S13-1
Molecular basis of complementary chromatic acclimation in cyanobacteria

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シアノバクテリアの光合成アンテナの補色調節機構の解析

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Key word : cyanobacteria, photosynthesis, phytochrome, new generation DNA sequencer

Cyanobacteria are unique phototrophic bacteria that utilize many colorful lights to perform their oxygenic photosynthesis. Certain cyanobacteria modulate composition of their green and red light-harvesting pigments, phycoerythrins and phycocyanins, responding to ambient green and red light. This phenomenon has long been known and called complementary chromatic acclimation (CCA), but its molecular basis was unclear. In this session, we demonstrate that CCA is regulated by a phycbchrome-class photoreceptor (cyanobacteriochrome) that reversibly photoconverts between a green-absorbing form and a red-absorbing form. The green/red absorption change is caused by photoisomerization and subsequent proton transfer of a linear tetapyrrole chromophore. We named this novel photoinversion mechanism as photochromic photocycle, which is distinct from red/far-red photoconversion mechanism of phytochrome. We also found that gene sets that are regulated by the cyanobacteriochrome exhibit significant variation among CCA cyanobacteria species. Therefore, we are now performing draft genome sequencing of these CCA species using Roche 454 GS FLX+ system at Toyoohashi University of Technology.

S13-2
Chlorophyll diversity in cyanobacteria and its adaptive significance

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シアノバクテリアの光合成色素の多様性とニッチ

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Key word : cyanobacteria, chlorophyll, diversity, niche, adaptation

Cyanobacteria are oxygenic photosynthetic prokaryotes which play important role as primary producers in diverse environment including ocean, lakes, rivers, hot-springs and so on. They have been developed characteristic light harvesting mechanisms which absorb light energy by the combination of chlorophyll(Chl)(s) and phycobiliproteins(PBP). Modification of their light harvesting might make them to survive in diverse environments. Until the early 70', cyanobacteria had been recognized to only contain Chl a as chlorophyll pigment. However, following genera have been discovered until now; Prochloron and Prochlorothrix, containing Chl a and b without PBP, Prochlorococcus, containing divinyl-Chl a and b with/without trace PBP, Acaryochloris, containing Chl d as a predominant pigment with trace amount of Chl a and PBP, and Chl f -cyanobacteria, producing Chl f as an inducible chlorophyll in addition to Chl a and PBP. These diversification of chlorophyll composition might be the results of adaptation of each cyanobacterium to light quality at each niche. In this symposium, I would like to discuss this chlorophyll diversities in cyanobacteria and its adaptive significance for ecological niche competition.