

分子生物学科・環境科学研究センター共催セミナー

Study of the structure of photosynthetic complexes and the effect of phosphatidylglycerol on cyanobacterial cell fission

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We used differential scanning calorimetry (DSC) as a technique capable of identifying photosynthetic complexes on the basis of their calorimetric transitions. Annotation of thermal transitions was carried out with thylakoid membranes isolated from various photosynthetic mutants of *Synechocystis* sp. PCC 6803. The thylakoid membranes exhibited seven major DSC bands between 40 and 85°C. The heat sorption curves were analyzed both by mathematical deconvolution of the overall endotherms and by a subsequent annealing procedure. The successive annealing procedure proved to be more reliable technique than mathematical deconvolution in assigning thermal transitions. The main DSC band, around 47°C, resulting from the high enthalpy change that corresponds to non-interacting complex of PSII, was assigned using the PSI-less/apcE⁻ mutant cells. Another band around 68–70°C relates to the denaturation of PSII surrounded by other proteins of the photosynthetic complexes in wild type and PSI-less/apcE⁻ cells. A further major transition found at 82–84°C corresponds to the PSI core complex of wild type and PSII-deficient BE cells. Other transition bands between 50–67°C and 65–75°C are believed to relate to ATP synthase and cytochrome *b₆f*, respectively. These thermal transitions were obtained with thylakoids isolated from PSI⁻/PSII⁻ mutant cells. Some minor bands determined at 59°C and 83–84°C correspond to an unknown complex and NADH dehydrogenase, respectively. These annotations were done by PSI-less/apcE⁻ and PSI⁻/PSII⁻ mutants. Effect of phosphatidylglycerol (PG) depletion on cell division was studied by *Synechococcus* PCC 7942 and *Synechocystis* PCC 6803 *pgsA* mutant strains. The PG depletion resulted in an enlargement and elongation of cyanobacterial cells, which can correspond to formation of FtsZ ring. The ring formation could be blocked by elimination of PG from cell membranes. The formation of FtsZ ring was followed by GFP labeled protein in mutant cells. PG is crucial for the formation of division rings and is implicated in the fission of cyanobacteria.

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