Gene sl0033 from Synechocystis 6803 Encodes a Carotene Isomerase Involved in the Biosynthesis of all-E Lycopene

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The function of gene sl0033 from Synechocystis 6803 which is homologous to the bacterial crtI-type phytoene desaturase genes was elucidated as a novel carotene isomerase. \textit{Escherichia coli} transformed with all genes necessary for the formation of $\zeta$-carotene and expressing a $\zeta$-carotene desaturase synthesized the positional isomer prolycopene (7,9,7',9'Z lycopene) which cannot be cyclized in the subsequent reactions to a- and $\beta$-carotene. Upon cotransformation with sl0033, the formation of all-$E$ lycopene is mediated instead.