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Bacterial cytochromes P450 are highly efficient and promising terpene hydroxylases

Key words: cytochromes P450, terpene hydroxylation, biotechnological production

Cytochromes P450 are the first enzymes to modify terpene synthase products. Although major advances concerning the engineering of plant P450s have been made, these enzymes still pose great challenges, especially in terms of microbial expression. Therefore, soluble bacterial P450s catalyzing terpene hydroxylation came into the focus of interest for biotechnological production of terpenoid compounds thus demonstrating the potential of these P450 enzymes for the production of terpenoids for the fragrance, flavor and pharmaceutical industry.

We have demonstrated highly selective hydroxylations of di- and triterpenes by members of the CYP106 family of *Bacillus megaterium*, as well as by cytochromes P450 from *Sorangium cellulosum* Soce56. The 3D structure of several of these P450s has been resolved and the structural basis for highly selective substrate hydroxylation has been explained. Moreover, highly selective hydroxylations ofionone as well as nootkatone and other terpenes were performed using different members of myxobacterial P450s and a valuable toolbox for the production of terpenoids has been created.

Taken together, bacterial terpene synthases and P450s are promising tools for the production of modified terpenes.

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