating microbes in extreme environments such as hot springs to understand:

Which microbes are present?

What roles do they play in their community?

How do they respond to environmental disturbances?

7B

Marine biofilms & microbiomes



A/Prof Rebecca Case
PI, Biofilm Biology
cluster, SCELSE
Associate Professor,
School of Biological
Sciences, NTU



Dr Clarence Sim
SCELSE-NTU
Research Fellow



Prasha Maithani
SCELSE-NTU
Research Assistant



Ananya Verma
SCELSE-NTU
PhD student

Microbes abound in marine settings, with marine biofilms:

- Playing pivotal roles in biogeochemical cycles,
- Developing and maintaining ecosystems, and
- Supporting marine life

Understanding the role of marine microbes (including bacteria, archaea, viruses, fungi and algae) in the formation of complex ecological networks is a focal point in marine biology, environmental microbiology, and industries that operate in marine environments.

SCELSE investigates these microorganisms and interactions, such as:

- Factors affecting seagrass function & health,
- Production of coral probiotics to enhance resilience to stressors, and
- Molecule discovery in bacterial-algal interactions

In earlier research, Prof Anni Zhang's team employed computational methods to investigate the adaptation mechanisms and phage-host interactions within the human gut microbiome, motivated by the challenge that healthy microbes often struggle to survive in patients' gut environments after faecal microbiota transplantation. The analysis flagged limitations in existing tools for microbial sequence analysis, leading to the team's development of X-Mapper for sequence alignment and QuickVariants for variant identification. These tools are specifically tailored to microbial data to improve accuracy and efficiency.

Come to Asst Prof Zhang's booth to learn how her lab is now developing AI models to explore broader microbial mechanisms, including DNA-protein binding, genetic sweeps, regulatory networks, and host-microbe interactions.

8C

Uncovering diverse microbial mechanisms via computation



Asst Prof Anni Zhang
Courtesy Appointment,
SCELSE
Assistant Professor,
School of Biological
Sciences, NTU



Jeffrey Gaston
Computer
Scientist



Qiwen Zheng
SBS
PhD student



Zhiqi Tang
SBS
PhD student

THEME 5: BIOINFORMATICS (FROM GENOMES TO ALGORITHMS)

8A

From humans to turtles: Exploring evolutionary history, current diversity, and future implications spanning public health to conservation through whole-genome research.



A/Prof Kim Hie Lim
PI, Meta-'omics &
Microbiomes cluster, SCELSE,
Asian School of the
Environment, NTU



**Dr Amit Gourav
Ghosh**
SCELSE-NTU
Research Fellow



Dr Regine Tiong
ASE-NTU
Research Fellow



**Sim Chin Yee
Faith**
SCELSE-NTU
PhD student

Our lab focuses on understanding genomic diversity and its applications in both human health and wildlife conservation. We're excited to showcase two of our flagship projects:

1. GenomeAsia 100K

We're helping to uncover the genetic fabric of Asia through the GenomeAsia 100K project—sequencing thousands of diverse populations from across the continent to uncover deep demographic histories, understand present-day genetic diversity influencing health and immunity (through HLA immune genes), and pave the way for equitable precision medicine.

2. Turtle conservation genomics

Our conservation genomics project focuses on hawksbill sea turtles, a critically endangered species. Using non-invasive sampling (e.g., unsuccessful eggs and hatchlings, eggshells and sand), we sequence turtle genomes to study population structure, natal origins, and genetic diversity – insights that are vital for conservation efforts in Southeast Asia.

9

SCELSE Business Development & Partnerships (BDP)



Dr Maria Yung
Assistant Director, Business
Development & Partnerships



Dr James Ho
Snr Research Fellow

Bridging the gap between academic research and industry is critical to ensure that cutting-edge biofilm and microbiome research is translated into market facing products.

BDP facilitates academic-industry connections, offering expertise through:

- Consultancies | Joint research initiatives | Collaborative agreements.

SCELSE welcomes industry members to partner with us for unparalleled access to knowledge and technical skills.

Contact:

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- Dr James Ho
Snr Research Fellow
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8B

The dynamics of airborne microbes



Prof Stephan Schuster
Deputy Centre Director
(Facilities & Capacities),
Research Director, Meta-'omics &
Microbiomes cluster
Professor, School of Biological
Sciences, NTU
President's Chair in Genomics, NTU
Scientific Director, GenomeAsia 100K



Dr Anton Sadovoy
SCELSE-NTU
Snr Research Fellow



Scan for more on
Air Microbiome



Vineeth Kodengil
SCELSE-NTU
Research Scientist



Cassie Heinle
SCELSE-NTU
Research Fellow



Santhi Puramadathil Sasi
SCELSE-NTU
Research Associate



Ngw War Aung
SCELSE-NTU
Research Associate

Airborne microbes affect our health and the environment in ways we are only beginning to understand. Traditional methods cannot capture the full picture of these invisible communities, leaving us vulnerable to unknown risks and missing potential benefits. SCELSE's air microbiome team pioneers novel air sampling and analysis strategies. Using next-generation sequencing and high-performance computing, they developed a robust workflow for studying ultra-low biomass air samples. Through these techniques, we are now able to understand the complex airborne microbial dynamics.

10

Singapore National Biofilm Consortium (SNBC)



Prof Staffan Kjelleberg
Director, Singapore National
Biofilm Consortium



Dr Sheela Reuben
Assistant Director
& Programme Manager



Mr Ernest Teoh
Assistant Manager

The Singapore National Biofilm Consortium (SNBC) is a national platform that serves as a coordinating hub at the convergence of health, engineering, technology, and science, that integrates innovation and business in biofilm and microbiome technologies to address emerging challenges across diverse industries. SNBC focusses on deepening collaborations and connections to catalyse academic-industry partnerships that lead to relevant industry outcomes and economic impact. This initiative is based on a multidisciplinary research platform and skill base, with translational capacity at SCELSE and other institutions across Singapore.

Contact:

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