How does MOR1 regulate microtubule-dynamics in Arabidopsis?

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Abstract:

All eukaryotic cells depend on dynamic arrays of protein filaments called microtubules for intracellular transport, cell shape and division. Rapid rearrangement of MTs requires the activity of microtubule-associated proteins of the XMAP215/Dis2 family, a highly conserved class of proteins. These proteins promote both MT growth and shrinkage and move processively with the MT ends, thus enabling catalysis of multiple reactions. Like other XMAP215/Dis2 members, the plant homologue MOR1 is predicted to form a long linear molecule with multiple N-terminal TOG domains. Mutant alleles of MOR1 identified in forward genetics screens that cause temperature-dependent loss of MT dynamics, consistently substitute conserved amino acids in only the first TOG domain, suggesting that this N-terminal domain is crucial for polymerase activity. We therefore test the hypothesis that the first TOG domain plays a crucial role in recruitment of free tubulin dimers to the growing plus end of MTs. We utilize the higher plant model system *Arabidopsis thaliana* to elucidate the molecular mechanisms that enable XMAP215/Dis2 family proteins to work as processive polymerases.

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