Chemical & Physical Sciences
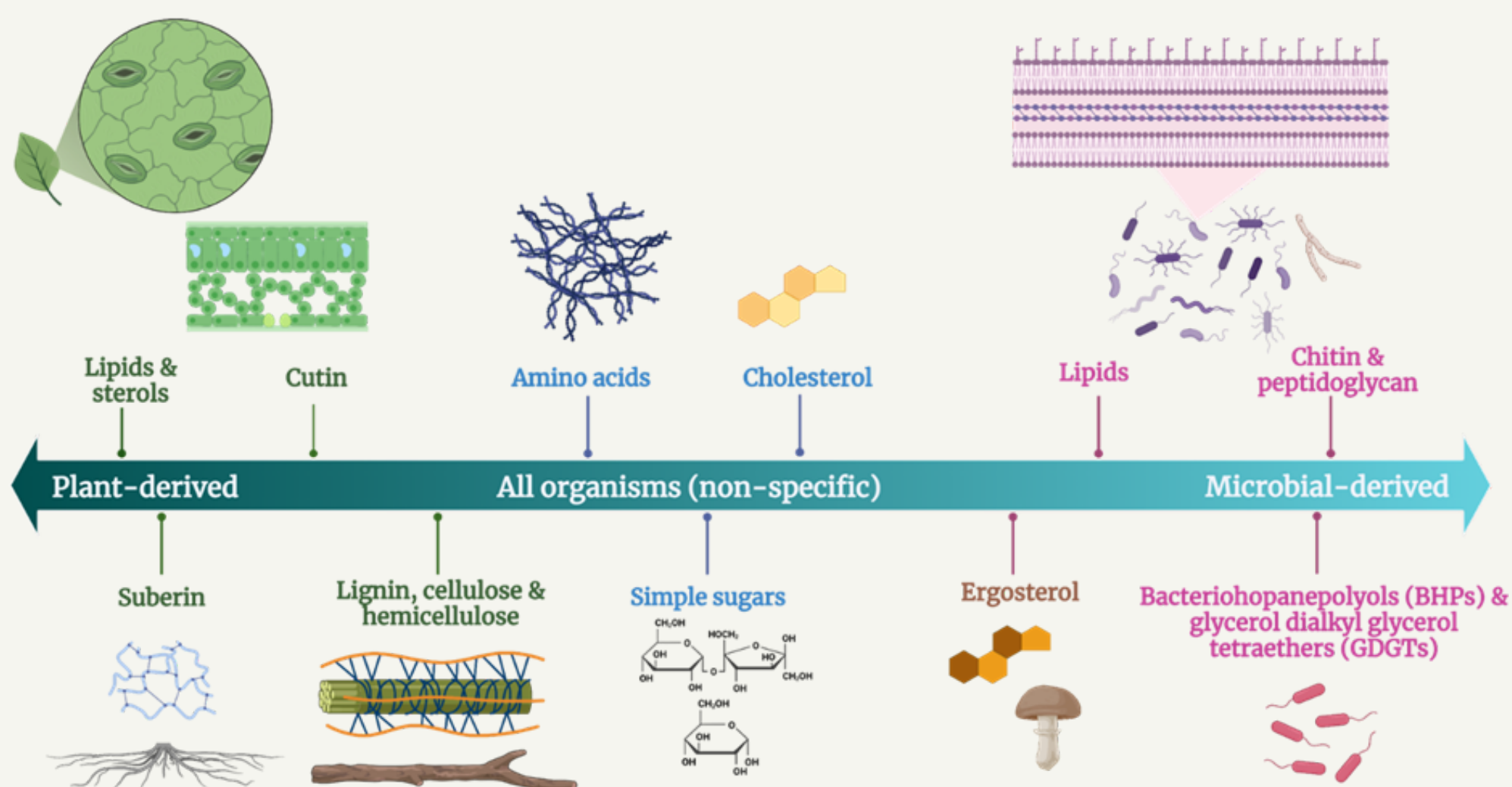# UNIVERSITY OF TORONTO
MISSISSAUGA

COLLOQUIUM SEMINAR SERIES

CHEMISTRY OF SOIL CARBON IN A CHANGING WORLD: ANALYTICAL CHALLENGES, RECENT ADVANCES, AND FUTURE PERSPECTIVES

Molecular continuum of soil organic matter

Soil organic matter is a critical component of terrestrial ecosystems because it is vital for maintaining soil fertility and overall ecosystem health. Soil organic matter is also a major global carbon sink with twice as much carbon in soils compared to CO_2 in the atmosphere. However, global environmental change and anthropogenic activities have impacted the intricate balance between soil carbon stored versus respired as CO_2. Globally, soil carbon storage is declining and altering the chemistry of soil organic matter. Soil organic matter is the most chemically active portion of soil (by mass) but how changes in composition will impact overall ecosystem function in the long-term, remain highly uncertain. A major aspect of this uncertainty is due to the complex chemistry of soil organic matter. Soil organic matter is a heterogeneous mixture of compounds from various plant and animal/microbial sources which participate in various biogeochemical reactions in soils. To circumvent these analytical challenges and improve the understanding of soil organic matter chemistry, an integrative molecular-level platform has been developed and uses nuclear magnetic resonance (NMR) spectroscopy along with targeted analysis via gas chromatography-mass spectrometry (GC-MS) to better understand how soil organic matter is impacted with warming, atmospheric nitrogen deposition, and changes in plant detrital inputs. This presentation will provide an overview of these challenges, how these integrative approaches can provide a more informed assessment, and future perspectives on how unravelling the molecular biogeochemistry of soil organic matter is paramount to developing a mechanistic and fundamental understanding of global carbon resources.

COLLOQUIUM SEMINAR SERIES
featuring

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