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| **Research Theme: Microbiology; Synthetic biology** |
| **PhD Research Project Title:**  **Genome-guided discovery of novel microbial enzymes and natural products** |
| **Scholarship category (Please indicate the source of funding for this project):**  **SBS Research Student Scholarship (for SBS faculty only)** |
| **Principal Investigator/Supervisor: Liang Zhao-Xun** |
| **Co-supervisor/ Collaborator(s) (if any): NA** |
| **Project Description**   1. **Background: Biosynthesis of natural products.**   Are you passionate about unraveling the mysteries of nature at the molecular level? Do you dream of pioneering breakthroughs in the world of microbial chemistry? If so, our lab offers an exciting opportunity for you to embark on a transformative Ph.D. journey.  In our lab, we delve deep into the captivating world of specialized metabolites produced by microbes. These compounds are not just your ordinary molecules; they boast intricate structures and possess remarkable bioactivity. They hold the potential to revolutionize fields ranging from medicine to agriculture.  Microbes are the virtuoso architects behind these bioactive compounds, and they rely on a fascinating orchestra of enzymes within biosynthetic pathways. These enzymes serve as the creative artisans, meticulously constructing and embellishing the chemical scaffolds of specialized metabolites. What's truly captivating is the vast, untapped diversity of these enzymes, waiting to be discovered.  In our lab, we are on a mission to uncover the hidden gems of microbial chemistry. Nature has concealed a multitude of biosynthetic gene clusters (BGCs) within microbial genomes, and many remain overlooked. This underestimation of functional diversity is where your journey begins.  As a Ph.D. student in our lab, you'll be at the forefront of scientific exploration. Here's what you can expect:  Unique Microbial Resources: We boast a collection of rare and extraordinary microbial strains, providing the raw materials for your discoveries.  Genomic Adventures: Dive into the fascinating world of microbial genomics. Sequence and mine the genomes of these remarkable microbes to unearth cryptic biosynthetic pathways.  Biochemical Wizardry: Unleash your skills in biochemical analyses to unravel the functions and activities of enzymes within these pathways.  Genetic Manipulation: Employ genetic tools to awaken dormant BGCs, opening the door to new possibilities.  Synthetic Biology Magic: Craft and engineer these pathways to produce novel specialized metabolites, potentially with groundbreaking applications.  If you have an insatiable curiosity and a desire to make an impact in the field of natural product discovery and biosynthesis, our lab is the place for you. Come be a part of our dynamic team of researchers dedicated to pushing the boundaries of knowledge and innovation.  **b) Proposed work:**   1. Microbial Genomics: Sequencing and analyzing the genomes of unique microbial strains to identify cryptic biosynthetic gene clusters (BGCs). 2. Bioinformatics: Using computational tools and methods to predict and analyze the presence of cryptic biosynthetic pathways in microbial genomes. 3. Enzyme Discovery: Searching for enzymes within these cryptic BGCs that are responsible for constructing and modifying the chemical scaffolds of specialized metabolites. 4. Functional Characterization: Employing biochemical techniques to understand the functions and activities of these newly discovered enzymes. 5. Genetic Manipulation: Using genetic tools to manipulate microbial strains, potentially activating and expressing the cryptic biosynthetic pathways. 6. Synthetic Biology: Applying synthetic biology techniques to engineer and modify these pathways for the production of novel specialized metabolites.   The students may be involved in tasks related to any of these aspects of the research, depending on their level of expertise and the specific objectives of the laboratory work.  **c) Preferred skills: basic understanding of biochemistry and molecular cloning.** |
| **Supervisor contact:**  **If you have questions regarding this project, please email the Principal Investigator:** |
| **SBS contact and how to apply:**  Associate Chair-Biological Sciences (Graduate Studies) : [AC-SBS-GS@ntu.edu.sg](mailto:AC-SBS-GS@ntu.edu.sg)  Please apply at the following:  **Application portal:** <https://venus.wis.ntu.edu.sg/GOAL/OnlineApplicationModule/frmOnlineApplication.ASPX> |