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| **Research Theme: Genomics and Pathogenesis** |
| **MSc Research Project Title: Metagenomic study of Microbial Communities in Wood Decay for Advancing Wood's Role as a Sustainable Construction Material** |
| **Principal Investigator/Supervisor: Dr HONG Yan** |
| **Co-supervisor/ Collaborator(s) (if any): NA** |
| **Project Description**  **a) Background:**  Timber wood is well recognized as a renewable and natural material. The use of wood as building materials represents a stable and easily accountable way of storing atmospheric carbon for long periods of time, serving as a good carbon sink that helps climate change mitigation. Other advantages are faster and easy construction, also higher strength-to-weight ratio than concrete or steel. Tropical timber materials produced from sustainably managed forests are used for more and more buildings around the world, like the most recent GAIA at NTU, the new home for Nanyang Business School and the largest wooden building in Asia.  Under ideal conditions, timber can be used for centuries. However, fungi and insect (wood boring beetles and termites) can cause quick timber degradation when the environment becomes conducive. Outdoor wood settings are especially vulnerable to fungi rot since sunshine and rainfall can wear out protective coatings and create small cracks that allow fungi spore germination and hyphae penetration. In addition to fungi, co-existing wood inhabiting bacteria are also involved in wood decay by affecting wood permeability, attacking wood structure and predisposing wood to further fungal attack. Timber wood durability / resistance to biological attack varies with tree species, wood treatments, environments of the setting up and maintenance. There is little research in this important area, especially on microbial communities that decay timber wood materials in the tropical environment.  **b) Proposed work:**  Our group has gained various capabilities from the study of pathogenic fungi for urban trees. This MSc work will be part of the research project expected to be funded by MOE research grant and supported by some industry players. We aim at gaining the foundation knowledge on tropical wood rot fungi that are damaging wood structures in Singapore, with the following milestones:  1. A survey of wood structure decay in Singapore through field visits and sample collections with the help of partners  2. The significant contributors to decay of wood structures will be identified in three areas: wood species, wood treatment and environmental factors  3. Metagenomic analysis for fungi, identification of the main fungi species associated with wood structure decay in Singapore through the qualitative and quantitative association analysis  4. Metagenomic analysis for co-existing bacteria in the samples, identification the dominant bacteria species associated with wood product decay through the qualitative and quantitative association analysis  5. Cultivation and isolation the important wood structure decay fungi, to obtain pure culture  6. In vitro wood decay analysis with pure fungal strains to confirm pathogenesis and to identify the most damaging wood product decay fungal species  7. A microbiome database for wood structure decay in Singapore  **c) Preferred skills:**  A good bachelor degree in Life Science, with laboratory experience in molecular biology research and willing to go for field trips. Should be self-driven and independent. Research experience on fungi culture and pathogenesis study, biodata analysis will be advantageous. |
| **Supervisor contact:**  **If you have questions regarding this project, please email the Principal Investigator:**  yhong@ntu.edu.sg |
| **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> |