A

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Arabidopsis thaliana         MET-ATLVAIFISGLLVSFTGYALYTAFGQPSQQLRDPFEEHGD 43
Oryza sativa                 MET-ATLVAISISGLLVSFTGYALYTAFGQPSQQLRDPFEEHGD 43
Zea mays                     MET-ATLVAISISGLLVSFTGYALYTAFGQPSQQLRDPFEEHGD 43
Pinus sylvestris             MET-ATLVTISISCLLVSFTGYALYTAFGQPSKQLRDPFEDHED 43
Physcomitrella patens        MET-ATLVAIFISCSLVSFTGYALYTAFGQPSKELRDPFEEHED 43
Psilotum nudum               MET-ATLIAIFISCLIVSFTGYALYTAFGQPSKELRDPFEEHED 43
Marchantia polymorpha        MET-ATFVAIFISCLLISFTGYALYTAFGQPSNELRDPFEEHED 43
Cyanophora paradoxa          MEI-STFLSIFISAALLGITGYSIYTAFGPPSKNLRDPFEEHED 43
Porphyra purpurea            MET-ATVLSIFISSLLLGITGYSIYTAFGPASKDLRDPFEEHEE 43
Thalassiosira pseudonana     MET-ATIIVIFVSSLLVGITAYSVYTAFGPASKNLRDPFEEHED 43
Chlamydomonas reinhardtii    MESPAFFFTFFLWFLLLSVTGYSVYVSFGPPSKKLRDPFEEHED 44
Synechocystis sp. PCC 6803   MES-ATVLSITFAVILIAITGLAVYTSFGPPSAELGDPFDDHED 43
Nostoc punctiforme           MEP-AIVLSISMAAVVVAITGISIYTSFGPPSKELNDPFDDHED 43
                             **  : .. : .   ::..*. ::*.:** .* .* ***::* :
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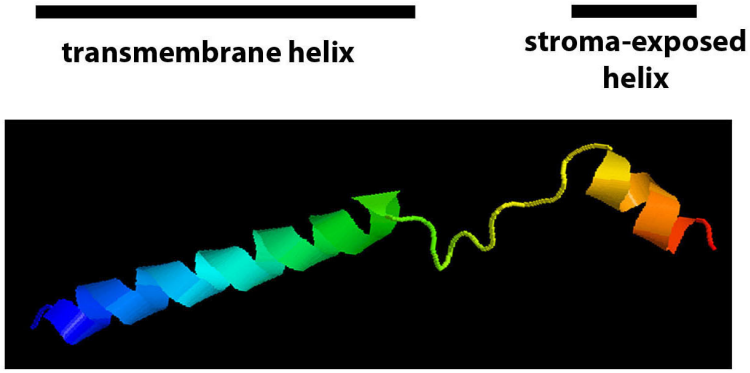
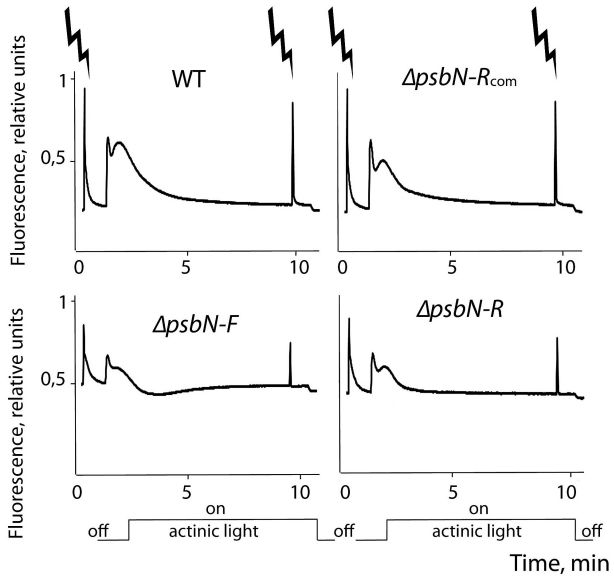
B



Supplemental Figure 1. Sequence Conservation and Structure of PsbN.

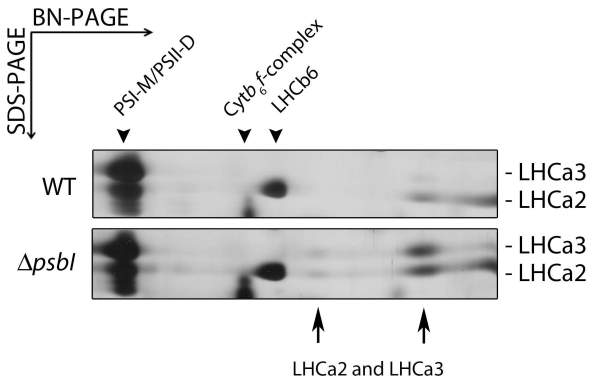
(A) Sequence Alignment of PsbN Proteins in Photosynthetic Organisms. asterisks, identical residues; two dots, conserved residues; one dot, semi-conserved residues.

(B) Predicted structure of the PsbN protein using the I-Tasser algorithm.



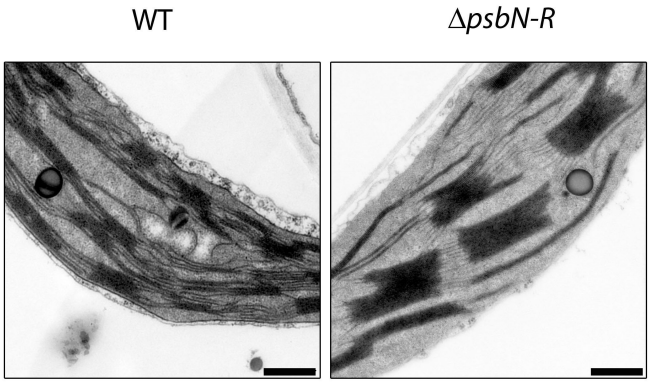
Supplemental Figure 2. Chlorophyll Fluorescence Induction Analysis of Six-Week-Old WT, Δ*psbN* Mutants, and Δ*psbN-R*$_{com}$ plants.

Flashes indicate saturating light pulses.



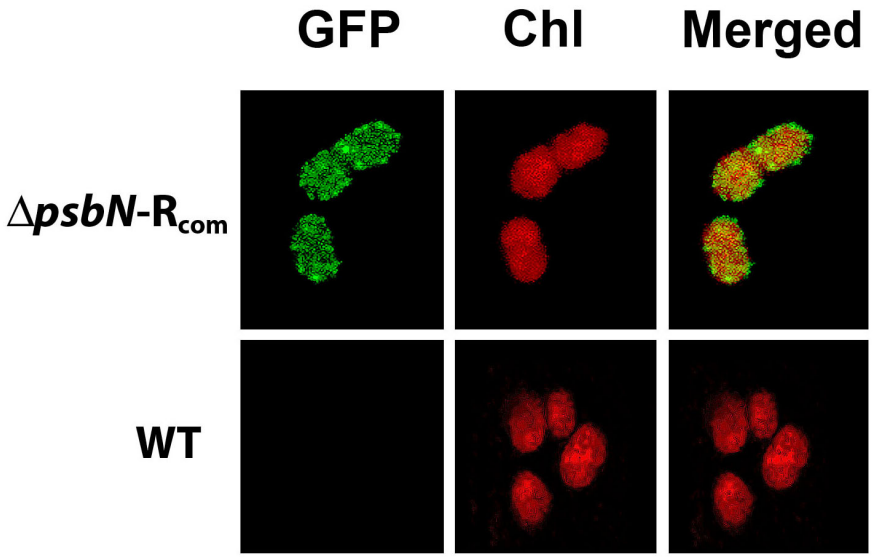
Supplemental Figure 3. Silver Staining of Thylakoid Membrane Proteins Separated by BN/SDS-PAGE in WT and Δ*psbI* Mutants.

The arrows indicate LHCa2 and LHCa3 proteins in Δ*psbI* not associated with PSI as revealed by mass spectrometrical detection.



Supplemental Figure 4. Electron Micrographs of the Chloroplast Membrane System in WT and Δ*psbN-R*.

Bar = 500 nm.



Supplemental Figure 5. Imaging of Chlorophyll Fluorescence and GFP in Leaves of WT and Complemented Δ*psbN-R*$_{com}$ Lines Using Confocal Laser Scanning Microscopy.

Supplementary Table 1. List of Oligonucleotides Used for PCR, Cloning and as Probes

Name	Sequence
HpaI-for	TATGATAAGAATGTTAACAGCAACCCTAGTCGC
psbH-rev	TCCTACCGCAGTTCGTCTTGGA
psbB-for	TTCTACGGCGGTGAACTCAACG
HpaI-rev	GCGACTAGGGTTGCTGTTAACATTCTTATCATA
psbTc-for	CACGATCGAATCTATGGAAG
psbH-rev	GACACCCATCAAAGGAGTAGTTC
aadA-for	GTTGTGCACGACGACATCATTCCGTG
PsbS-for	CACCATGGCTCAAACCATGCTGCTTACTTCAGG
PsbS-rev	AATAAAAGCTTCTTTTTGGTTTTGGGTTTGAAGAGAGCGAGAG
psbN-for	TAATTAAGCTTATGGAAACAGCAACCCTAGTCGC
psbN-rev	GTCTCCATGTTCCTCGAATGG
psbB-Probe	GCCATCGAACCGGCCCAACCAGCAACCAGAGCTGTATGCATTATATG AACAGAAAGCAACCGACCGGGATCATTCAATAC
psbN-Probe	CTAGTCTCCATGTTCCTCGAATGGATCTCTTAGTTGTTGAGAAGGTTG CCCAAAAGCGGTATATAAGGCGTACCCAGTAA
psbH-Probe	CAGGAGCTACTTTACCATATTCCGAATTCAATGGTTTTAATAAATCTC CTACCGCAGTTCGTCTTGGACCAGATCTAGAA
petB-Probe	GAGATACACACGAAATACATGCAGGATCATCATTAGGACCATCATAC TTGCCGACCATCGATGAACTGATCGGATTAACC

The recognition motif for the LR clonase reaction and the *Hind*III and *Hpa*I restrictions sites used for cloning are underlined