



## Dr Konstantinos Vavitsas

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University of Queensland

### Understanding and Expanding the Photosynthetic Organisms for Terpenoid Production

Terpenoids are one of the largest classes of chemical compounds, some of them with industrial interest as nutraceuticals, biofuels, or chemical feedstock. Even though they are mainly plant-derived compounds, terpenoid production in photosynthetic organisms is rather unexplored, with a few successful studies reported in the literature. In this presentation I will elaborate on the potential of using plant chloroplasts and cyanobacteria as biosynthetic vessels, with a focus on terpenoid production, by linking productivity directly and indirectly with photosynthesis. First, I will theoretically investigate the feasibility of redirecting photosynthetic products—electrons and fixed carbon—towards heterologous compounds. I will subsequently present the full localization of a diterpenoid biosynthetic pathway within the *Nicotiana benthamiana* chloroplast, and the protein modifications required to achieve this goal. Faster-growing and simpler photosynthetic systems, however, have a larger bioproduction potential. Therefore, I will examine the effects of introducing two heterologous biosynthetic pathways in the cyanobacterium *Synechocystis* sp. PCC 6803, using targeted metabolite analysis and computational modelling. Finally, I will outline some perspectives on the future work as part of my fellowship which is the development of a modular genetic engineering toolbox for model cyanobacterial species, and its implementation on terpenoid production.

### Biography

Dr Konstantinos Vavitsas is a CSIRO Future Science Fellow at the University of Queensland, and a member of the executive board of Synthetic Biology Australasia. He obtained his B.Sc. in Biology from the University of Athens, Greece, and his M.Sc. in Applied Biotechnology from Uppsala University, Sweden. He obtained his PhD on Biotechnology/Synthetic Biology from the University of Copenhagen, Denmark, for his work on diterpenoids production in photosynthetic organisms.

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CeLS Seminar Room 1

28 Medical Drive, Centre for Life Sciences, Singapore 117456

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