Subunit organization of the FtsH complexes in the cyanobacterium *Synechocystis* sp. PCC 6803

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FtsH proteases are housekeeping enzymes that play an important role in the quality control of membrane protein complexes by efficiently removing damaged or misassembled subunits. FtsH homologues are ubiquitous in bacteria and have also been found in mitochondria and chloroplasts. The cyanobacterium *Synechocystis* sp. PCC 6803 contains four FtsH homologues: FtsH1 (Slr1390), FtsH2 (Slr0228), FtsH3 (Slr1604) and FtsH4 (Sll1463), of which FtsH2 has been shown to be involved at an early stage in the degradation of photo-damaged D1 protein during the Photosystem II repair cycle. In order to elucidate the composition and structure of the FtsH protease complexes in *Synechocystis* sp. PCC 6803, Glutathione-*S*-transferase (GST)-tagged FtsH derivatives were generated in this cyanobacterium and isolated by affinity chromatography. Immunoblotting experiments using FtsH-specific antibodies indicated the presence *in vivo* of FtsH1/FtsH3 heterocomplexes, FtsH2/FtsH3 heterocomplexes and FtsH4 homocomplexes. Analysis of the FtsH2-GST/FtsH3 complex by negative stain electron microscopy followed by single particle analysis has revealed the 3-D structure at a resolution of 26 Å. The data support a hexameric heterocomplex composed of alternating FtsH3 and FtsH2-GST subunits.

Keywords: FtsH, PSII repair, thylakoid, D1 degradation