80. A Baeyer-Villiger monooxygenase from *Cyanidioschyzon merolae* prolongs growth in *Synechocystis* sp. PCC6803.

Mattia Niero; Elisabetta Bergantino

Department of Biology, Università degli Studi di Padova, Padova, Italy
✉ *mattia.niero@unipd.it, elisabetta.bergantino@unipd.it*

Baeyer-Villiger monooxygenases (BVMOs) are enzymes that catalyse the insertion of an oxygen atom into a carbon-carbon bond. These enzymes represent a promising tool in the field of organic chemistry to get rapid access to enantiomerically pure esters or lactones.
In order to test the possibility to use cyanobacteria as photosynthetic microbial vector for the production of recombinant BVMOs, we introduced into *Synechocystis* sp. PCC6803 chromosome the coding sequence of the BVMO from the red algae *Cyanidioschyzon merolae*. To evaluate possible undesired side effects of the genomic manipulations worked out, we compared the growth of the recombinant strains to that of the wild-type. Unexpectedly, we observed that the strain expressing the BVMO presents a prolonged growth and a delayed stationary phase compared to the wild-type. Our preliminary data suggest an active role of the recombinant enzyme in the metabolism of *Synechocystis*, leading to an increased biomass accumulation. In relation with the data reported by Zhou et al.[1] in a recent work, we are heading our research to find a possible link between the observed phenotype and an increased NADPH consumption caused by the BVMO activity.
We speculate that the BVMO expressed by the recombinant strain would oxidize an unknown substrate at the expense of molecular oxygen and NADPH, unbalancing the redox state and promoting a prolonged growth. Moreover, since the biocatalityc characterization of this Bayer-Villiger monooxygenase revealed a substrate preference towards long aliphatic ketones [2], we are going to investigate on secondary metabolites from the fatty acid pathway, as possible *in vivo* substrates for the heterologous enzyme.

Zhou, Jie, et al. "Introducing extra NADPH consumption ability significantly increases the photosynthetic efficiency and biomass production of cyanobacteria." *Metabolic engineering* 38 (2016): 217-227.
Beneventi, Elisa, et al. "Discovery of Baeyer–Villiger monooxygenases from photosynthetic eukaryotes." *Journal of Molecular Catalysis B: Enzymatic* 98 (2013): 145-154.