Development of tools for precise genome engineering and biosynthetic pathway construction in lactic acid bacteria

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Abstract

Strains of Lactic Acid Bacteria (LAB) have a broad range of applications in food industry, including manufacturing of cheese, sausages, and other fermented products. Due to their robustness and stress tolerance, LAB are also being explored as potential candidates for production of fine chemicals within a frame of several projects, including BacHBerry. The latter is focused on identification and production of novel high-value plant-borne polyphenolic compounds, such as flavonoids. Many LAB strains are easily genetically accessible, as there exist efficient transformation protocols, as well as expression vectors, and tools for genome modification. Major drawbacks of currently available genome modification strategies are they are time consuming, require several rounds of selection, and in most cases only a single locus can be targeted at a time. This work aims at implementing CRISPR/Cas-mediated genome engineering in LAB, namely in *Lactococcus lactis*, in order to shorten the time and effort required for introduction of heterologous biosynthetic pathways into these organisms. Once established, the technique would be used for construction of platform strains for production of polyphenolic compounds and other high-value chemicals.