Plants and their Pathogens

LS.3.P117 The "native" structure of aggregated plants' thylakoids.

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Plants' chloroplasts, the site of the photosynthetic reactions, contain continuous system of thylakoids' membranes. Within these membranes the stromal (unstacked) and granal (stacked) regions can be singled out. Varying light, temperature and abiotic stress conditions can change the stromal to granal regions ratio. In our previous study we showed that the chilling sensitive plant – bean has a smaller content of appressed regions (grana) than the chilling tolerant one, pea [1]. Recently we created a 3D model of whole pea and bean chloroplasts, based on focal sections (CLSM) of isolated, intact chloroplasts [2]. We showed that during magnesium ions induced aggregation pea chloroplasts contain large, distinctly separated, appressed domains, while the appressed regions present in bean thylakoids are less distinguished. So even during forced aggregation we saw distinct differences between species. Visualization of aggregated isolated thylakoids has never been done before.

The aim of this study is to visualize isolated, non-fixed aggregated thylakoids using freeze fracture method and topography of thylakoids by AFM liquid cell microscopy. Aggregated pea thylakoids also contain appressed regions (possibly granal) and some long, singular membranes (stromal) (Fig.1.). Since the aggregated regions are very similar to the ones contained in intact chloroplasts described previously [2], a chloroplast as a whole is probably not necessary for the membrane rearrangement process to occur. We think that such a singular membrane can be transformed into a number of appressed regions. Isolated pea and bean thylakoids retain intact chloroplasts' property of aggregating into stacked regions of different sizes.

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Figure 1. Aggregated pea thylakoids; the green bar is 2 μm long.



Figure 2. Aggregated pea thylakoids; the green bar is 1 μm long.