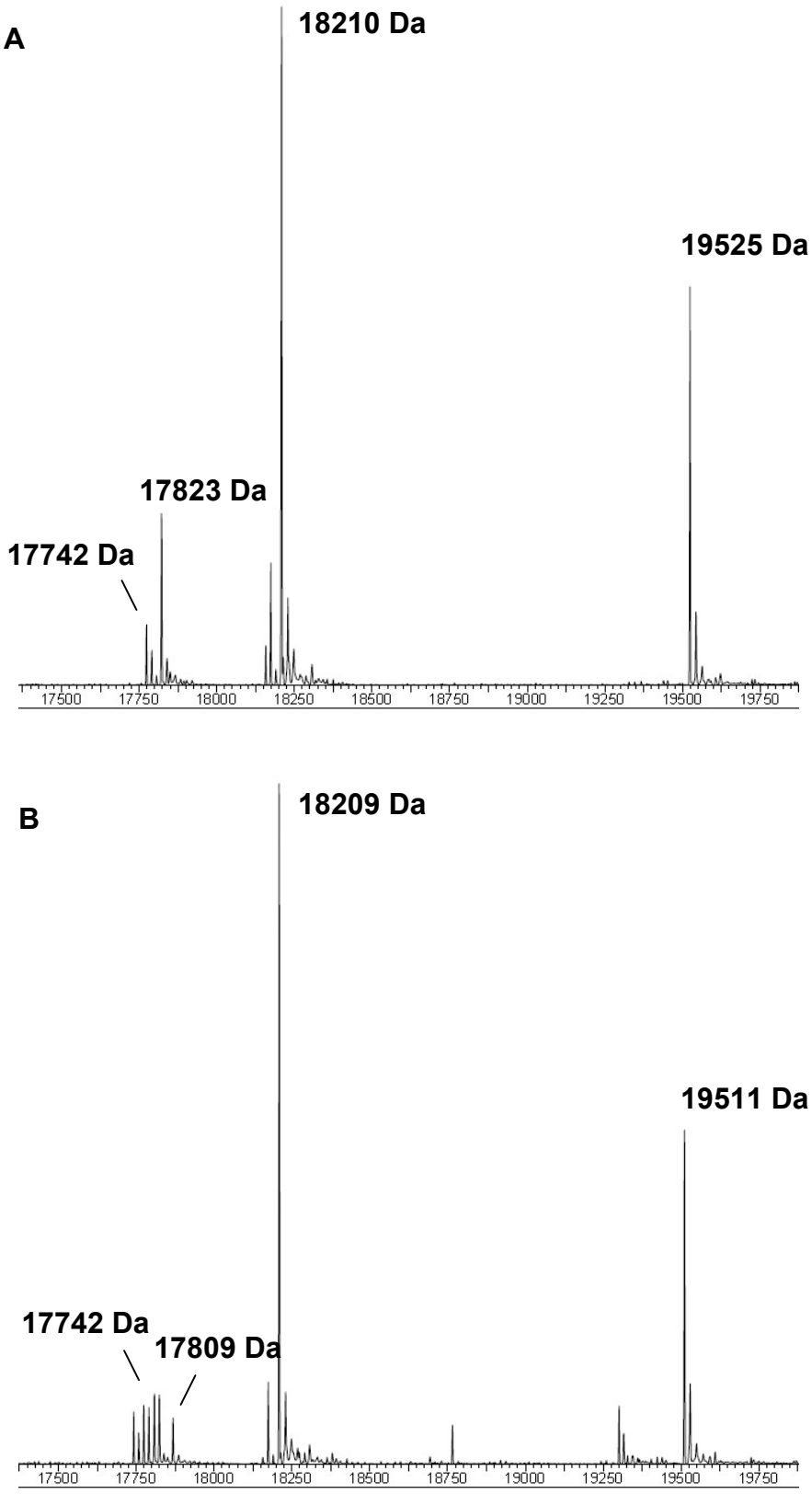
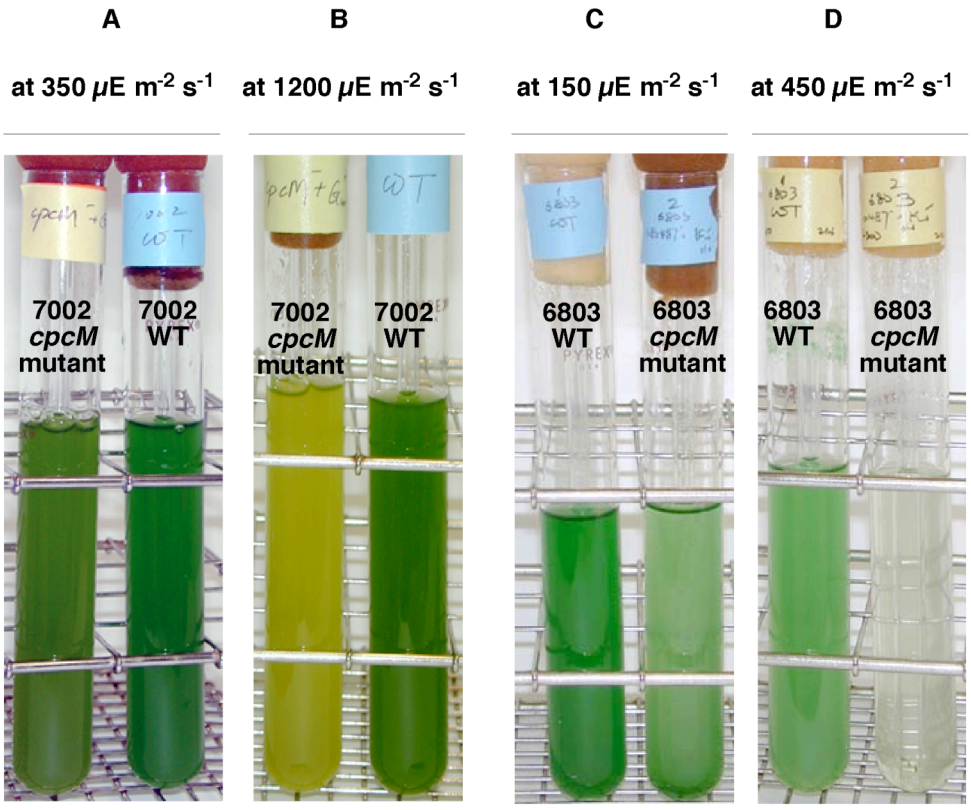
Supplemental Figure 1. HPLC-Mass spectrometric analysis of the PBP from isolated PBS of *Synechococcus* 7002 wild type (*A*) and *cpcM* mutant (*B*).

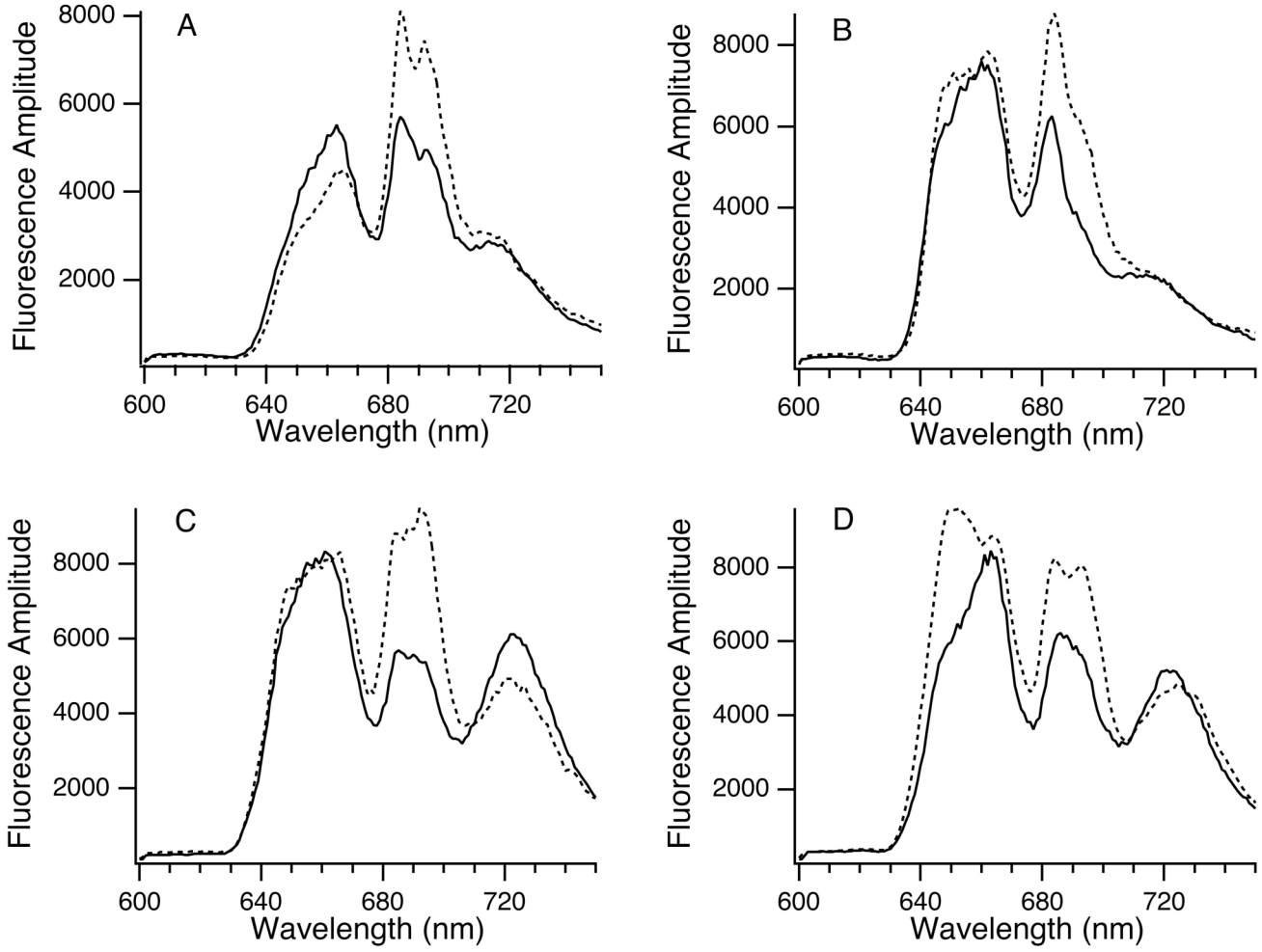


Supplemental Figure 2: Sequence comparison of the CpcB, ApcB and ApcF proteins from *Synechococcus* 7002 and *Synechocystis* 6803. The highly conserved Asn71/72 residues in CpcB, ApcB and ApcF are highlighted in red, and the Cys residues that are the sites at which phycocyanobilin is covalently bound to these proteins are indicated in blue.

Supplemental Figure 3. Liquid cultures of the wild type and *cpcM* mutants strains of *Synechococcus* 7002 and *Synechocystis* 6803 grown at different light intensities. The *Synechococcus* 7002 strains were grown photoautotrophically in A^+ medium at the indicated light intensities: (*A*) 350 µmol photons m^{-2} s^{-1} and (*B*) 1200 µmol photons m^{-2} s^{-1}. The *Synechocystis* 6803 strains were grown photoautotrophically in B-HEPES medium at 150 µmol photons m^{-2} s^{-1} (*C*) and 350 µmol photons m^{-2} s^{-1} (*D*). The *cpcM* mutant of *Synechococcus* 7002 contains much less PBP than the wild type when grown at high light intensity. The *Synechocystis* 6803 *cpcM* mutant is much more sensitive to high light intensity than the corresponding wild-type strain.



Supplemental Figure 4. Low-temperature fluorescence emission spectra of wild type and *cpcM* mutant cells. The 77K fluorescence emission spectra were measured for cells of (*A*), *Synechococcus* 7002 wild type; (*B*), *Synechococcus* 7002 *cpcM* mutant; (*C*), *Synechocystis* 6803 wild type; and (*D*), *Synechocystis* 6803 *cpcM* mutant. Cells were incubated for 5 min in blue light to produce state 1 (dashed line) or were dark-adapted for a similar period to produce state 2 (solid line). Each spectrum is the average of three independent measurements. The excitation wavelength was 590 nm, which principally excites the PBP.



Supplemental Figure 5. Crystal structure of the alpha (aqua blue) and beta (green) subunits of PC (*A*) and AP (*B*). The N-methylasparagine residue is highlighted in pink and shown in space-filling manner in the β-PC subunit and in orange-brown with only the methyl group shown in space-filling manner in β-AP. The phycocyanobilin chromophores are shown in dark blue in space-filling manner. Note that the N-methylasparagine lies immediately adjacent to the chromophore attached to the Cys82 of β-PC and Cys81 of β-AP. The PC structure is that for the red alga *Cyanidium caldarium* (56) and the AP structure is that from *Arthrospira* (*Spirulina) platensis* (4).

A: Phycocyanin

B: Allophycocyanin