

**THE DIFFERENCES BETWEEN CYANOBACTERIA IN THE KINETIC MECHANISM OF PHOTOSYSTEM I REDUCTION BY CYTOCHROME  $c_6$  ARE MAINLY DETERMINED BY THE HEME-PROTEIN**

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In photosynthetic organisms, the transfer of electrons from cytochromes  $b_6/f$  to photosystem I (PSI) — which are both membrane-embedded complexes — is performed by the soluble metalloproteins cytochrome  $c_6$  (Cyt) and plastocyanin [1]. Plastocyanin and Cyt react with PSI following a similar kinetic model and exhibit similar rate constants when they are both isolated from the same organism, but vary from one another. In cyanobacteria, the donor proteins can be acidic, neutral or basic, and the role of electrostatic forces in their interaction with PSI varies accordingly. Thus, the slightly acidic donors of *Synechocystis* (pI = 5.6) exhibit repulsive electrostatic interactions with PSI, the reaction of the neutral (pI= 7.0) *Arthrospira* Cyt is independent of ionic strength, and finally the interaction of the positively charged *Nostoc* donors with PSI is driven by attractive electrostatic forces. In order to understand the factors responsible for the specificity of the interaction between the donor protein and PSI, the kinetics of the cross-reactions between Cyt and PSI from the three cyanobacteria have been investigated by laser flash photolysis. The ionic strength dependence of the rate constants was characteristic for each Cyt, but independent of the organism from which PSI was isolated. These observations can be interpreted by assuming that the specific structural features that each Cyt has acquired during evolution determine their differences in the kinetic behaviour, whereas the three cyanobacterial photosystems must be quite similar to one other. This is not in agreement with the widely accepted proposal that the PSI docking site for Cyt and Pc underwent rapid and large changes during evolution.

**REFERENCE**

1. Hervás, M., Navarro, J.A. and De la Rosa, M.A. Electron transfer between soluble proteins and membrane complexes in photosynthesis. **Accounts Chem. Res.** 36 (2003) 798-805.