

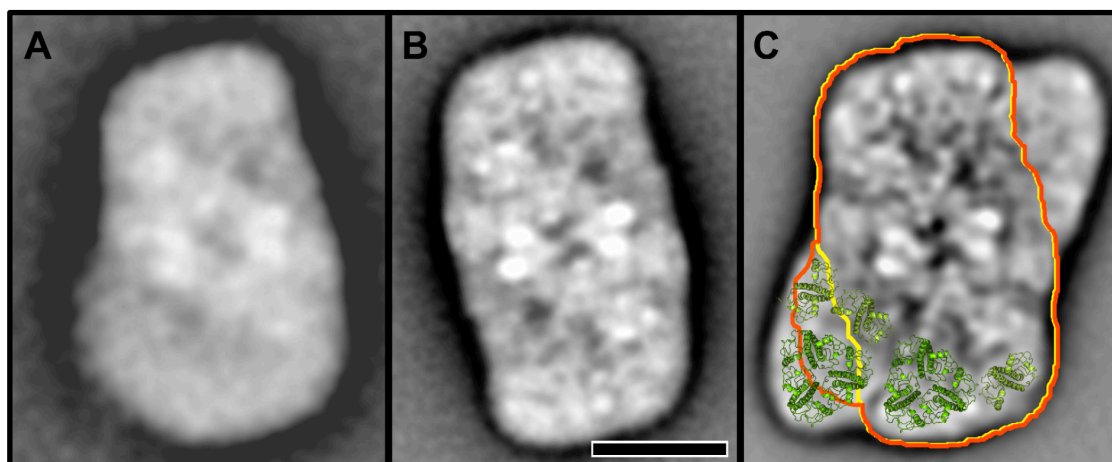
Supplemental Figure 1. PSII complex topography in *amiLhcb1* derived from single particle analysis of membrane crystals.

(A) The largest C_2S_2+ , i.e. C_2S_2 with an extra mass in one of the positions of the M trimers.

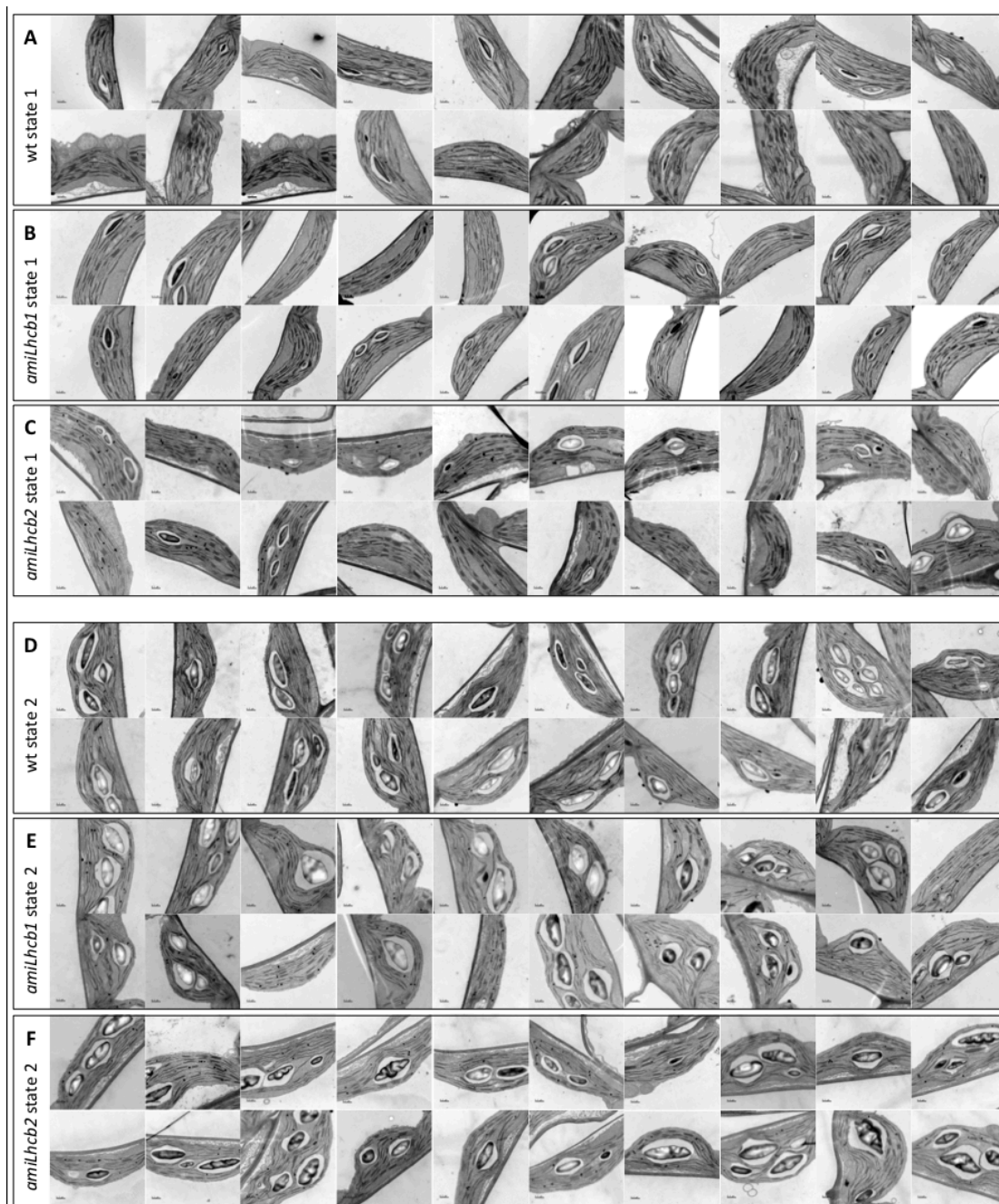
(B) The most abundant (C_2S_2) of the complexes.

(C) The spinach $C_2S_2M_2$ complex with an extra mass overlaid with the contours of the C_2S_2 complex (yellow) and C_2S_2+ (orange).

Scale bar=10 nm.

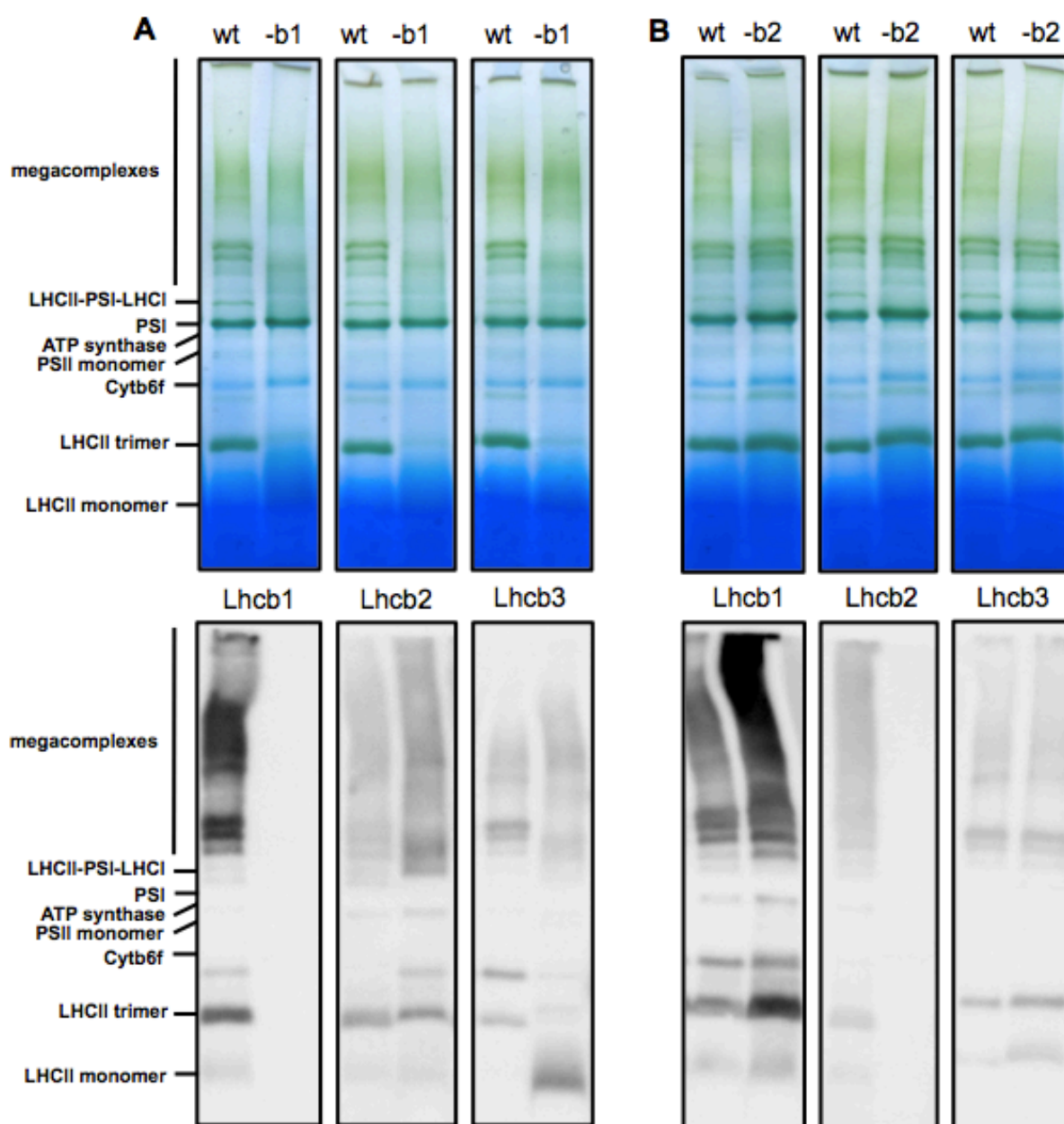


Supplemental Figure 2. Micrographs of leaf cross-section demonstrating (A-C) Thylakoid membranes of wt (A), *amiLhcb1* (B), and *amiLhcb2* (C) subjected to PSI light. (D-F) Thylakoid structure of wt (D), *amiLhcb1* (E), and *amiLhcb2* (F) in state 2.



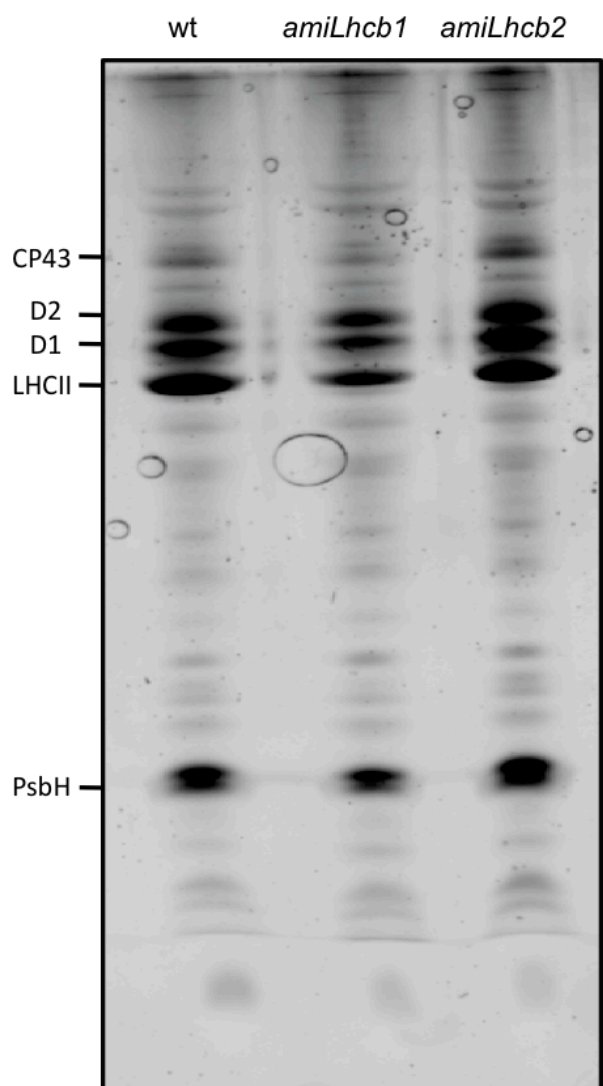
Supplemental Figure 3. BN gel electrophoresis of thylakoid complexes and their Lhcb1-3 protein content.

(A-B) Thylakoid membranes complexes composition of digitonin-solubilized wild type, *amiLhcb1* (A) and *amiLhcb2* (B) thylakoids (top) and immunoblots with Lhcb1, Lhcb2 and Lhcb3 antibodies (bottom). The identities of the pigment-protein complexes separated are shown to the left. Three replicate gels are shown in each case.



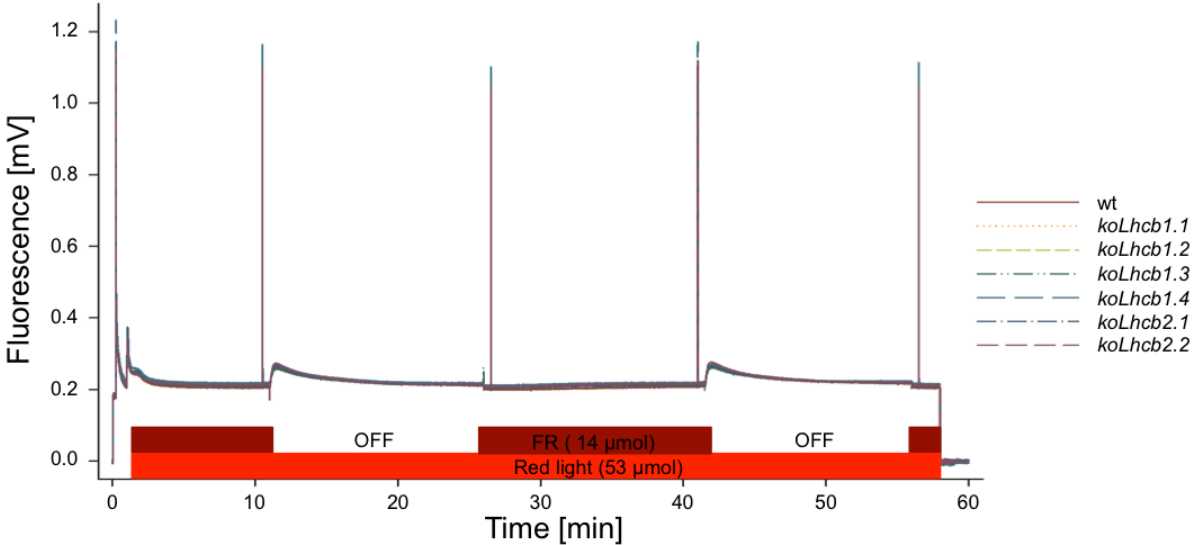
Supplemental Figure 4. Visualization of phosphorylated thylakoid proteins with ProQ Diamond staining.

Thylakoid samples were isolated from wt, *amiLhcb1*, and *amiLhcb2* grown under normal light conditions and separated by SDS-PAGE prior to staining.



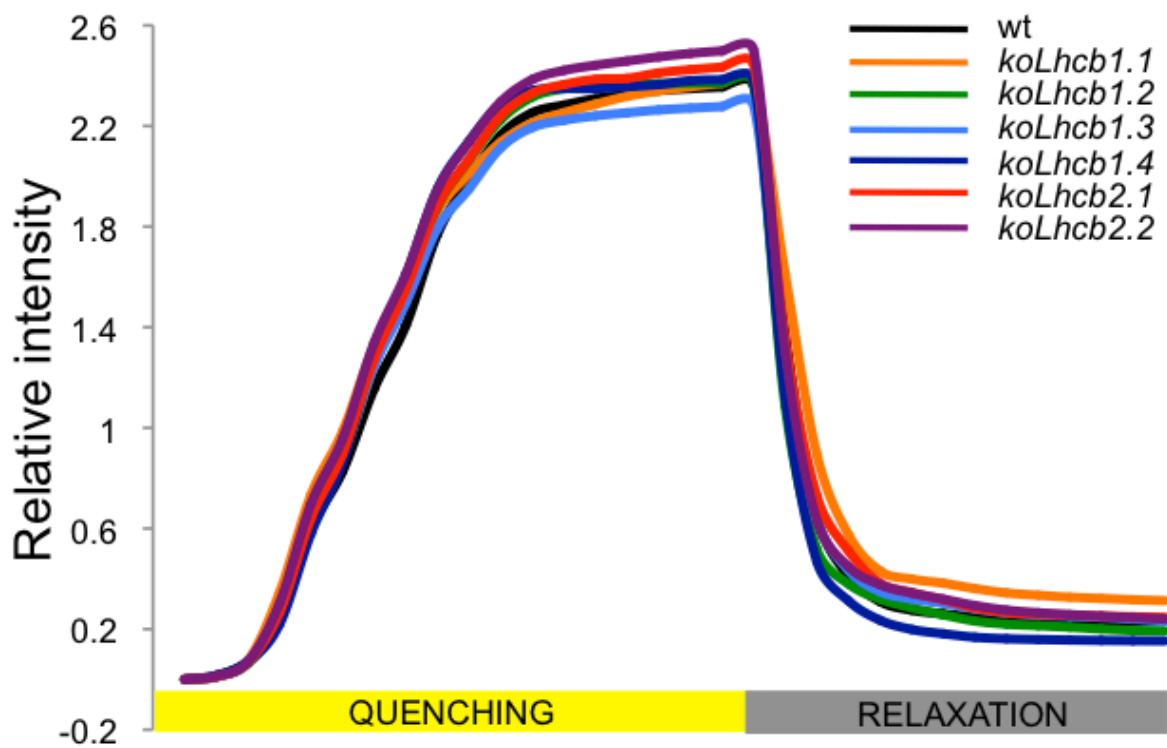
Supplemental Figure 5. Pulse-amplitude modulated fluorescence traces.

Fluorescence was recorded after shifts from state 1 to state 2 light and back for wild type (black) and individual Lhcb1 and Lhcb2 T-DNA KO lines.



Supplemental Figure 6. Non-photochemical quenching in examined lines.

Feedback de-excitation (qE type of NPQ) induction and relaxation in wild type (black) and individual Lhcb1 and Lhcb2 T-DNA KO lines.



Supplemental Figure 7. PQ reduction state (measured as F/F_m).

The reduction state was measured at different light intensities in wild type (black), *amiLhcb1* (magenta), *amiLhcb2* (blue), *stn7* (green), and *pph1/tap38* (orange). Arbitrary units are shown.

