

FtsZ proteins in *Physcomitrella*: more than just chloroplast division

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Plastids as well as bacteria divide by binary fission. In bacteria, the division process is mediated by the action of the FtsZ (filamentous temperature sensitive Z) protein which forms a contractile ring at the future division site.

Plants have acquired plastids through an endosymbiotic event. An *ftsZ* gene from an engulfed cyanobacterium was transferred to the host nucleus, was duplicated and equipped with sequences coding for chloroplast-targeting signals. In plants, FtsZ proteins group into two families (FtsZ1 and 2) and function in plastid division.

In order to analyze the subcellular localization of FtsZ proteins in *Physcomitrella patens* we employed *ftsZ:gfp* fusions which revealed plastidic localization for FtsZ 1-1, 2-1, and 2-2 whereas FtsZ1-2 undergoes dual targeting and is found in plastids and the cytosol [1, 2]. As shown previously, the targeted knockout of *ftsZ2-1* gave rise to plants with macrochloroplasts underlining the protein's involvement in organelle division [3].

To further elucidate the individual functions of FtsZ proteins in *Physcomitrella* knockouts of *ftsZ1-1*, 1-2, and 2-2 were generated. Compared to wild type, knockout plants of *ftsZ1-1* and 2-2 reveal only mild phenotypic aberrations. In contrast, loss of *ftsZ1-2* leads to severe alterations in plant morphology and development. Compared to wild type, Δ *ftsZ1-2* lines grow slower and exhibit shorter gametophores. Chloroplast shape and size in leaflet, chloronema and caulonema cells are highly irregular. Protonema cell dimensions and leaflet cell patterning are altered as well. We therefore conclude that in *Physcomitrella* FtsZ1-2 is involved not only in plastid division but also plays an important role in shaping cells and chloroplasts.

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[1] Kiessling, J., Kruse, S., Rensing, S.A., Harter, K., Decker, E.L., Reski, R. (2000) *J Cell Biol.* 151: 945-950

[2] Kiessling, J., Martin A., Gremillon, L., Rensing, S.A., Nick, P., Sarnighausen, E., Reski, R. (2004) *EMBO R.* 5: 889-894

[3] Strepp, R., Scholz, S., Kruse, S., Speth, V., Reski, R. (1998) *PNAS* 95 : 4368-4373