
Synthetic biosystems for the production of high-value compounds

Sotirios Kampranis*¹

¹Department of Plant and Environmental Sciences - University of Copenhagen (PLEN) –
Thorvaldsensvej 40 1871 Frederiksberg C Copenhagen, Denmark

Abstract

Natural products have applications as pharmaceuticals, flavours and fragrances, or bio-fuels. However, the industrial exploitation of many natural compounds is limited by low or inconsistent availability and inefficient chemical synthesis. To overcome this limitation, we are engineering yeast as a sustainable production platform for the synthesis of natural products. Work in our group in has focused on compounds of the terpenoid/isoprenoid group. We have taken advantage of the modular structure of terpene biosynthesis to develop a versatile plug-and-play platform that allows the facile exchange of standardized compatible parts to enable the rapid reconstruction of natural or "new-to nature" terpene biosynthetic pathways. We have shown that the combination of gene-mining, protein engineering and metabolic engineering can help recreate part of the natural terpene diversity in engineered biosystems. In subsequent studies, we have reconfigured this modular platform to facilitate the process of natural product pathway characterization and we have applied this approach to elucidate the biosynthetic pathway leading to the potent antioxidant carnosic acid.

Keywords: yeast, protein engineering, terpene, CYP

*Speaker