



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

Cell-Cell Communication during Plant Development

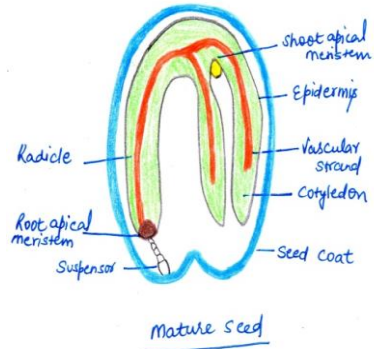
Dr. Shri Ram Yadav

Department of Biotechnology

Indian Institute of Technology, Roorkee



Plant Life Cycle



Post-embryogenesis

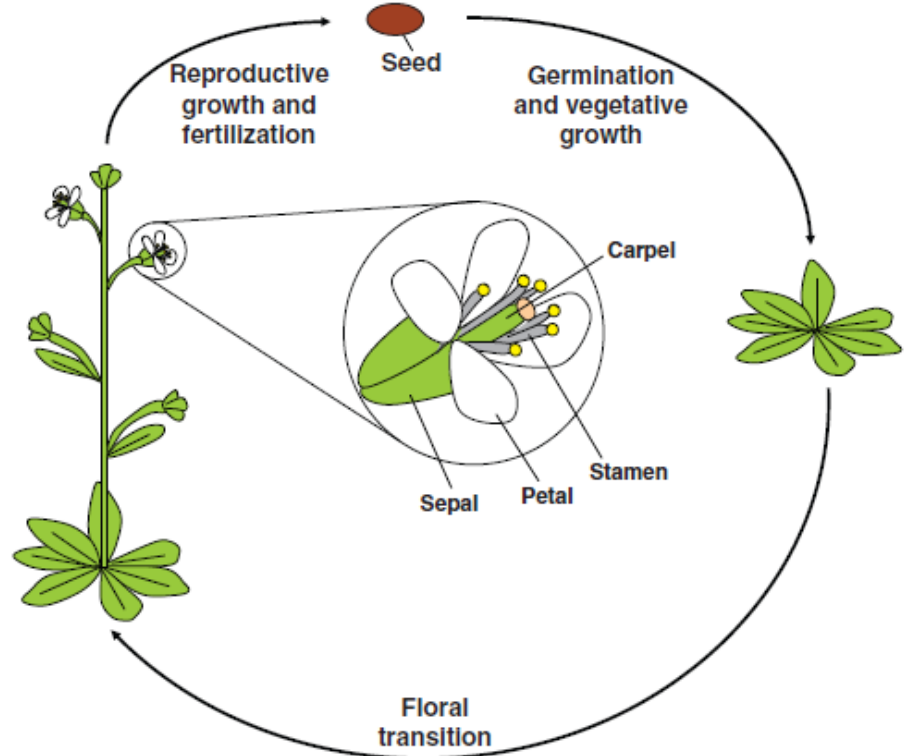
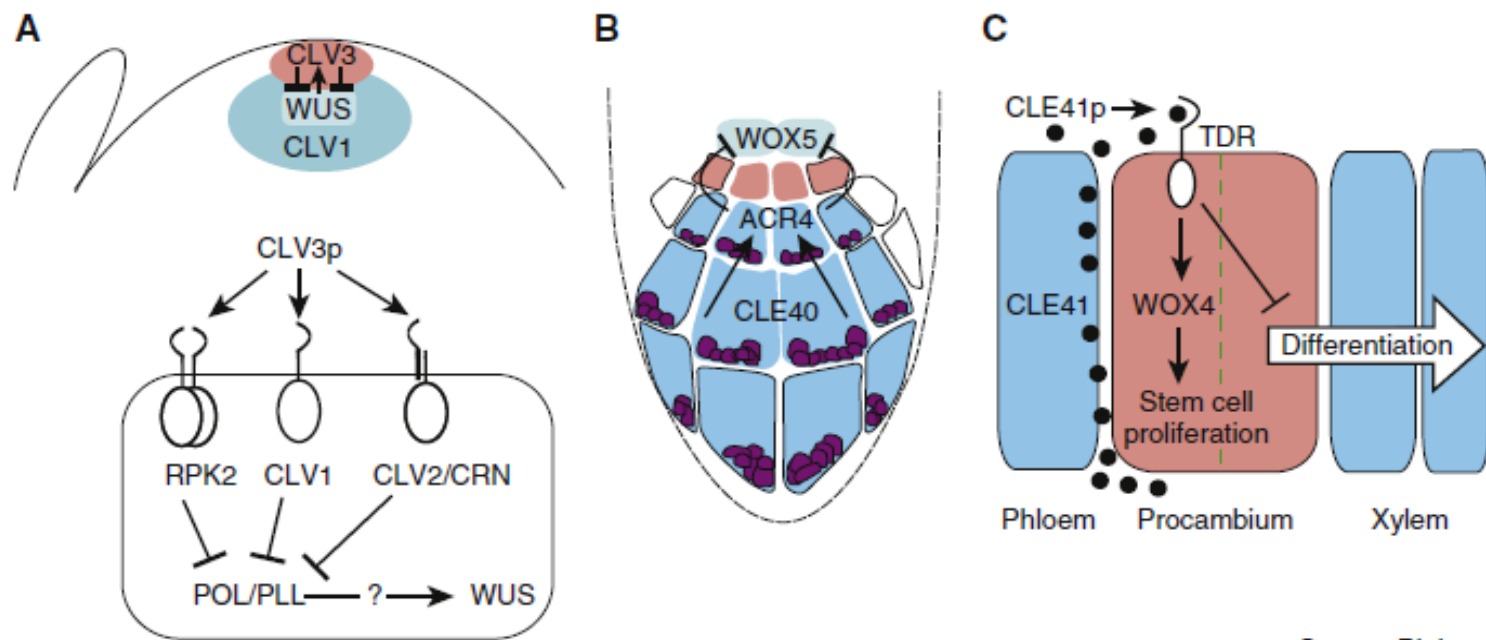


Image Source: Liu et al. (2009), Development ,136, 3379-91.

Peptide Signaling in Plant Development

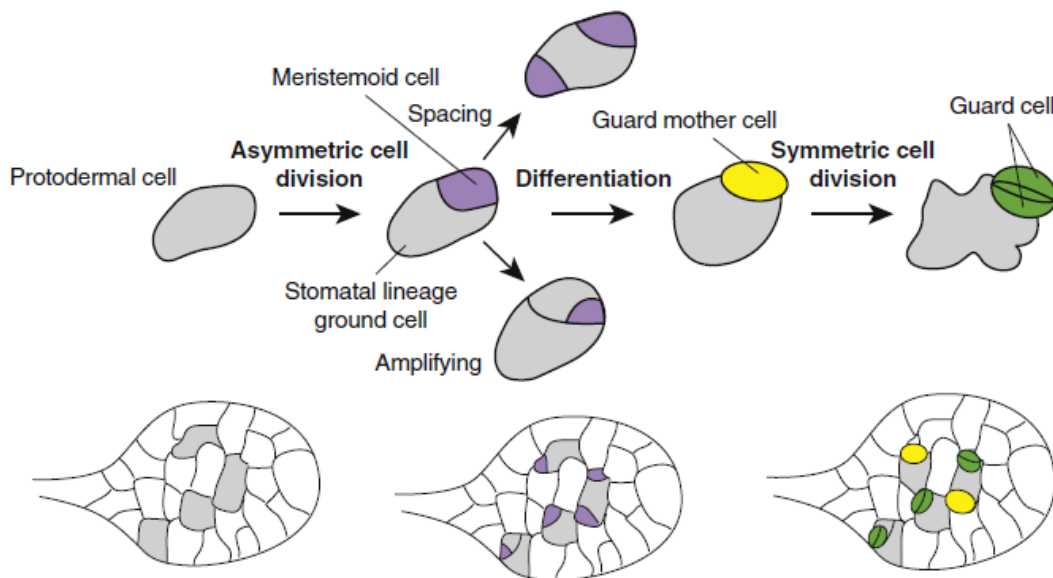


Current Biology

Image Source: Katsir et al. (2011), Current Biology 21, R356–R364.

Peptide Signaling in Plant Development

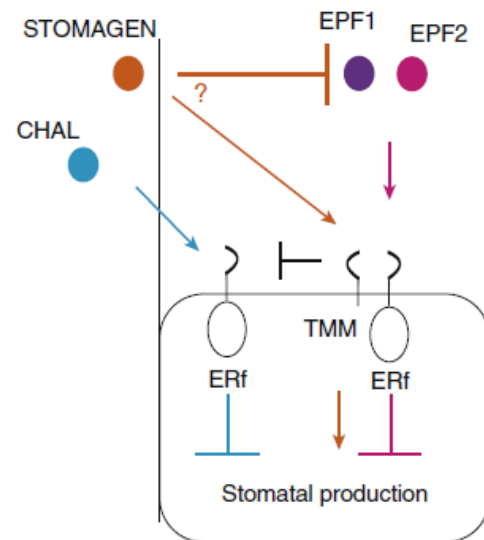
A



B

Non-stomatal lineage:

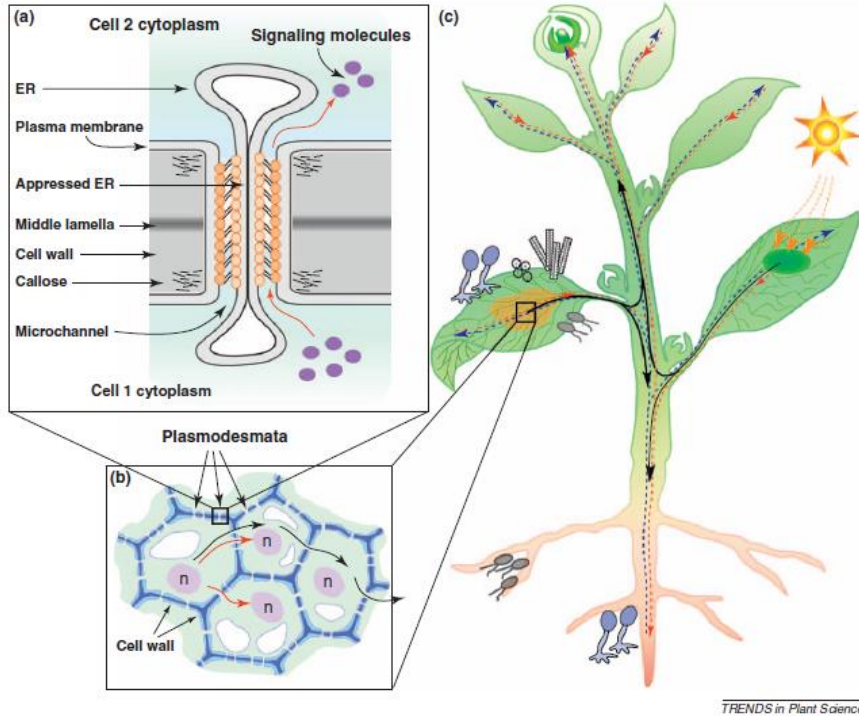
Stomatal lineage:



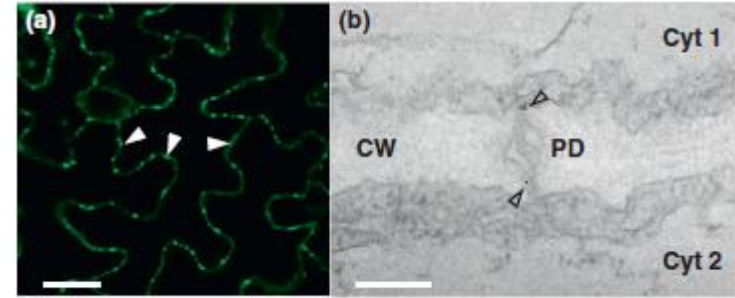
Current Biology

Image Source: Katsir et al. (2011), Current Biology 21, R356–R364.

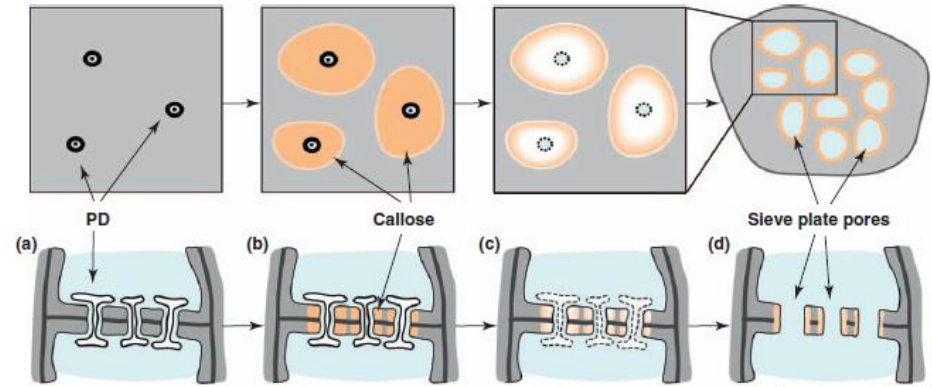
Symplastic Cell-Cell Communication



TRENDS in Plant Science



TRENDS in Plant Science



TRENDS in Plant Science

Image Source: Lee & Lu (2011), Trends Plant Sci., 16, 201-10.

Symplastic Cell-Cell Communication

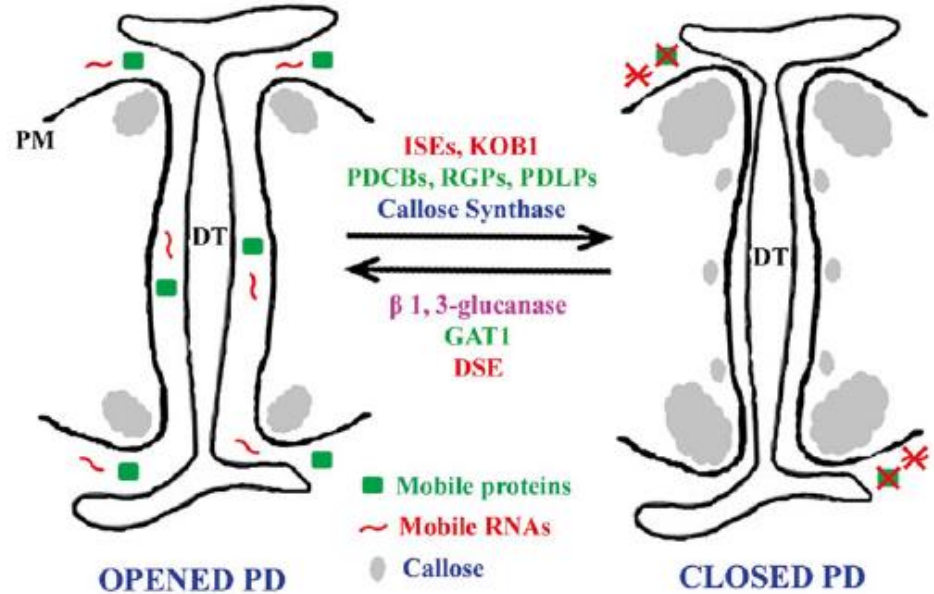
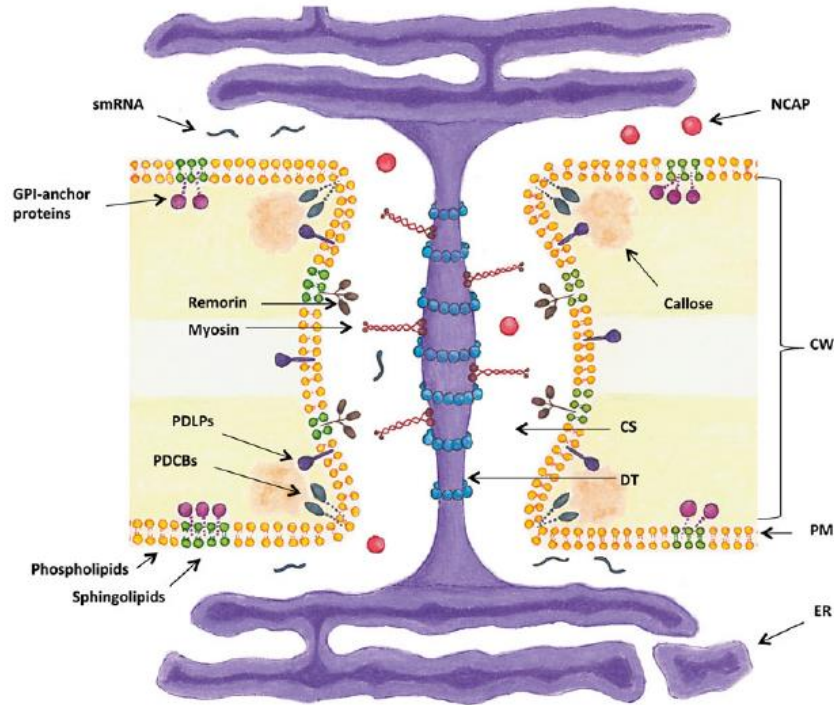
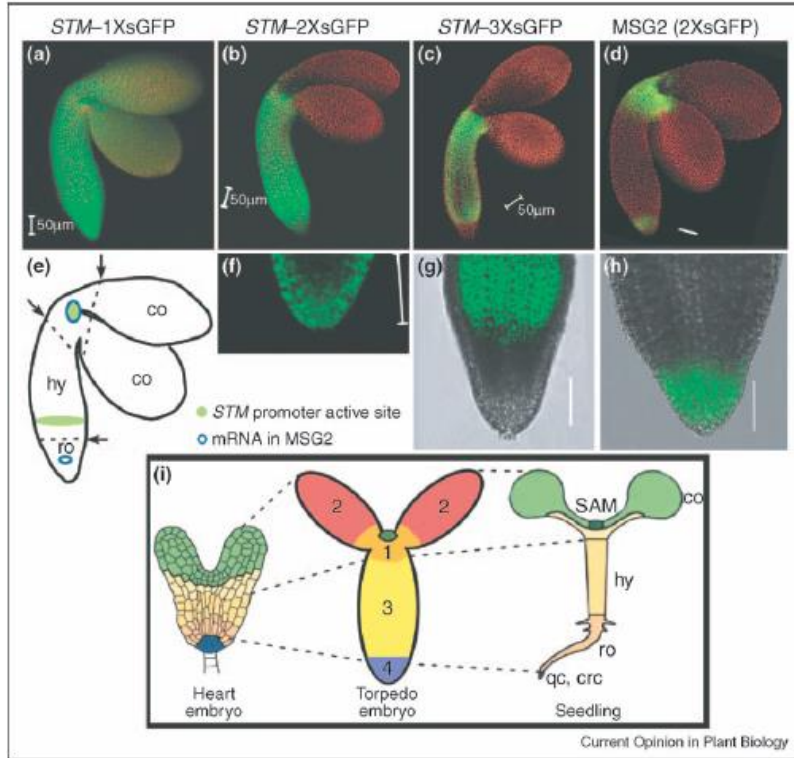


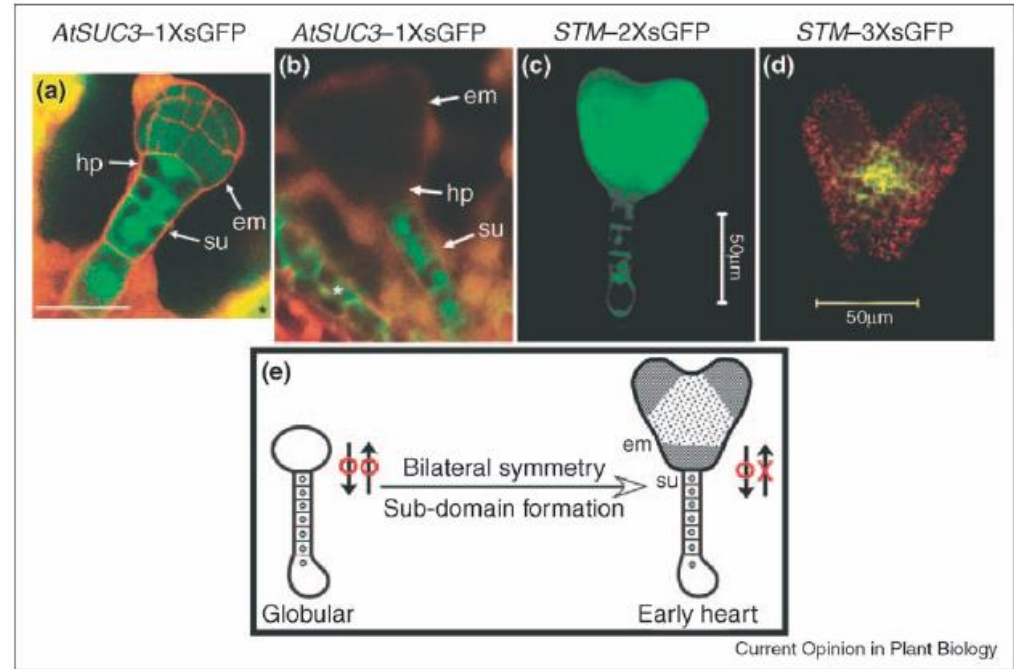
Image Source: Seville et al. (2015), Methods Mol Biol., 1217, 3-24.

Cell-to-cell communication via plasmodesmata during *Arabidopsis* embryogenesis



Current Opinion in Plant Biology

suspensor cells by the *AtSUC3* promoter



Current Opinion in Plant Biology

Image Source: Kim & Zambryski (2005), Curr Opin Plant Biol. 8, 593-9.

Symplastic Cell-Cell Communication at Root

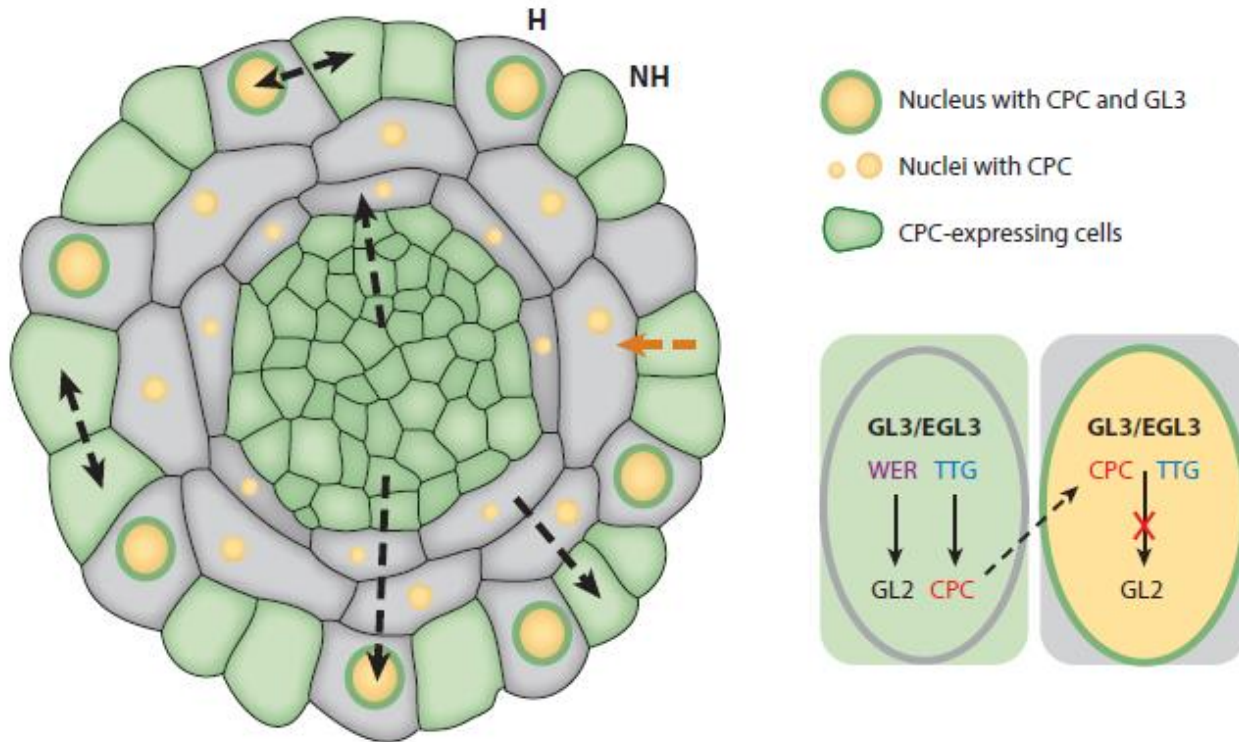


Image Source: Gallagher et al. (2014), *Annu. Rev. Cell Dev. Biol.* 30, 207–33.

Symplastic Cell-Cell Communication at Root

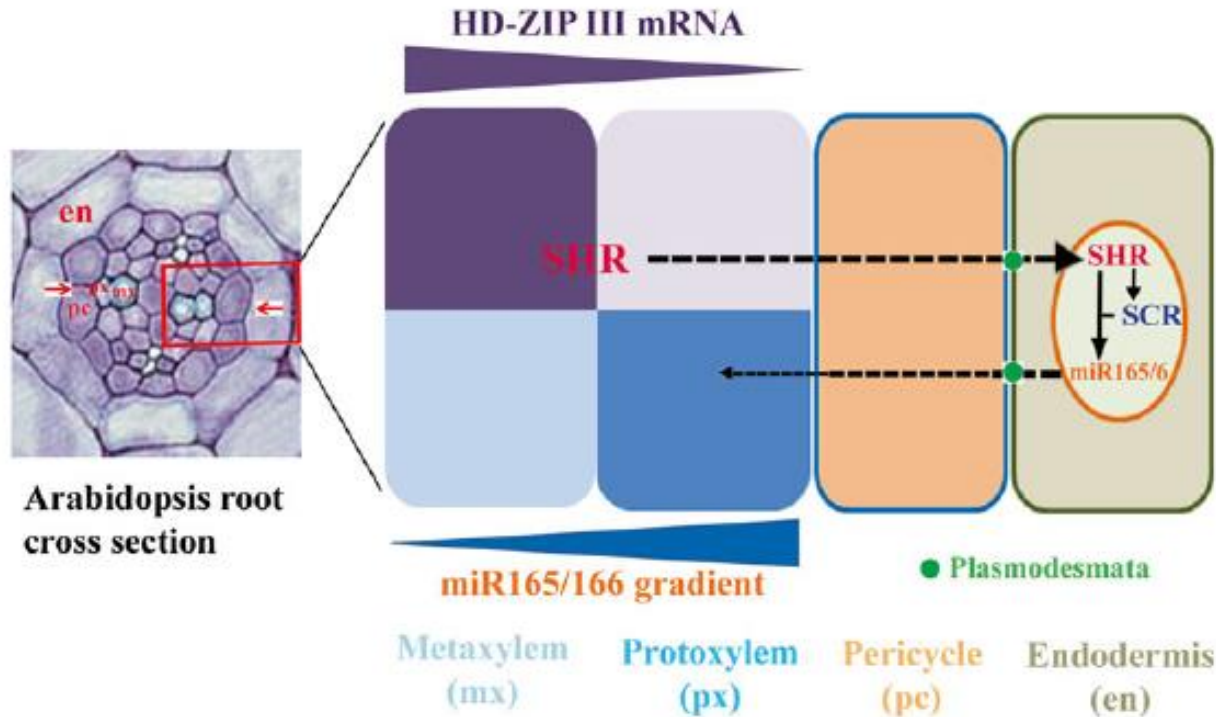


Image Source: Sevilem et al. (2015), Methods Mol Biol., 1217, 3-24.

Callose Biosynthesis Regulates Symplastic Trafficking during Root Development

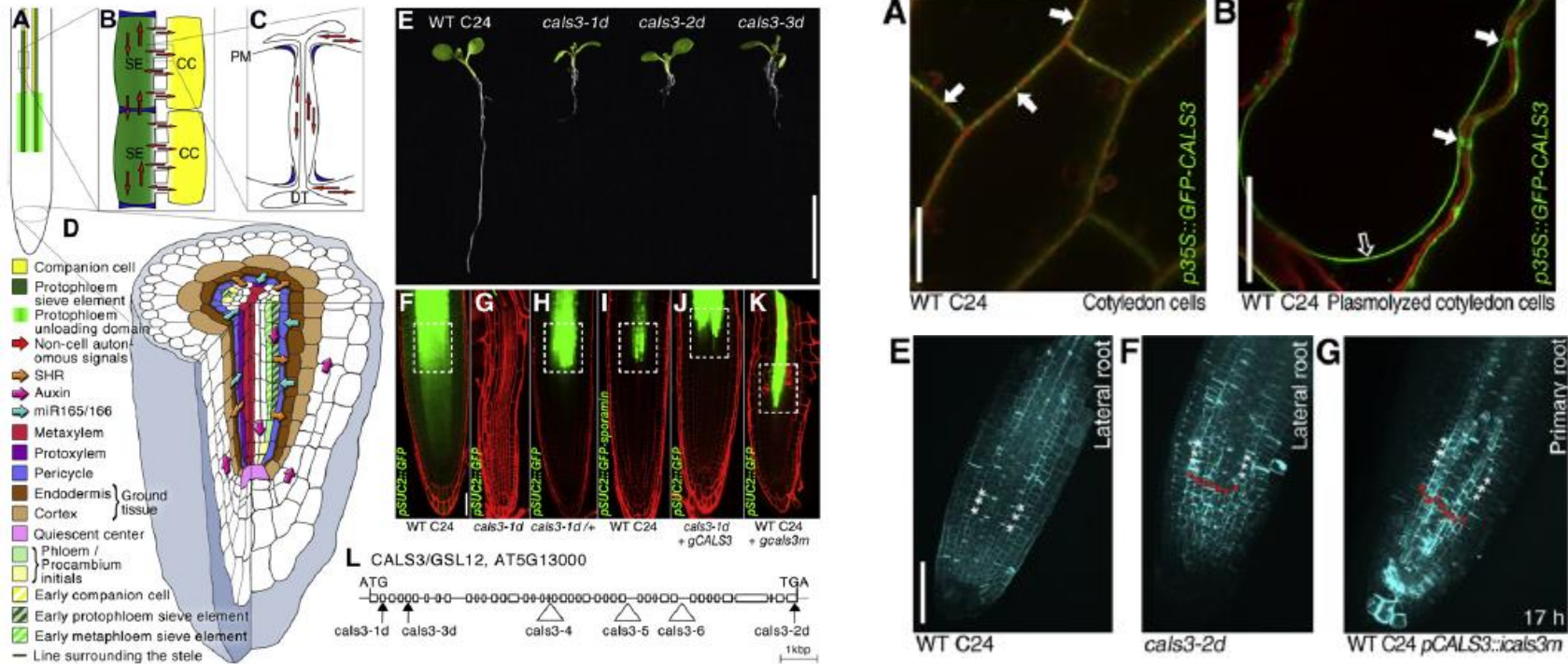
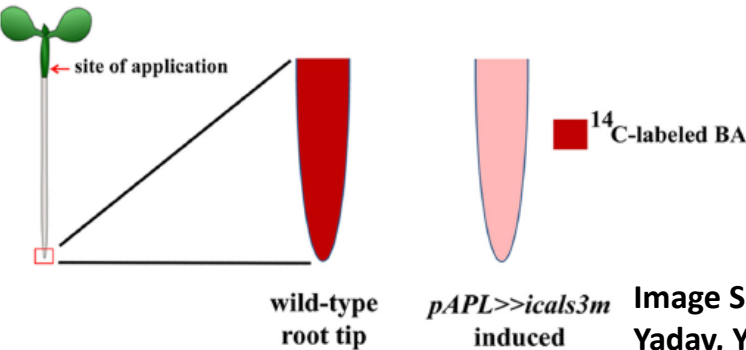
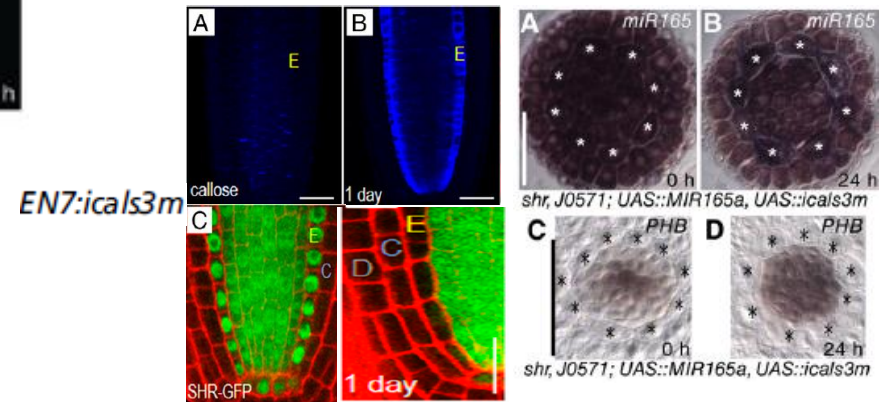
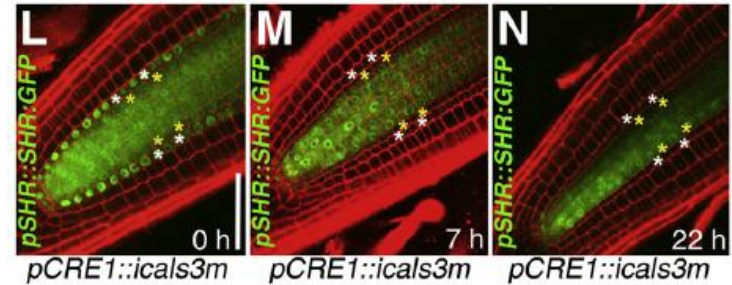
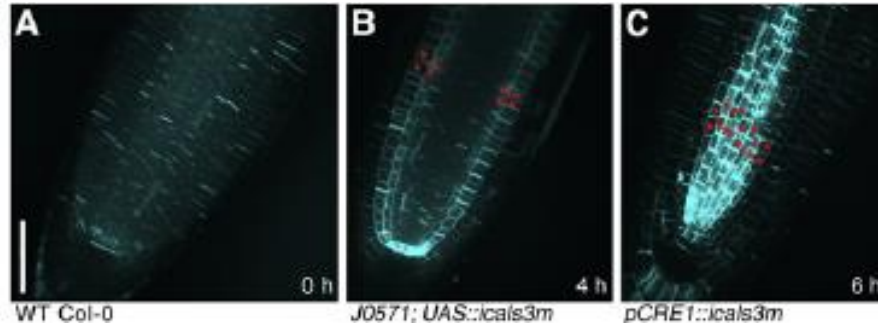
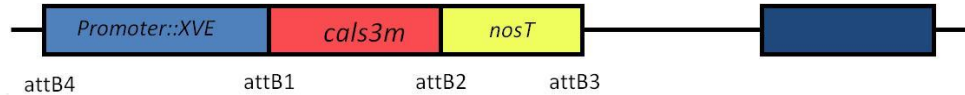


Image Source: Vaten et al. (2011), Developmental Cell 21, 1144–55.

Callose Biosynthesis Regulates Symplastic Trafficking during Root Development

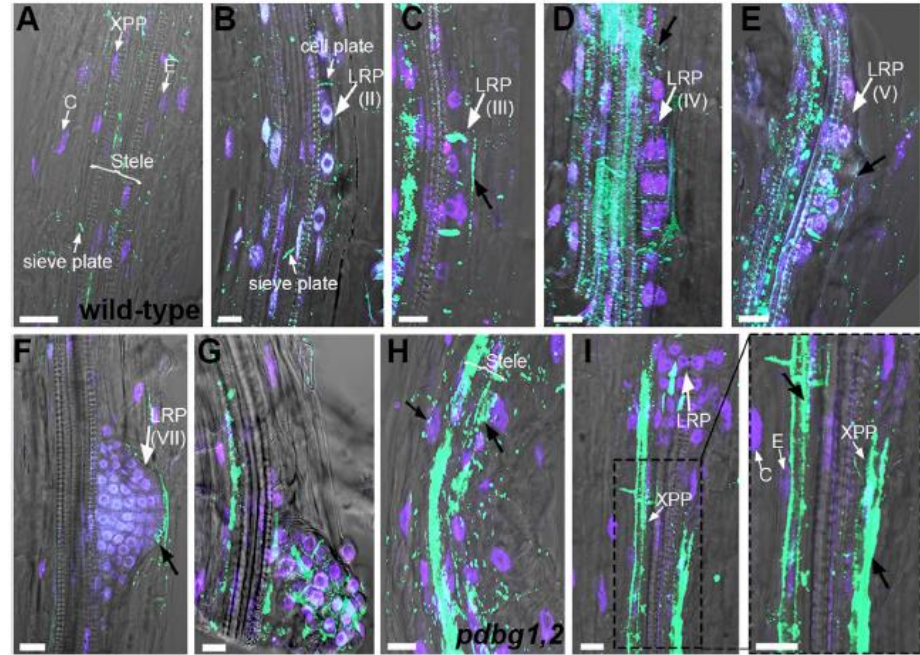
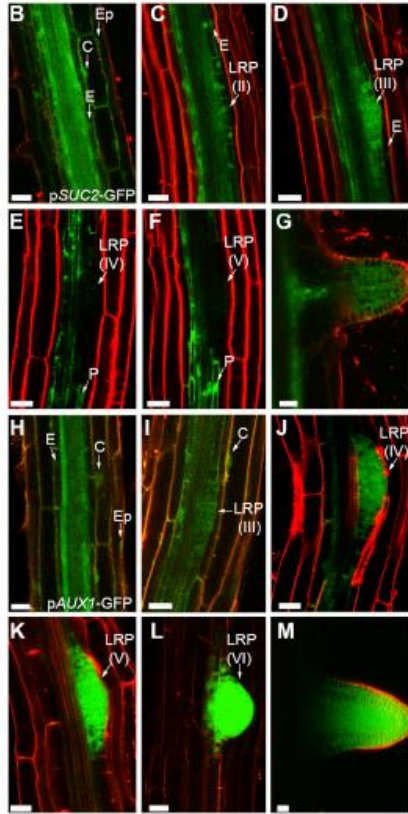
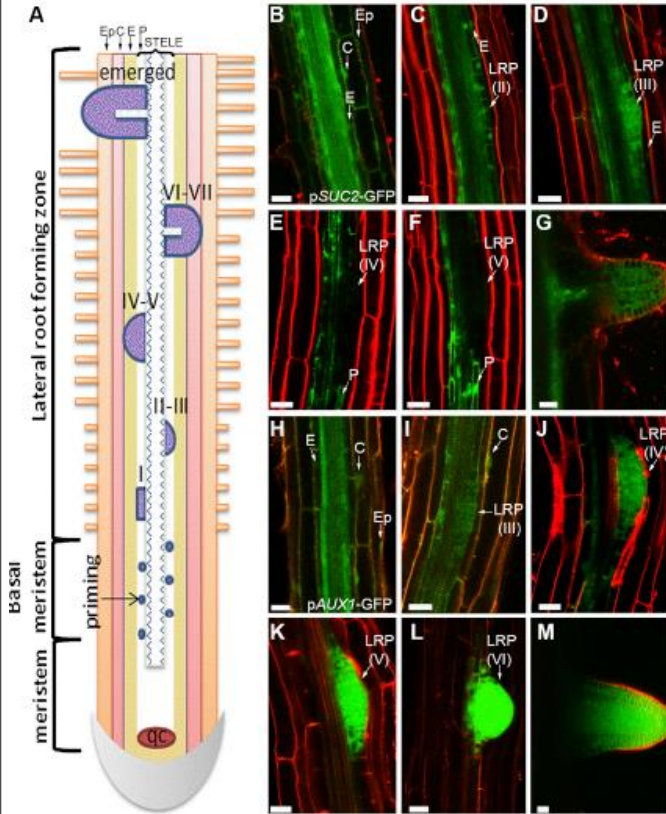


wild-type root tip
pAPL>>icals3m induced

Image Source: Vaten et al. (2011), Developmental Cell 21, 1144–55.

Yadav, Yan et al. (2014), Front Plant Sci. , 5, 44.; Wu et al. (2016), PNAS, 113, 11621-26.

Symplastic Cell-Cell Communication at LR



pdbg1,2

plasmodesmal-localized β -1,3-glucanase 1 [PdBG1]

Image Source: Benitez-Alfonso et al. (2013), Developmental Cell 26, 136–47.

Symplastic Cell-Cell Communication at LR

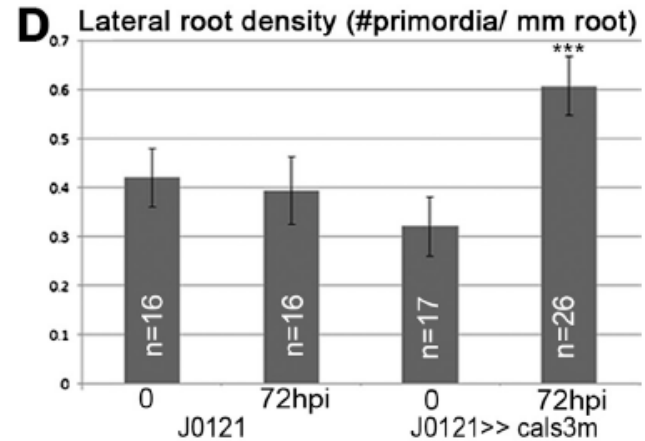
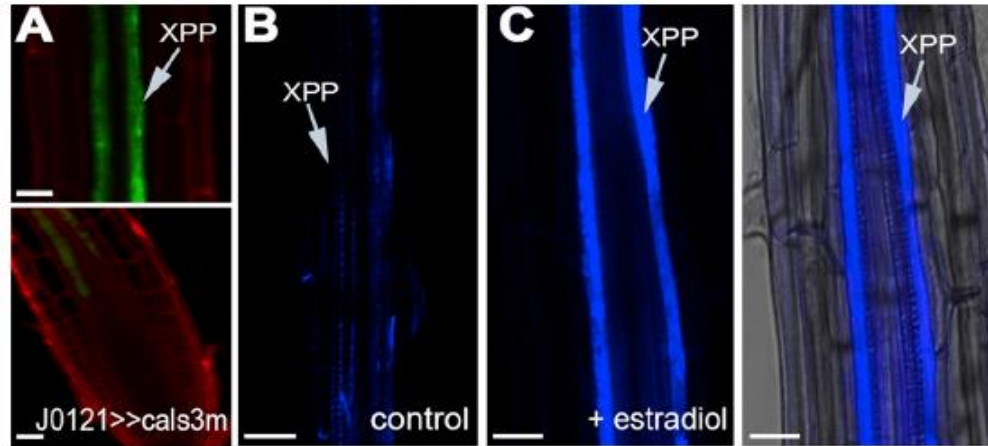
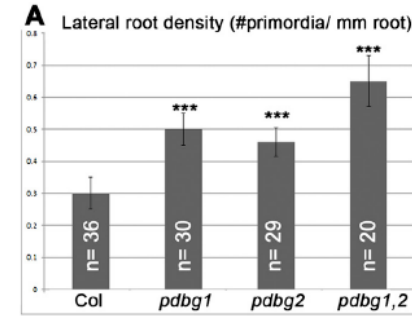
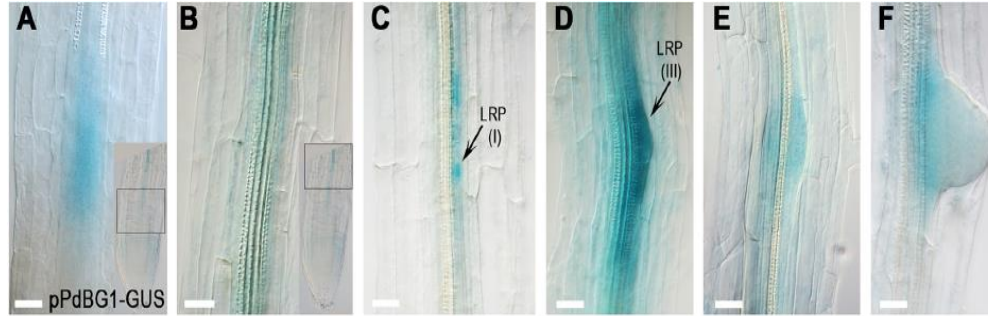


Image Source: Benitez-Alfonso et al. (2013), Developmental Cell 26, 136–47.

Long-distance Cell-Cell Communication in Plants

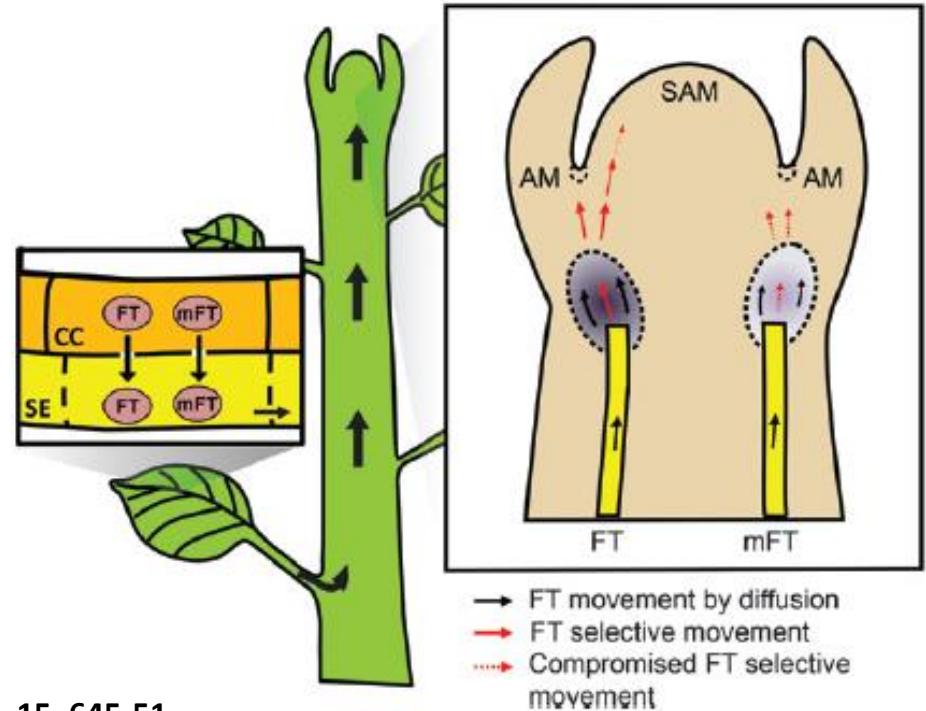
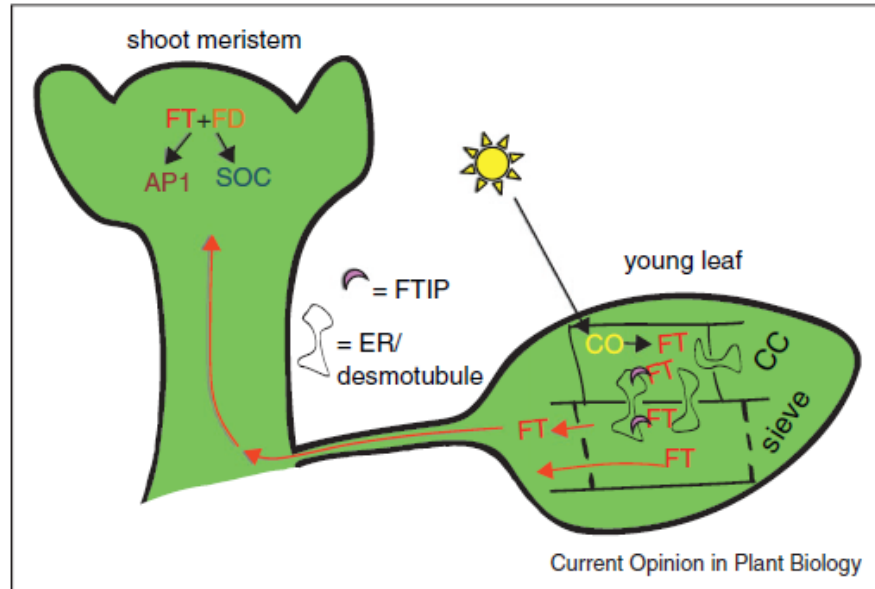
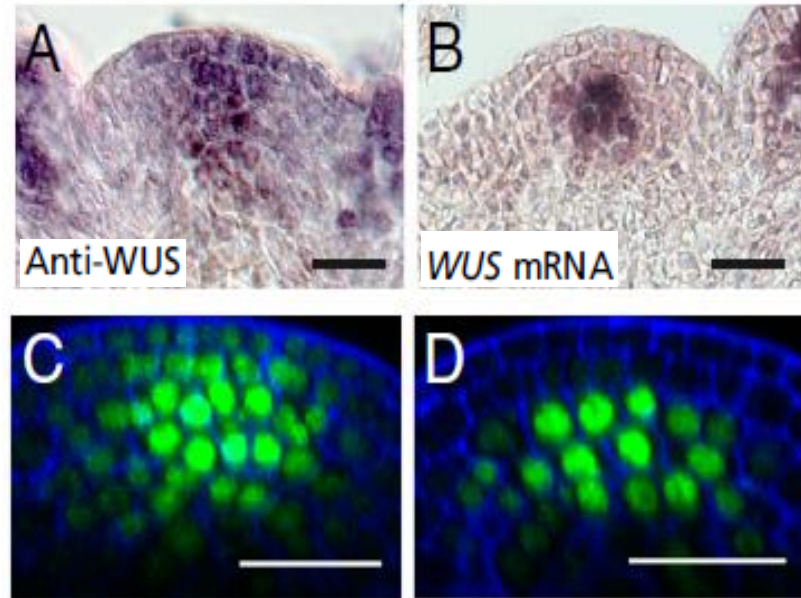
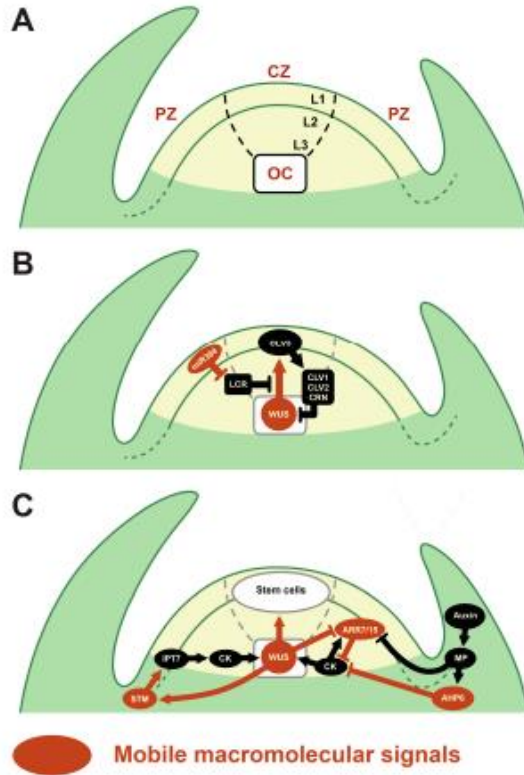


Image Source: Wu & Gallagher (2012), Curr Opin Plant Biol., 15, 645-51.
Yoo et al., (2013), Plant J., 75, 456-68.

Symplastic Cell-Cell Communication at SAM



pCLV3::AlcR; pAlcA::CalS3m
pWUS::WUS-linker-GFP

Image Source: Kitagawa & Jackson (2017), Plants, 6, 12. Daum et al. (2014), PNAS, 111, 14619–24.