The Use of Codon-Optimized phcB in Genetically Engineered Escherichia coli to Produce Fatty Acid Methyl Esters

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ABSTRACT

In the effort to replace fossil-derived petroleum, renewable fuels such as biodiesel are under development. Biodiesel consists of a mixture of fatty acid methyl esters (FAMEs), which can be naturally synthesized by certain microorganisms in small, regulated amounts. To increase FAME production, unregulated FAME biosynthetic pathways can be engineered into non-native host organisms, like Escherichia coli. Previous research has shown that the methyltransferase (PhcB) gene isolated from Ralstonia solanacearum plays a critical role in the final stage of FAME biosynthesis. Wild-type PhcB however, does not yield significant titers of FAMEs when expressed in E. coli. To counter this issue, this project focused on expressing and characterizing codon-optimized PhcB in recombinant E. coli to produce higher titers of varying-length FAMEs during the fermentation of a renewable sugar feedstock.

BIOGRAPHY

Eric Stevens (B.S. chemistry) is a recent graduate from SUNY-ESF in Syracuse, NY. Eric's interest in biotechnology stems from a background of chemistry and renewable energy related research. During the summer of 2014, Eric was selected to participate in an NSF-funded biological systems engineering internship at Auburn University, where he worked on biochemically converting pretreated biomass into butanol. Eric's senior thesis, the subject of his presentation, further reflects this interest, as he attempted to promote the synthesis of biodiesel molecules in genetically engineered *E. coli*.