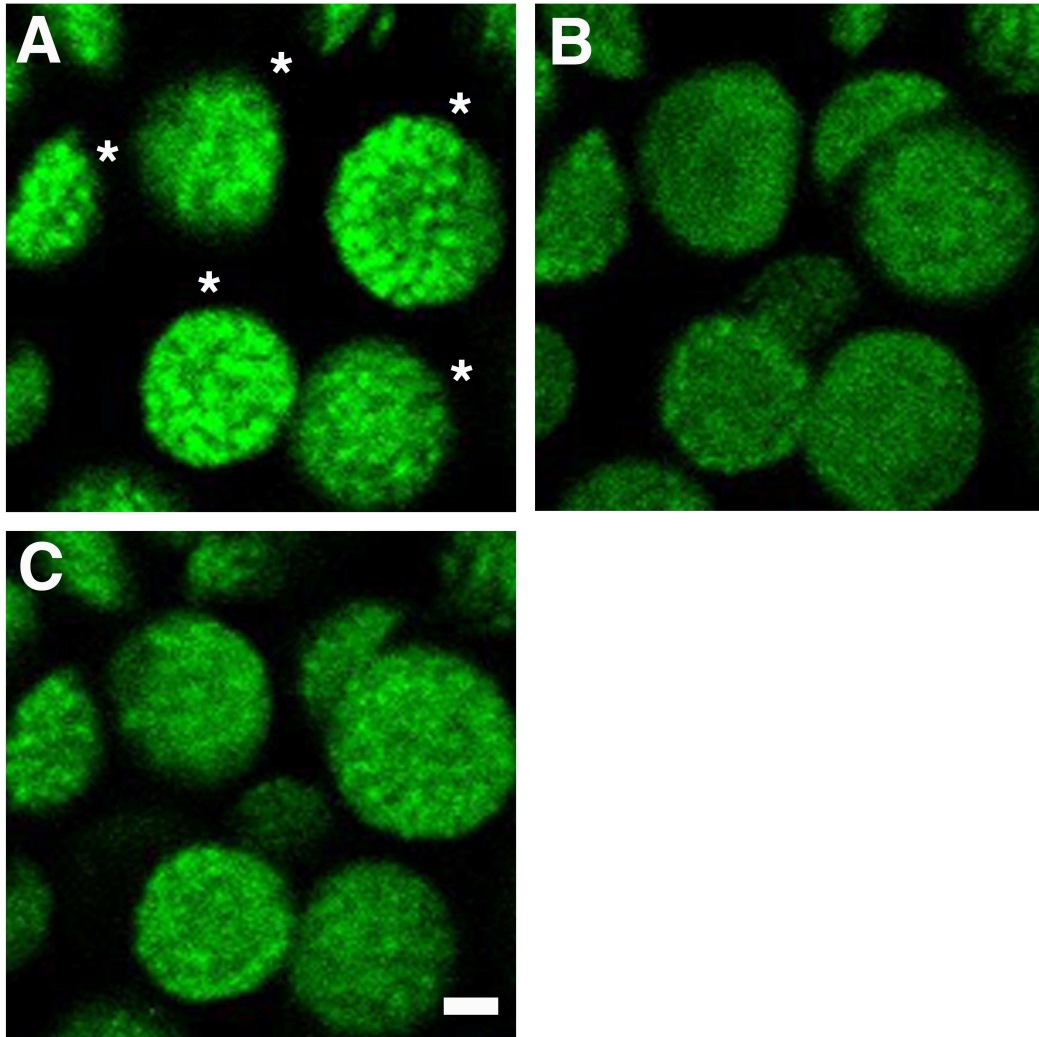
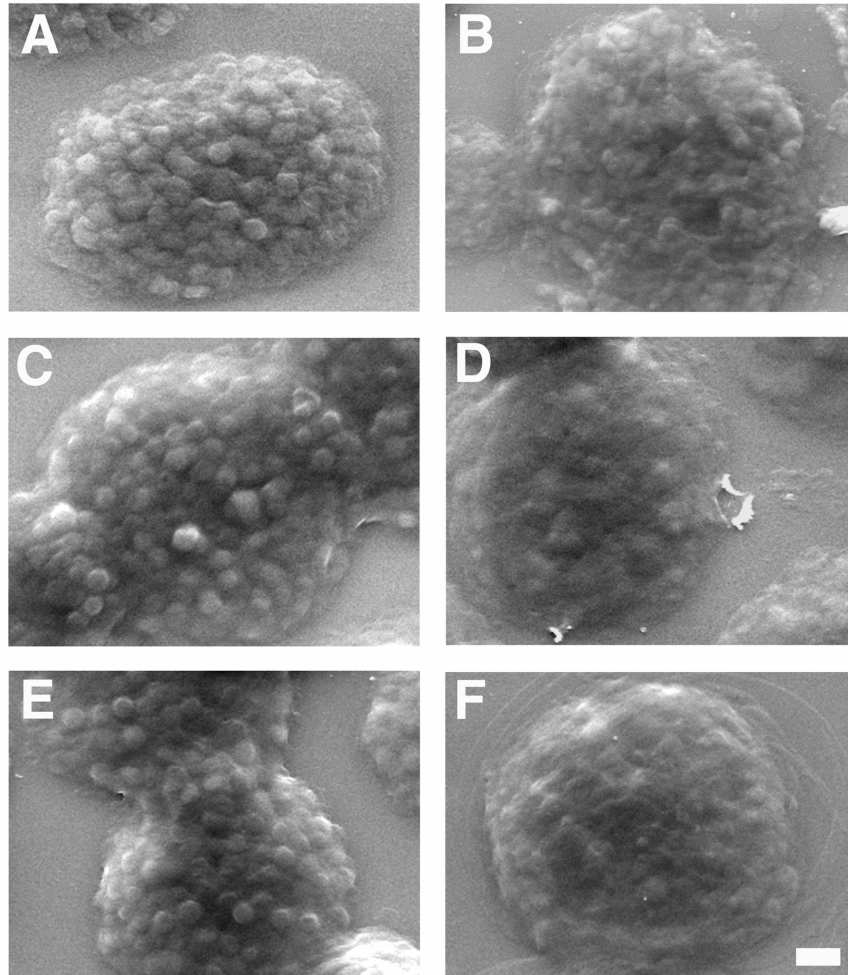


**Supplemental Figure 1. Changes in chlorophyll fluorescence during state transitions measured at room temperature.** Fluorescence was monitored using a PAM fluorometer in thylakoid samples containing 10 mM NaF with (A) or without (B) 1 mM ATP. Dark-adapted thylakoids were illuminated with  $30 \mu\text{mol photons}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  of PSII-specific light for 30 minutes to induce state II. The maximum fluorescence ( $F_m$ ) of thylakoids adapted to state I or state II was measured following a saturating flash ( $1 \text{ s}, 5000 \mu\text{mol photons}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ ) before, during (after 15 min) and at the end (30 min) of the transition. The change in  $F_m$  was calculated as  $\Delta F_m = (F_{mI} - F_{mII})/F_{mI}$ .  $\Delta F_m$  in thylakoids adapted to state II without ATP was insignificant (B).



**Supplemental Figure 2. Reversibility of the structural rearrangements during state transitions as monitored by confocal microscopy.** Time-lapse series of native hydrated dark-adapted thylakoids (A) after illumination with PSII-specific light for 30 min (B) followed by subsequent illumination with PSI-specific light for 30 min (C). Samples contained 1 mM ATP, 10  $\mu$ M ferredoxin and 0.6 mM NADP<sup>+</sup>. Scale bar: 2  $\mu$ m. Asterisks denote chloroplasts that remained in focus throughout the experiment.



**Supplemental Figure 3. SEM images of state I- and state II-adapted thylakoids re-suspended in buffers containing increasing  $Mg^{2+}$  concentrations.** Samples were prepared as described in the methods except for variations in the final re-suspension buffer (RB), which contained: 5 mM  $MgCl_2$  and 2.5 mM EDTA (**A and B**); 7.5 mM  $MgCl_2$  and 2.5 mM EDTA (**C and D**) or 8 mM  $MgCl_2$  with no EDTA (**E and F**). Under all conditions, the transition from state I (**A, C, E**) to state II (**B, D, F**) was accompanied by expansion of the thylakoid network and significant loss of granum structure. Scale bar: 1 $\mu$ m.

