

**ALTERNATIVE PATHWAYS OF ELECTRON DONATION TO
PHOTOSYSTEM I IN CYANOBACTERIUM *Synechocystis* AND IN
BARLEY LEAVES**

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Electron donation to Photosystem (PS) I from sources alternative to PSII was studied in intact leaves of barley seedlings, in wild-type strain of *Synechocystis* 6803 and its mutant deficient in PSII using the kinetics of P700⁺ re-reduction after far-red irradiation. In cells of PSII-deficient mutant, re-reduction of P700⁺, oxidized primary donor of PSI, after far-red light irradiation was slow and monoexponential. Its rate was severalfold increased both after 5-min incubation of cells at 50°C and, particularly, in the presence of 1 mM propyl gallate. The response to propyl gallate, which inhibits oxidase mediating electron release from plastoquinone pool to oxygen, indicated competition between chlororespiratory electron transport and electron path from plastoquinone pool to PSI. Methyl viologen, which inhibits electron recyclization around PSI, had negligible effect on the rate of P700⁺ re-reduction in both wild-type and mutant cells of *Synechocystis*. That phenomenon evidenced electron donation from reductants like NADPH or/and NADH as a path for P700⁺ reduction after far-red light. Acceleration of P700⁺ re-reduction induced by brief heat treatment was also found in intact barley leaves. Heat-induced stimulation of P700⁺ re-reduction after far-red light was observed in barley leaves treated with methyl viologen. Thus, similarly to cyanobacterium, electron input to PSI from reductants located in chloroplast stroma seemed to mediate P700⁺ reduction after leaf exposure to far-red light. In contrast to cyanobacterium, biphasic kinetics was found for P700⁺ re-reduction in leaves, which was likely related to heterogeneity of PSI in respect to donation from stromal reductants. In wild-type cells, the rate of P700⁺ re-reduction after far-red light was found to be much higher compared to that in PSII-deficient mutant. At the same time, the activation effects of both elevated temperature and propyl gallate on the rate of P700⁺ re-reduction were small in wild-type cells. Comparison of P700⁺ re-reduction in cyanobacterium and leaves of higher plants thus revealed its more complex pattern in chloroplasts, which is likely determined by the complexity of photosynthetic membranes in higher plants.