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論　文　の　要　約

報告番号	甲 第　1004　号	氏　名	門脇　太朗
学位論文題目	Studies on interaction between photosynthetic electron transport and regulation of gene expression in cyanobacteria (シアノバクテリアにおける光合成電子伝達と遺伝子発現制御の相互作用に関する研究)		

論文の要約

The redox state of the photosynthetic electron transport chain is known to act as a signal to regulate the transcription of key genes involved in the acclimation responses to environmental changes. We hypothesized that the protein thioredoxin (Trx) acts as a mediator connecting the redox state of the photosynthetic electron transport chain and transcriptional regulation, and established a screening system to identify transcription factors (TFs) that interact with Trx. His-tagged TFs and S-tagged mutated form of Trx, TrxMC35S, whose active site cysteine 35 was substituted with serine to trap the target interacting protein, were co-expressed in E. coli cells and Trx-TF complexes were detected by immuno-blotting analysis. We examined the interaction between Trx and ten OmpR family TFs encoded in the chromosome of the cyanobacterium Synechocystis sp. PCC 6803 (S.6803). Although there is a highly conserved cysteine residue in the receiver domain of all OmpR family TFs, only three, RpaA (Slr0115), RpaB (Slr0946) and ManR (Slr1837), were identified as putative Trx targets. The recombinant forms of wild-type TrxM, RpaA, RpaB and ManR proteins from S.6803 were purified following over-expression in E. coli and their interaction was further assessed by monitoring changes in the number of cysteine residues with free thiol groups. An increase in the number of free thiols was observed after incubation of the oxidized TFs with Trx, indicating the reduction of cysteine residues as a consequence of interaction with Trx. Our results suggest, for the first time, the possible regulation of OmpR family TFs through the supply of reducing equivalents from Trx, as well as through the phospho-transfer from its cognate sensor histidine kinase.