

## MPM3-6

### Approach toward Comprehensive Understanding of Photosystem II Reactions based on the Diversity of Cyanobacteria.

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Photosystem (PS) II in oxygenic photosynthetic organisms is called water:plastoquinone oxidoreductase. PS II consists of photosynthetic antenna pigments, electron carriers and many polypeptides. Its structure was shown by a relatively high resolution [ref], however there still be an ambiguity. Processes and mechanisms for photochemical and electrochemical reactions are still under debate. As one of approaches to solve those points, we adopted a few unique species of cyanobacteria as natural mutants; those are *Acaryochloris marina* MBIC 11017 that contains chlorophyll (Chl) *d* as a major pigment, and the other is *Gloeobacter violaceus* PCC 7421 that does not have any intracytoplasmic membranes.

We isolated PS II complexes from *A. marina*, and identified the primary electron donor with Chl *d* dimer and the primary electron acceptors with pheophytin (Phe) *a*, respectively. Due to a smaller gain of light energy by Chl *d* than that of Chl *a*, the redox potential of Phe *a* was shifted to higher. This was an adjustment of overall reaction process. The water oxidation reaction is stabilized by three extrinsic proteins. In *G. violaceus*, primary structures of these three are significantly different from those of other cyanobacteria. We found that oxygen-evolving activity was kept the same even by altered interaction with other components, indicating the other way of stabilization. Based on these findings, we discuss the reaction processes in PS II.

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