

**CYTOCHROME c_6 OR PLASTOCYANIN ARE STRICTLY REQUIRED
FOR THE FUNCTIONING OF PHOTOSYNTHESIS AND
RESPIRATION IN *Synechocystis* sp. PCC 6803**

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In cyanobacteria the photosynthetic and respiratory electron transfer chains share a number of components such as the plastoquinone pool and cytochrome b_6f . As respiratory cytochrome c is lacking in cyanobacteria, it has been proposed that these organisms use the same c -type cytochrome – in particular cytochrome c_6 – to serve both in photosynthesis and respiration. Cytochrome c_6 is a well known electron carrier between cytochrome b_6f and photosystem I in cyanobacteria, but it can be replaced by plastocyanin (a copper-protein) in the photosynthetic and respiratory electron transport chains, with the synthesis of one or another protein being regulated by the copper concentration in the culture medium. However, the presence of alternative unidentified electron carriers has been suggested. In order to clarify this point, we have constructed two deletion mutants of the cyanobacterium *Synechocystis* sp. PCC 6803 lacking either the *petE* or *petJ* gene which respectively codes for the copper or heme protein. We have compared the photoautotrophic and heterotrophic growth rate of the two mutants in Cu-free and Cu-supplemented medium, as well as their photosystem I reduction kinetics *in vivo*, with those of wild-type cells. The two mutant strains grow at equivalent rates and show similar *in vivo* photosystem I reduction kinetics as wild-type cells when cultured in media that allow the expression of just one of the two electron donor proteins, but their ability to grow and reduce photosystem I is much lower when neither cytochrome c_6 nor plastocyanin is expressed. These findings indicate that *Synechocystis* cells strictly depend on the synthesis of either cytochrome c_6 or plastocyanin to grow not only photoautotrophically, but also heterotrophically. Thus, taken together, all this data indicate that there is no any other alternative redox mediator as efficient as cytochrome c_6 and plastocyanin in the photosynthetic and respiratory electron transport chains [1].

REFERENCE

1. Durán, R.V., Hervás, M., De la Rosa, M.A. and Navarro, J.A. The efficient functioning of photosynthesis and respiration in *Synechocystis* sp. PCC 6803 strictly requires the presence of either cytochrome c_6 or plastocyanin. **J. Biol. Chem.** 279 (2004) 7229 - 7233.