The ability to label different subcellular locations with the green fluorescent protein (GFP) has made it possible to visualize intracellular activities in living cells. We have introduced chimeric genes which express GFP in a variety of organelles within the plant cell in order to study the dynamics of cell organization. Labeling plastids with GFP led to the rediscovery of tubules emanating from plastids. Now termed stromules, for stroma-filled tubules, the function and mechanism of formation of these unexpected structures remains a topic for study.

We have investigated whether myosins are involved in movement of stromules, plastids, mitochondria, peroxisomes, and other subcellular structures. Plant genomes encode the myosin
XI family of myosin proteins. We have placed fluorescent labels on portions of the tail regions of Arabidopsis myosin XIs in order to determine whether they localize, and therefore what role a particular myosin may play in movement of different types of organelles. (5-7)

Chloroplasts accumulate at the top of leaf cells, which can improve acquisition of light energy. In the presence of strong light, chloroplasts move to the side of the cells, possibly resulting in protection from photodamage. The actin cytoskeleton mediates these responses, but the signal transduction pathway leading to chloroplast movement and the mechanism of chloroplast motility is not entirely understood. We are exploring the effect that chloroplast movement has on photosynthesis and the role of the cytoskeleton and signaling proteins in chloroplast positioning.

![Diagram of accumulation and avoidance responses](image)


