Biocatalytic Production of *(R)*-α-ionone

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Project Summary

In this project, a streamlined and efficient biocatalytic process for the selective production of (*R*)-α-ionone will be developed. To this end, Nature's Brønsted acid catalysts, the squalene-hopene cyclases (SHCs)[1] will be evaluated to identify enzymes capable of generating (*R*)-α-ionone with a high level of regio- and stereo-control. Optimization of enzyme activity (e.g., activity, selectivity, thermostability, solvent tolerance) will be achieved through laboratory evolution to create enzyme variants suitable for use in manufacturing processes.[2] Following development of improved enzyme candidates, enzyme production will be optimized via fermentation engineering to create a cost-effective and environmentally benign route to (*R*)-α-ionone.

Our work on SHCs will not only open up practical and environmentally friendly routes to the high-value chemical products, but also help to elucidate the underlying catalytic mechanisms of this important and under-developed enzyme family, thus advancing our fundamental understanding and our ability rationally re-engineer these systems.

References:

1 Bornscheuer, U. T. et al. Nature 2012, 485, 185.

2 Siedenburg G. & Jendrossek, D. et al. Appl. Environ. Microbiol. 2011, 77, 3905.