

SAC phosphoinositide phosphatases at the tonoplast mediate vacuolar function in *Arabidopsis*

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Phosphatidylinositol (PtdIns) is a structural phospholipid that can be phosphorylated into various lipid signaling molecules, designated polyphosphoinositides (PPIs). The reversible phosphorylation of PPIs on the 3, 4, or 5 position of inositol is performed by a set of organelle-specific kinases and phosphatases, and the characteristic head groups make these molecules ideal for regulating biological processes in time and space. In yeast and mammals, PtdIns3P and PtdIns(3,5)P₂ play crucial roles in trafficking toward the lytic compartments, whereas the role in plants is not yet fully understood. Here we identified the role of a land plant-specific subgroup of PPI phosphatases, the suppressor of actin 2 (SAC2) to SAC5, during vacuolar trafficking and morphogenesis in *Arabidopsis thaliana*. SAC2-SAC5 localize to the tonoplast along with PtdIns3P, the presumable product of their

activity. In SAC gain- and loss-of-function mutants, the levels of PtdIns monophosphates and bisphosphates were c