

## **T17: Dynamics of actin filaments and microtubules in *Physcomitrella patens***

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In eukaryotes, actin filaments and microtubules play a crucial role in their development and morphogenesis, being involved in various types of cellular processes such as establishment of cell polarity, cell division, cell elongation, and intracellular organelle movement. Gametophyte cells of the moss *Physcomitrella patens* provide excellent model systems to study the role of cytoskeleton during these processes because molecular genetic approach is available in addition to their simple structure. We have focused on intracellular chloroplast movement that has long been thought to be governed only by actin filaments but we demonstrated that chloroplasts can move along both actin filaments and microtubules in the moss (Sato *et al.*, 2001). We investigated the dynamics of actin filaments and microtubules during the chloroplast relocation movement in living cells using GFP-based reporter constructs, GFP-mouse talin for actin filaments and GFP-*P. patens* alpha-tubulin for microtubules. We also developed a change-over microscope between fluorescence observation and microbeam irradiation (CFM) to capture the dynamic changes of the cytoskeleton at high time resolution during chloroplast photo-movement. CFM study of cells with GFP-talin expression revealed that actin meshwork emerged at the irradiated area under weak light conditions, while the meshwork translocated on the side of the irradiated area under strong light conditions. We will discuss the role of the characteristic actin organization on the regulation of chloroplast distribution. In interphase cells of GFP-tubulin transformed plants, two principal mechanisms of microtubule dynamics, dynamic instability and treadmilling, were observed. Further, we will also show the organization change of cytoskeleton in another processes such as tip-growth and cell division.

Sato, Y., Wada, M., Kadota, A. 2001. *Journal of Cell. Science* 114: 269 - 279