**Research Theme:** Biochemistry, Microbiology, chemistry biology

**Research Project Title:** Discover bioactive compounds and associated biosynthetic pathways from marine microorganisms

**Principal Investigator/Supervisor:** A/P Liang Zhao-Xun

**Co-supervisor/ Collaborator(s) (if any):** NA

### Project Description

**a) Background**

Actinomycetes are a group of gram-positive bacteria known for their unsurpassed ability to produce bioactive secondary metabolites. A large percentage of antibiotics used today were isolated from terrestrial actinomycetes. After sixty years of extensive screening of terrestrial microorganisms that include actinomycetes, the prospect of isolating novel antimicrobial compounds from terrestrial microorganisms has diminished greatly. Actinomycetes are distributed widely in both marine and terrestrial habitats. It becomes increasingly clear that the underexplored marine actinomycetes are also capable of producing secondary metabolites. Motivated by the potential of discovering novel bioactive compounds from marine microorganisms, we propose a research project to explore the diversity and metabolite-producing capacity of actinomycetes from the unique marine environment of Singapore and Southeast Asia. We will focus on the microbial consortia associated with marine sponges and coastal mangrove sediments, considering that they provide highly complex multispecies environments for symbiotic microbes to produce metabolites for defense or communication purposes. The underpinning **hypothesis** of the research initiative is that the sponges and marine sediments from the ecologically unique Southeast Asia region harbor symbiotic actinomycetes that capable of producing novel bioactive metabolites.

**b) Proposed work**

1. **Isolate novel actinomycetes from sponge and mangrove sediment samples collected from Singapore’s marine environment.**
2. **Discover metabolites with antimicrobial or anti-biofilm activity from marine actinomycetes.** We will focus on the discovery of marine metabolites with antimicrobial or anti-biofilm activity. We will use colony-based screening to identify strains that produce antimicrobial compounds.
3. **Heterologous expression of biosynthetic gene clusters.** To overcome the difficulty of low-titre production or to uncover metabolites from silent biosynthetic pathways, we will clone and transfer targeted biosynthetic gene clusters from marine bacteria to hosts for heterologous expression.

### Supervisor contact:

If you have questions regarding this project, please email the Principal Investigator: zxliang@ntu.edu.sg

### SBS contact and how to apply:

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Please apply at the following: [http://admissions.ntu.edu.sg/graduate/R-Programs/R-WhenYouApply/Pages/R-ApplyOnline.aspx](http://admissions.ntu.edu.sg/graduate/R-Programs/R-WhenYouApply/Pages/R-ApplyOnline.aspx)