

SCELSE's Year 7 review spans research and organisation quality

For SCELSE's Year 7 review next year, an International Review Panel (IRP) will visit SCELSE from 9th to 12th April 2018 to meet all the principal investigators and interact with postdocs and students.

The review serves to provide a critical assessment of the centre's performance, strategic relevance and future potential. The scope of

the review spans two major aspects: quality of research and quality of organisation.

SCELSE's quality of research will be assessed on its scientific performance

the research landscape, it will also be assessed on its strategic position and long-term potential.

Quality of organisation will be assessed based on the effectiveness of SCELSE's scientific leadership team in the articulation and implementation of the research strategy. The effectiveness and robustness of the administrative management team in financial and human resources will be a key area of focus. In addition, progress in talent development and retention, and contribution to host universities will also be assessed.

The intention of the Year 7 IRP is to assess if SCELSE has reached world class standards. Following on from the Year 3 review, the IRP will continue to evaluate whether SCELSE has met the original intent of the Research Centres of Excellence (RCE) scheme, but in addition they will also comment on the centre's sustainability and succession planning.



and its progress in furthering new knowledge, pushing scientific frontiers and forging breakthroughs. It will be benchmarked against other comparable research centres and assessed on its impact in technology transfer, research translation and application. Based on the overall background of development in

Calendar

SCELSE Seminars

15 Nov: Prof. Karen Krogfelt. Technical University of Denmark. 3:00pm - 4:00pm. SBS-CR2.

22 Nov: Dr Maurizio Labbate. University of Technology Sydney. 3:00pm - 4:00pm. SBS-CR2.

Group Meetings

Environmental Engineering meeting: Tuesdays 9am, B3 Meeting Room.

Kline Group meeting: Mondays 9:30am, B3 Meeting Room (please check with Kimberly prior to joining).

Events

Fridays: Shut Up and Write! 10:00am. Please see teamsites for location.

16 - 17 Nov: SCELSE Annual Scientific Retreat. Raffles Marina.

24 Nov: SCELSE Happy Hour. 5:00pm onwards. B2 Coffee Lounge.

29 Nov: SBS/SCELSE/LKCMedicine Postdoc Club. 5:00pm. SBS-CR2.

Courses

07 Nov: ASM Scientific Writing Workshop. NTU School of Biological Sciences. 8:30am - 1:30pm. SBS TR6.

06 - 14 Dec: EMBO Global Exchange Lecture Course. Structural and biophysical methods for biological macromolecules in solution. NTU School of Biological Sciences, Singapore.

Conferences 2018

19 - 22 Mar: International Conference on Microbial Communication (MiCom 2018). Jena, Germany.

27 - 29 May: 8th Biofilms Conference (Biofilms 8). Aarhus, Denmark.

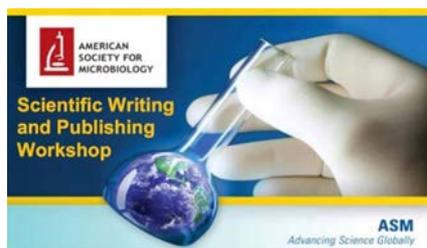
ASM Scientific Writing Workshop to provide overview of best practices

The American Society for Microbiology (ASM) Singapore Student Chapter is organising a workshop on Scientific Writing and Publishing targeted for undergraduate and graduate students, researchers and faculty. It will be held on 7th November, 8:30am to 1:30pm at NTU SBS training room 6.

This four-hour virtual workshop provides an overview on the skills needed to write a strong scientific manuscript and the process for getting published.

Best practices for developing both the content and presentation of a document will be outlined and the ethics and logistics of submitting manuscripts for publishing will also be examined.

Topics include organising data, creating powerful titles and compelling abstracts, what reviewers look out for,



the submission process, dealing with reviews and ethics in scientific publishing.

The workshop will be facilitated by Dr Daphne Ng (Office of Public Relations, ASM

Singapore Student Chapter), Kaylie Lam (President, ASM Singapore Student Chapter) and Dr Russel Lee (Young Ambassador of Science, ASM).

A certificate of completion will be issued at the end of the workshop. Light refreshments will be provided.

Seats in the workshop are limited and on a first-come first-serve basis.

More details about the workshop will be released to participants closer to the workshop date.

Please register your interest by signing up at:

<https://tinyurl.com/y8dnuzg3>

SCELSE

STAFF PROFILE

Scientific research is tough because it requires focus and persistence, but also provides many opportunities to learn, to gain new insights, and to appreciate the beauty of nature. Dr Sean Booth seizes any opportunity to do good science and to convey its excitement to the wider public.

"I published my first paper quite early, from my undergraduate work, using metabolomics to study copper toxicity in *Pseudomonas fluorescens*," Sean said. He also used to do science outreach, such as volunteering to judge science fairs, and looks forward to the next SCELSE Open House and Singapore Science Festival next year.

At SCELSE, Sean works in the Microbial Biofilms cluster with A/Prof. Scott Rice.

"We work on the three-species biofilm model and I study how the interaction between species influence their development, in terms of grouping behaviour, metabolism and stress response or tolerance," he said. Sean also works with A/Prof. Diane McDougald on the toxicity of *Vibrio*

on protozoa, and with Dr Viduthalai Rasheedkhan Regina on the L'Oréal project.

"It is challenging to work with metabolomics, because pulling out meaningful data takes a lot of delving into statistics and the literature. But learning to do this independently is very rewarding as there is sense of personal accomplishment when you make the connection and discover something," Sean explained. He added that he finds his microscopy work the most enjoyable because of the beauty of the images.



Sean cross-country skiing in Kananaskis Country, Alberta, Canada

"I like how cool it looks, the pretty colours and how they merge together," Sean said. He also enjoys supervising the two URECA undergraduate students in the lab.

Sean obtained his BSc in cellular and molecular biology from University of Calgary, Canada in 2010. He then continued to do his PhD at Prof. Ray Turner's lab, focusing on energy-taxis and metal toxicity effects on organic pollutant metabolism in *Pseudomonas pseudoalcaligenes*.

Sean Booth Research Fellow

Sean won a student speaker award for his talk on aluminium toxicity during a conference in Lille, France in 2015, and a University of Calgary research innovation award for the most accomplished science graduate student in 2017. He graduated with a PhD in environmental microbiology and joined SCELSE in April this year.

"I met Scott at the ISME 2016 conference in Montreal, Canada. That's where I learnt of SCELSE as an international research centre with a great diversity of people and decided to come here," Sean said.

For students just starting out in science, Sean advises them to "grasp all opportunities to learn new things and be involved in different projects." He added that they should talk to people more about their science because "you will never know where you can get great insights."

About life in Singapore, Sean enjoys trying new food.

"There is always interesting food here. I have been eating pineapple a lot, and have eaten durians three times - a very unique experience!"

Outside of science, Sean plays disc golf regularly during most weekends at courses in Dover or Ang Mo Kio. He also cycles often.

"I recently went mountain biking at the Bukit Timah Nature Reserve twice in a week, that was great," he said.

Publication profile

Although the first antibiotic treatment for tuberculosis (TB) became available nearly 70 years ago, TB remains a leading cause of death by infectious disease today, due to the rapid emergence of drug-resistant strains. Thus, new anti-TB drugs with novel mechanisms of action are urgently needed. Through a carefully controlled study on mycobacteria, SCELSE researchers uncovered some interesting biological knowledge and developed a new platform to validate future anti-TB drugs.

Mycobacterium tuberculosis - the bacterium that causes TB - has a distinctive outer membrane (OM) abundant in mycolic acids (MAs) which makes the membrane more rigid and less permeable to antibiotics. MAs are synthesised as trehalose monomycolates (TMMs) at the inner leaflet

Fighting tuberculosis by targeting the flip of mycolic acids

of the inner membrane (IM) and are transported to their final position in the OM via a multi-step process. The first step is for the TMMs flip across the IM to the outer leaflet, and an essential IM protein Mycobacterial membrane protein Large 3 (MmpL3) is likely to be involved.

SCELSE researchers focused on a related species *Mycobacterium smegmatis* as a model organism. They generated *M. smegmatis* spheroplasts by treating the bacteria with glycine and lysozyme such that the resulting spheroplasts have no OM or cell wall and are only bound by IM, now exposed to the outside. By adding the enzyme LysB which specifically degrades TMMs but cannot enter the spheroplast, they found that most newly synthesised TMMs can flip

across the IM to the outside leaflet.

They tested three candidate drugs SQ109, BM212 and AU1235 which are believed to affect MmpL3-mediated TMM transport, and found that only the latter two were able to reduce LysB degradation.

They checked this effect using another method: metabolically labelling TMMs with 6-azido-trehalose which can be labelled with a biotin probe. Both BM212 and AU1235 drastically reduced the amounts of biotin-labelled TMMs showing that they inhibited TMM flipping across the IM.

In particular, they found that BM212 strongly inhibits TMM flipping in a dose-dependent manner and can bind directly to MmpL3.

The researchers concluded that

MmpL3 is the TMM flippase and their new platform can be used to validate MmpL3-targeting anti-TB drugs.



MmpL3 is the flippase for mycolic acids in mycobacteria

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Latest SCELSE publications



SCELSE social

New SCELSE Baby



Congratulations to A/Prof. Federico Lauro on the birth of his baby boy Mattias!



Conference report

SCELSE researchers participated in the 2nd International Symposium on Microbial Resource Management (MRM2) in Ghent, Belgium and presented SCELSE's research while benefiting from the talks and discussions with leading experts in the field. Mr Ezequiel Santillan, who attended the conference together with his wife Ms Solange Elizabeth Astorga and Dr Joeri Coppens, shares his experience with this conference report:

In the past few years, many exciting

NTU President visits SCELSE



SCELSE centre director Prof. Staffan Kjelleberg invited NTU President Prof. Bertil Andersson to join the SCELSE morning tea on Monday 30th October. Prof. Kjelleberg presented him with a token of appreciation and thanked him for his strong support throughout SCELSE's journey. Prof. Andersson said that he is immensely proud of SCELSE and what it has achieved. He will step down as NTU President at the end of 2017 and SCELSE conveys best wishes for his future endeavours!

SCELSE High Tea



SCELSE members got together on 27th October for high tea at the Pen & Ink restaurant in NTU North Spine. Left photo: Asst Prof. Kim Hie Lim, her daughter Lumi and Ms Adeline Yong. Right photo: Lab management team.

SCELSE X-Campus Run

SCELSE members participated in the 6.75km NTU cross-campus fun run on the evening of 11th October!

From left: Dr Sean Booth, Mr Ezequiel Santillan, Ms Solange Astorga, Dr Lindsey Deignan, Ms Sandra Kolundzija, Dr Caroline Chenard, Ms Nathasha Oberoi-Lee, Ms Jane Ong, Mr Kenny Lau, Dr Nikolay Berezchnoy and Dr Jamie Hinks.

Microbial Resource Management conference



From left: Ms Solange Astorga, Dr Joeri Coppens and Mr Ezequiel Santillan at the MRM2 conference in Ghent, Belgium

new technologies have led to an increased understanding of microbial community composition. Now,

especially with the rise of synthetic ecology approaches, microbial ecologists try to bridge the gap. This specialised conference focused on the transition from synthetic ecology to natural ecosystems and was organised by the inter-university network on MRM.

We presented SCELSE's research within MRM: Joeri gave a talk entitled "Unravelling the microbial resource management toolset for mainstream shortcut nitrogen removal through nitrite shunt in tropical conditions", while I presented a poster entitled "Effects of disturbance on diversity, function, and underlying community assembly processes towards enhanced microbial resource management".

cont. p. 4

SCELSE

STUDENT PROFILE

This month's student profile features Hu Yidan!

Tell us a bit about your work in SCELSE.

Biofilms as biocatalysts have shown great promise for chemical synthesis. Biofilm thickness is a crucial factor influencing mass transfer and biocatalytic activity, and hence, plays a key role in determining the overall performance of biofilm-mediated biocatalysis. My research is on engineering thickness-controllable catalytic biofilms through synthetic biology approaches.

I am from A/Prof. Cao Bin's group. I am very happy to work in this team that



Yidan at the 2015 SCELSE retreat in Raffles Marina. (Photo: Prasanna Jogdeo)

is cooperative, active and energetic.

Any interesting findings or experiences so far?

We have constructed light responsive gene circuits to achieve a light controllable biofilm. As c-di-GMP is a universal regulator, we find that our gene circuits can be used in different microorganisms for different purposes.

What excites you and what makes you go

zzzzzz?

It excites me when my husband tells me, "I bought a gift for you". It makes

Hu Yidan PhD Student

me go ZZZZ when I see the gift.

If you were stranded on a deserted island, what would you want to bring with you?

I want to bring my family with me on the deserted island. Well, if they are willing. I also want to bring a lot of books.

Fill in the blanks: When _____, I _____.

When I am stressed and unhappy, I usually read books or listen to music.

Anything you would like to say to fellow students?

If the results of experiments are not consistent with expectations, don't be disappointed and depressed. Lots of exciting findings come from unexpected results.

Event report

SCELSE researchers featured prominently at TEDxNTU 2017 - both on stage and behind the scenes - with this year's theme "game changers" highlighting luminaries who are exemplars of change and innovation in their respective fields.

Dr Kristen Sadler, Research Director of Strategy and Bioscience at the NTU President's Office, and TEDxNTU advisor/licence holder welcomed participants and hoped the event will be the start of the TEDx journey for many.



A/Prof. Federico Lauro giving his talk on ocean microbes at TEDxNTU 2017

Game changers at TEDxNTU 2017

"We all have the power to change the game; our speakers today have taken steps and actually made a difference," Dr Sadler said.

SCELSE's A/Prof. Federico Lauro gave the first talk of the event about his work in marine

microbial research. He recounted how as a competitive sailor, he witnessed plastic pollution and coral damage over time, which spurred him to pioneer citizen oceanography in 2013 for crowdsourcing

marine microbiome data.

"Imagine a world where every ship can go collect data which is then shared in a public depository for all mankind. We need to know ocean microbes better and together we can," A/Prof. Lauro said.

Other highlights include Ms Jenny Tay about the funeral business, Mr Michael Sng about making military toys and Dr Wong Choon Yue about robotics.

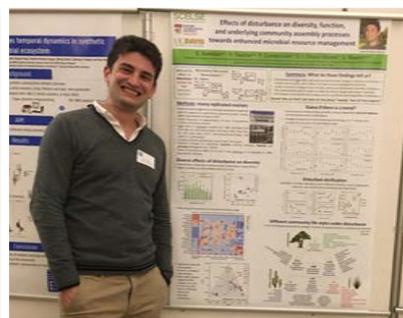
"I find the talk by Jenny Tay very interesting," said Mr Woo Yissue, SCELSE PhD student. "This is a game changer in that her efforts helped to change the negative attitudes and reduce stigma towards the funeral business."

Behind the scenes, SCELSE members Mr Eze Santillan and his wife Ms Sol Astorga are TEDxNTU co-curators and part of the event organising team.

Microbial Resource Management conference (from p. 3)

My poster was selected by a group of professor-judges and won the poster award.

I really enjoyed the conference because I somehow felt like I belonged there. The multiple ways researchers are trying to harness the complexity of microbial communities to control the ecosystem services they provide really inspired me. Much of the work and ideas presented there are relevant to my current research at SCELSE. I was surprised to see how many groups are using flow-cytometry as a



Mr Eze Santillan presenting his poster

fingerprinting tool to easily and rapidly infer changes in the most abundant OTUs of a sample.

Personally, I benefited a lot from the discussions on my work during

the poster sessions, and I had the chance to exchange ideas with several professors like Paul Bodelier, Nico Boon, Soren Sorensen, Barth Smets and James Prosser. It is really nice to personally meet the people behind the papers we normally read and inspire our research. I also discussed research with many postdocs and PhD students, and the feedback I got was very good, which is extremely motivating for the final phase of my PhD.

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