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Complementation of *bchE R. Capsulatus* from *chlE* from the Cyanobacteria *Synechocystis sp. 6803*

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COMPLEMENTATION OF *BCHE⁻ R. CAPSULATUS* WITH *CHLE* FROM THE CYANOBACTERIA *SYNECHOCYSTIS SP. 6803*

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The bacterium *Rhodobacter capsulatus* has the ability to live both aerobically and anaerobically, and it uses photosynthesis to survive anaerobic conditions. One gene essential for photosynthesis in this organism is *bchE*, which codes for an enzyme in the pathway responsible for making bacteriochlorophyll. The cyanobacterium *Synechocystis sp. PCC 6803* has the related gene *chlE*, which codes for an enzyme involved in the chlorophyll biosynthesis pathway. In this experiment, the functional relationship of these two genes was tested through complementation. A plasmid was constructed that contained the *Synechocystis chlE* gene attached to an S-tag sequence, and the plasmid was then transformed into a strain of *E. coli* (S17-1/_ pir). This new strain of *E. coli* containing the *chlE* plasmid was then mated with a strain of *R. capsulatus* that had been engineered to lack a functional *bchE* gene and thus could not grow anaerobically. The transfer of the *chlE* plasmid and its ability to compliment the non-functional *bchE* gene was demonstrated by the ability of the daughter cells that resulted from the mating (the ChlEexp strain) to grow anaerobically, as well as the presence of an S-tagged band of the appropriate size on a Western blot of cell extracts. As of yet, enzymatic assays have shown no activity in cell extracts, but from the data collected so far we can see that the cyanobacterial chlorophyll gene *chlE* has the ability to replace the function of the bacteriochlorophyll gene *bchE* in *R. capsulatus.*