

# Biology Seminar



Western  
UNIVERSITY · CANADA

12:30 - 1:30 pm  
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BGS 0165



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## Engineering production of New-to-Nature Terpenoids in *Saccharomyces cerevisiae*

Specialized metabolites constitute a rich source of high-value compounds with great benefits to human health. They inspired the majority of the drugs introduced into clinical practice in the last 50 years and dominate the food, beverage, and fragrance industries, providing most of the widely used scents, pigments, and flavors. However, the natural chemical diversity of specialized metabolism is still poorly understood, preventing access to potentially valuable compounds. With the recent advances in metabolic engineering and synthetic biology the untapped chemical space of natural products can be now further explored and expanded for sustainable production of novel molecules. These compounds may have increased and broader range of activity and bioavailability to enable new applications aligned with continuous evolving challenges of modern society. Focusing on terpenoids, we enabled systematic synthesis of new-to-nature molecules with an unnatural number of carbons in their structure (11 or 16 carbons) by interchanging plant and microbial specialized biosynthetic pathways. We bypassed the constraint of terpene biosynthesis to building blocks with a multiple of 5 number of carbons in their structure, by plugging-in unique transferases that methylate prenyl diphosphate substrates. Leveraging the promiscuity of downstream enzymes or engineering their substrate selectivity or product specificity, we recapitulated the natural terpene modularity in a heterologous host. Our approach set the basis of entirely new classes of terpenoids such as C11 and C16 novoterpenes, with more than 100 identified molecules, some of which with interesting odorant properties.

