

## Organelle Biogenesis and Function in Plants

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Membrane trafficking and organelle biogenesis play important roles in regulating plant growth and development, as well as responses to external signals. The plant endomembrane system contains several functionally distinct membrane-enclosed organelles, including the endoplasmic reticulum (ER), Golgi apparatus, trans-Golgi network (TGN) or early endosomes (EE), prevacuolar compartment (PVC) or multivesicular body (MVB) and vacuole. The endosomal sorting complex required for transport (ESCRT) machinery mediates the formation of intraluminal vesicles (ILVs) in MVBs as well as the sorting of the ubiquitinated cargoes into the internal vesicles (ILVs) in eukaryotes. Since 2014, we have characterized a plant unique ESCRT component termed FYVE domain protein required for endosomal sorting 1 (FREE1) and demonstrated that FREE1 plays multiple functions with distinct underlying mechanisms in plants, including regulation of MVB and vacuole biogenesis (Current Biology 2014), crosstalk of the endomembrane system with the autophagic pathway (PNAS 2015), Abscisic Acid (ABA) signaling (Nature Plants 2019; 2021), degradation of lipid droplets (LDs) in germinating seedlings (Plant Cell 2022), and autophagosome closure under stress condition (Nature Communications 2023). We have also identified and characterized several *Arabidopsis* *sof* (suppressor of *free1*) as novel regulators of the MVB pathway (Nature Communications 2018; Plant Cell 2019; Plant Cell 2023-R1). Here I will summarize our major findings and present an update on our research progress of the multi-functions of FREE1 in regulating organelle biogenesis and function as well as a brief update on organelle membrane contacts during autophagy and ER-Phagy conditions (Autophagy 2022, PNAS 2022, 2023) in *Arabidopsis*. Supported by Research Grants Council of Hong Kong and CUHK.