The University of Hong Kong
School of Biological Sciences

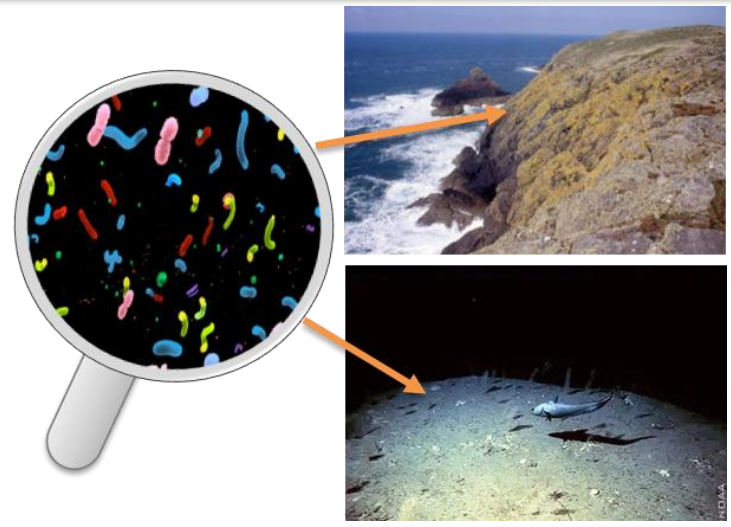
Public Seminar

Ecological Patterns And Physiological Adaptations Of Marine Bacteria In Tropical Extreme Environments

Date: 29th September 2025

Time: 14: 30 PM (HKT)

Venue: ROOM 6N11 + Zoom



About the speaker:

Yuanqiu HE, Hester is a PhD student supervised by Prof. Juan Diego Gaitan-Espitia. Her research focuses on understanding the mechanisms shaping bacteria diversity and phenotypic adaptation to extreme, challenging environments in the ocean.

Abstract:

Microbes are ubiquitous in our oceans. These organisms can thrive even in some of the harshest places on Earth including tropical rocky shores and the deep sea. The extreme environmental conditions of these habitats (e.g., temperature, UV and atmospheric pressure) have influenced the diversity and evolution of marine microbes, shaping a variety of phenotypic adaptations. It is unclear, however, whether these phenotypic adaptations are underpinned by similar agents of selection (i.e., extreme environmental conditions), driving convergent evolution in microbial functional and genetic characteristics. Addressing this major knowledge gap in microbial ecology can help us to understand the generality and predictability of microbial evolution in extreme environments as well as the mechanisms underpinning enhanced tolerances to environmental stress. Here, the patterns of microbial diversity along environmental gradients in extreme marine habitats were explored. Contrasting patterns were found in the two most extreme environments. While the lowest bacterial diversity appeared in supratidal zone, the deep sea exhibited highly diverse bacterial communities. This pattern may suggest a stronger environmental selection and filtering driven by desiccation and UV in the supratidal habitats, than the cold, nutrient limit and high- pressure conditions experienced by microbes in the deep sea.

Similarly, extreme marine environments have shaped distinctive functional and genetic characteristics of bacteria. Decreasing growth rates characterized the ecological strategies of marine bacteria in extreme marine habitats, particularly in the deep sea. This trade-off between species diversity and growth rates was also accompanied by patterns in genome size. Larger genomes with more coding genes were found in bacteria strains isolated from extreme marine habitats (shore and deep sea). Therefore, slow growth and large gene repertoires could represent associated strategies that enhance survival in extreme marine habitats. Findings of this study will help to improve our understanding of the mechanisms supporting microbial diversity and ecological success in changing and extreme environments.