

Plant Power presents:

Production of isoprenoids in *Synechocystis* PCC 6803



by
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There is an urgent need to develop renewable alternatives to petroleum that will help meet global demands for fuels and synthetic chemistry feedstock, without contributing to climate change or other environmental degradation. Using photosynthetic microorganisms, like cyanobacteria, as production systems for such alternatives is advantageous, since they can achieve direct conversion of carbon dioxide from the atmosphere into the desired product, using sunlight as the energy source.

Isoprenoids, or terpenoids, is a large family of compounds, including carotenoids, tocopherol, phytol, sterols and hormones. We are working on producing renewable hydrocarbons originating from the isoprenoid biosynthesis in the model cyanobacterium *Synechocystis* PCC 6803, by metabolic engineering using genetic techniques.

Isoprene is a volatile five-carbon compound, made industrially from petroleum and used for production of synthetic rubber. It can be made in some plants from dimethylallyl diphosphate (DMAPP) in a reaction catalysed by the enzyme isoprene synthase. In one project, we introduced the capability to produce isoprene into *Synechocystis*.

In another recent project, we have generated a strain of *Synechocystis* capable of accumulating the 30-carbon molecule squalene, an isoprenoid that has commercial use in cosmetics and medicine. Squalene, if produced sustainably on a large scale, could also be used instead of petroleum as a raw material for fuels and as feedstock for the chemical industry. In some bacteria, squalene is an intermediate metabolite in the formation of hopanoids, a class of penta-cyclic isoprenoid molecules. *Synechocystis* PCC 6803 possesses one gene, *shc*, predicted to encode squalene hopene cyclase (Shc), an enzyme converting squalene into hopene, which is then further modified to form hopanoids. By inactivation of *shc*, we are able to investigate the possibility for squalene production by cyanobacteria, as well as the potential effects of squalene accumulation, and the role of hopanoids in cyanobacteria.

When: 15-Nov 2013, 10-11 am

Where: Room M117/K117, Thorvaldsensvej 40, 1st floor

Open to all – no need to register, for more information contact Kristine Kirkensgaard (krki@plen.ku.dk), Project Manager in Plant Power (<http://plantpower.ku.dk/>)



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