Cellulose Synthase Complexes Act in a Concerted Fashion to Synthesize Highly Aggregated Cellulose in Secondary Cell Walls of Plants

Significance
We show that cellulose synthase complexes (CSCs) exhibit different patterns of movement in the plasma membrane (PM) during synthesis of primary and secondary cell walls (PCWs, SCWs), contributing to distinctive organizations of these two types of cell walls.

Scientific Results
During PCW synthesis, CSCs move bidirectionally, whereas during SCWs synthesis, densely arranged groups of CSCs move coherently to synthesize highly aggregated microfibrils.

Research Details
- We introduced fluorescent cellulose synthases (GFP-CESA3, GFP-CESA7) into an Arabidopsis line containing an inducible transcription factor that causes epidermal cells to transdifferentiate into xylem cells that form SCWs.
- With spinning disk confocal microscopy we monitored CSC movements before and after induction of SCW formation.