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Microbial Diversity and Bioinformatics

New Frontiers in Fungal Ecology: Partnerships Beyond the Seed Plant Realm



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Time: 2025. 09. 22 Mon. 15:00

Venue: Auditorium, 1st Floor,
Interdisciplinary Research Building
跨領域科技研究大樓1樓演講廳

Host: Dr. Isheng Jason Tsai 蔡怡陞研究員



Abstract

Fungi form diverse associations with photosynthetic organisms, ranging from mutualistic symbioses to parasitic relationships. These interactions are fundamental to global nutrient cycling and reflect the long coevolutionary history between fungi and their phototrophic partners. While some fungi draw carbon from living phototrophs and provide nutrients in return, others may act as commensals or parasites. Despite the ecological importance of these interactions, our understanding remains heavily biased toward seed plant systems. The fungal associations with seedless phototrophs, including bryophytes, ferns, and cyanobacteria, represent a critical knowledge gap in biodiversity research.

Since joining Academia Sinica, I have established a research program investigating these overlooked fungal-phototroph interactions. Our research addresses two key questions: First, how do we characterize the diversity of these associations? Second, do these fungi exhibit similar trophic modes and ecological roles as those well-characterized in seed plant systems, such as mycorrhizae? Our approach integrates field-based discovery, microscopy, stable isotope analysis, and molecular sequencing. Taiwan's subtropical forests provide an ideal study system, offering unique insights complementary to the temperate and arctic zones that dominate current fungal research.

In this talk, I will focus on our findings from three focal systems: 1. Bryophyte-fungal associations; 2. Cyanobacteria-fungal symbiosis (Phyllosymbia); 3. Fern-fungal associations. Our work fills critical gaps in understanding fungal interactions beyond seed plants, with profound implications for understanding biodiversity patterns and ecosystem functioning in subtropical regions.