



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

Shoot Development: SAM Maintenance

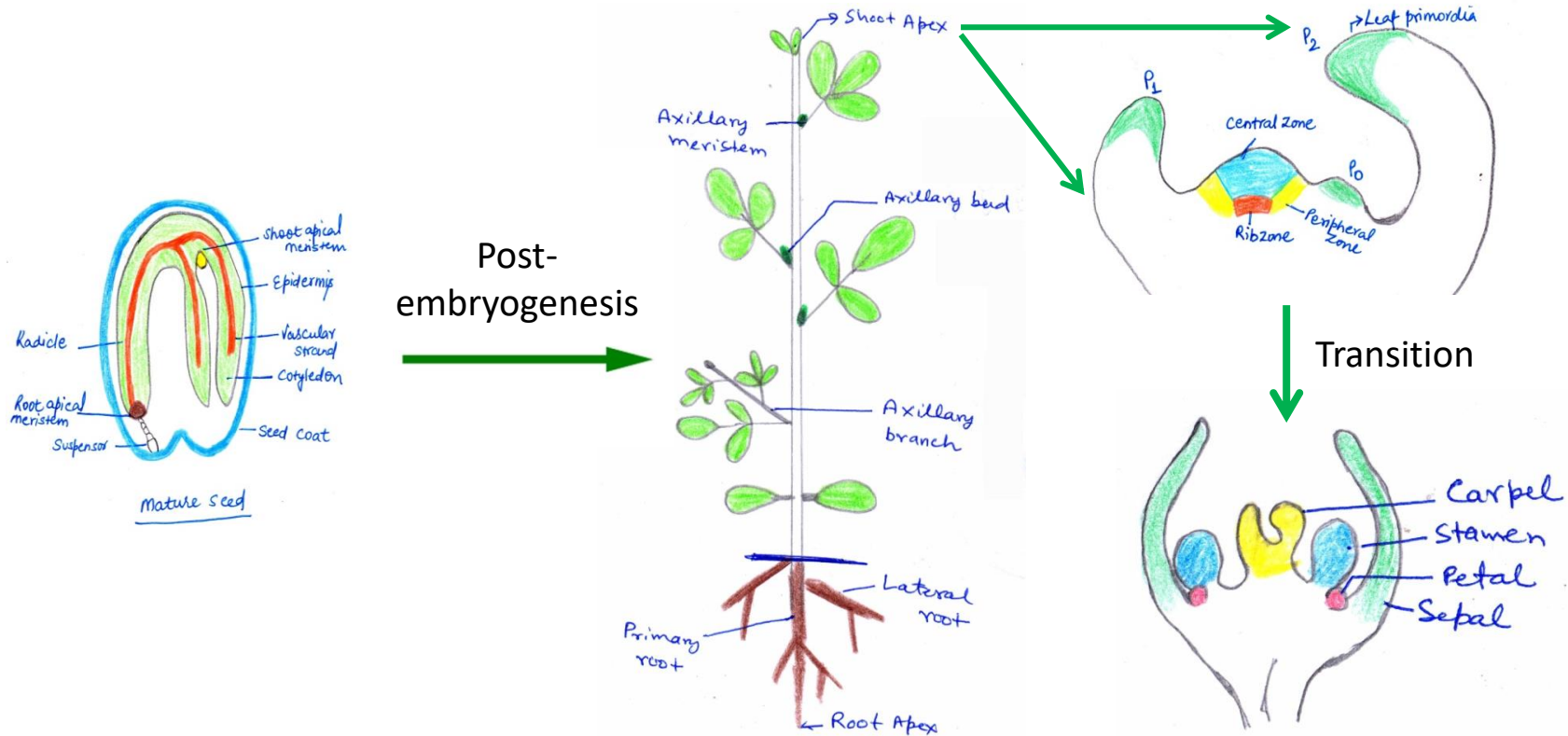
Dr. Shri Ram Yadav

Department of Biotechnology

Indian Institute of Technology, Roorkee



Shoot System Architecture



Shoot Apical Meristem Organization

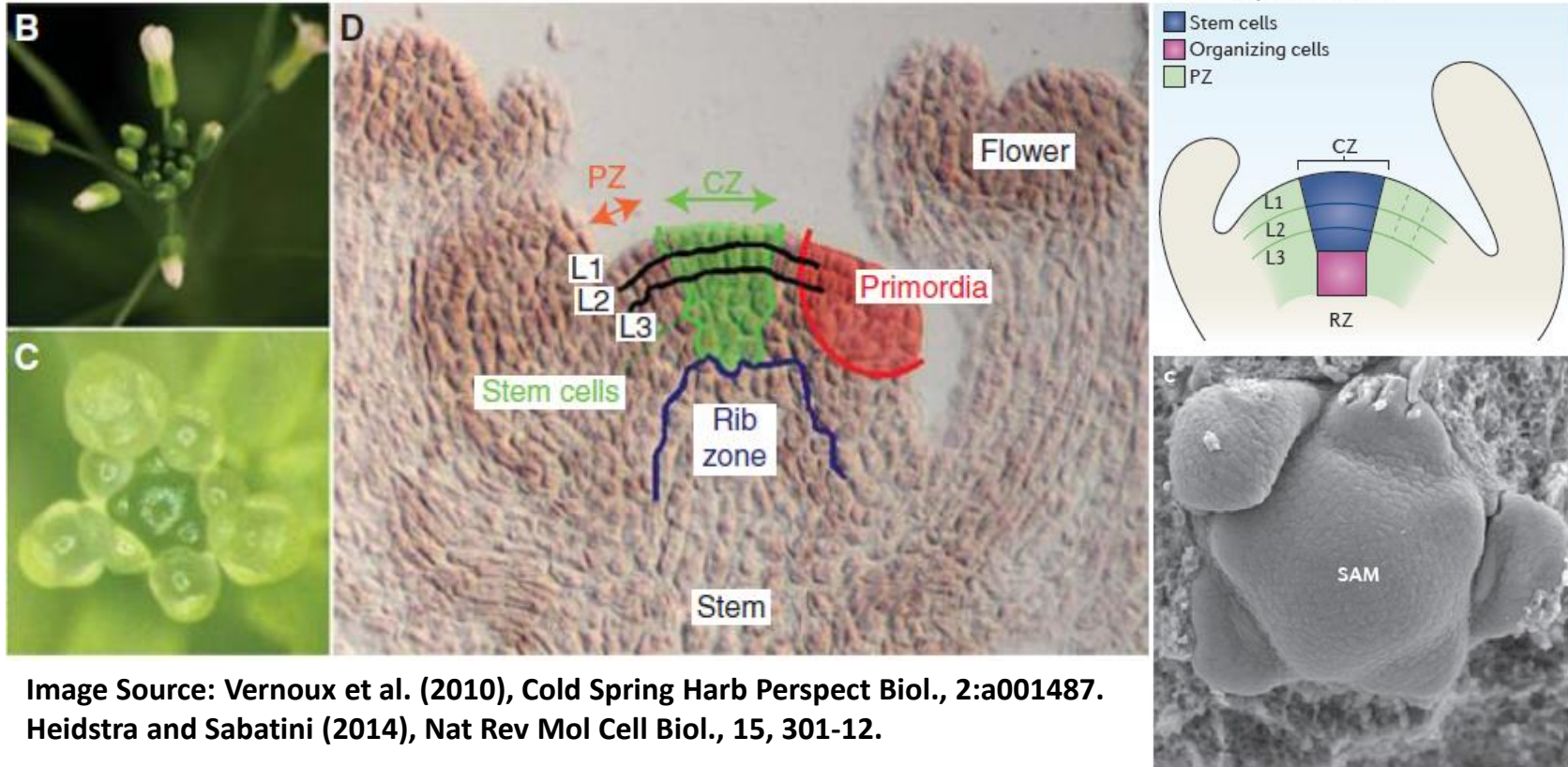
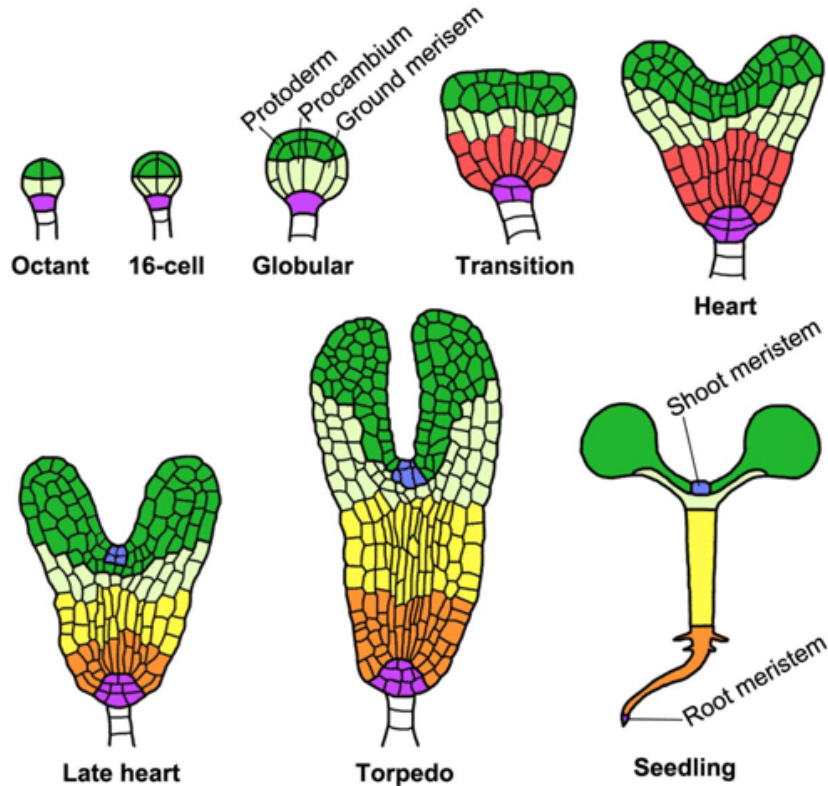


Image Source: Vernoux et al. (2010), Cold Spring Harb Perspect Biol., 2:a001487.
Heidstra and Sabatini (2014), Nat Rev Mol Cell Biol., 15, 301-12.

SAM Establishment during Embryogenesis



zygote



1-cell embryo

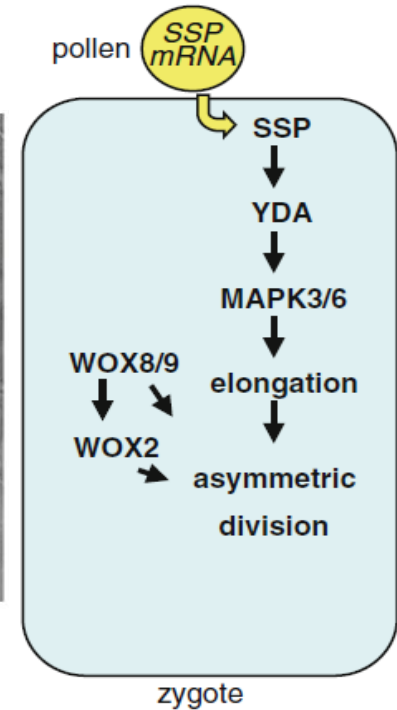
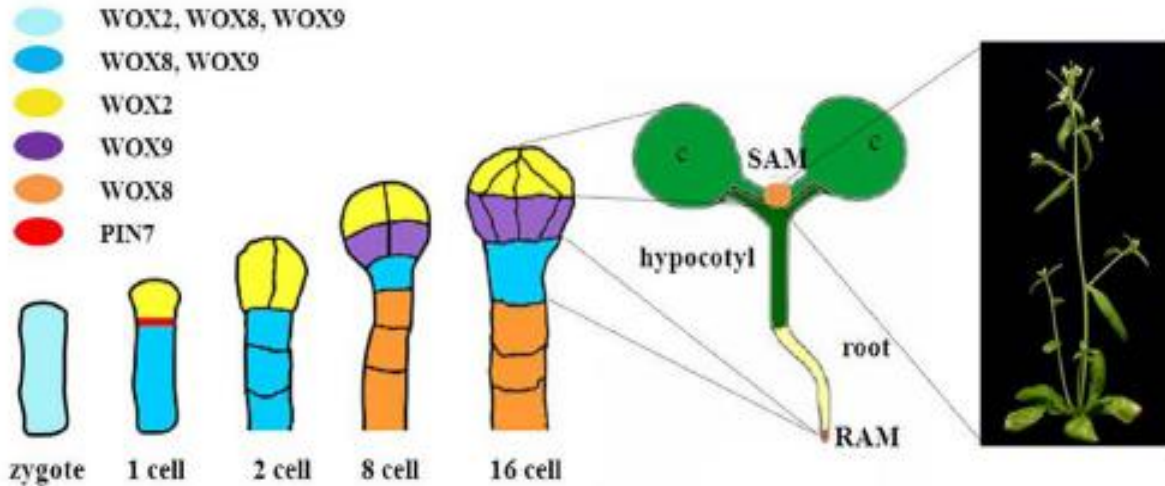


Image Source: Kim et al. (2017), J. Plant Biol., 60,306-13.
Zhang and Laux (2011), Sex Plant Reprod 24,161-69.

SAM Establishment during Embryogenesis

B



b

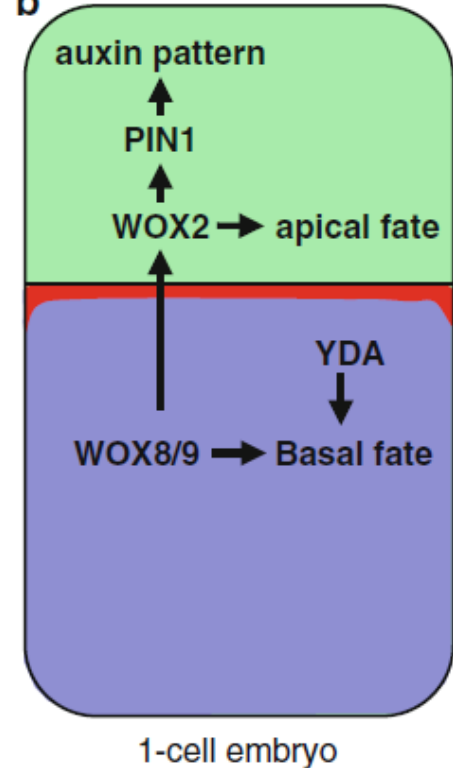


Image Source: Boscá et al. (2011), Front Plant Sci. ,2,93.
Zhang and Laux (2011), Sex Plant Reprod 24,161–69.

SAM Establishment during Embryogenesis

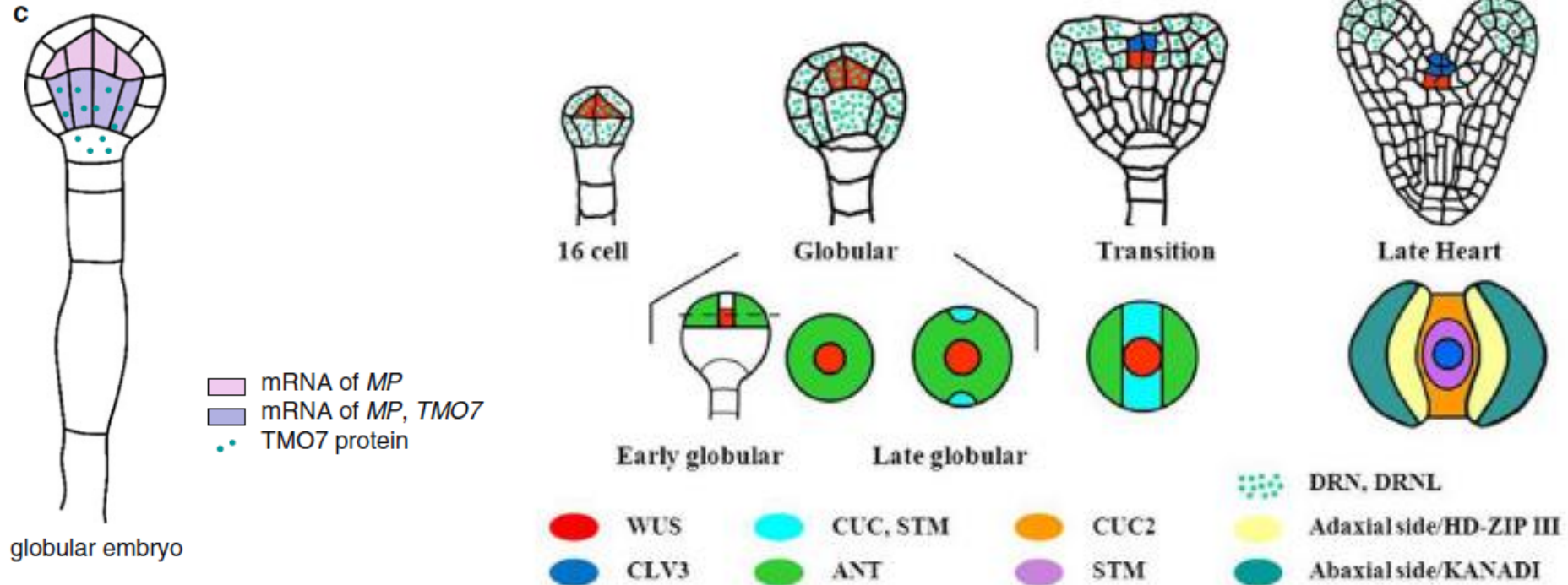


Image Source: Boscá et al. (2011), Front Plant Sci. ,2,93.

Zhang and Laux (2011), Sex Plant Reprod 24,161–69.

SAM Establishment during Embryogenesis

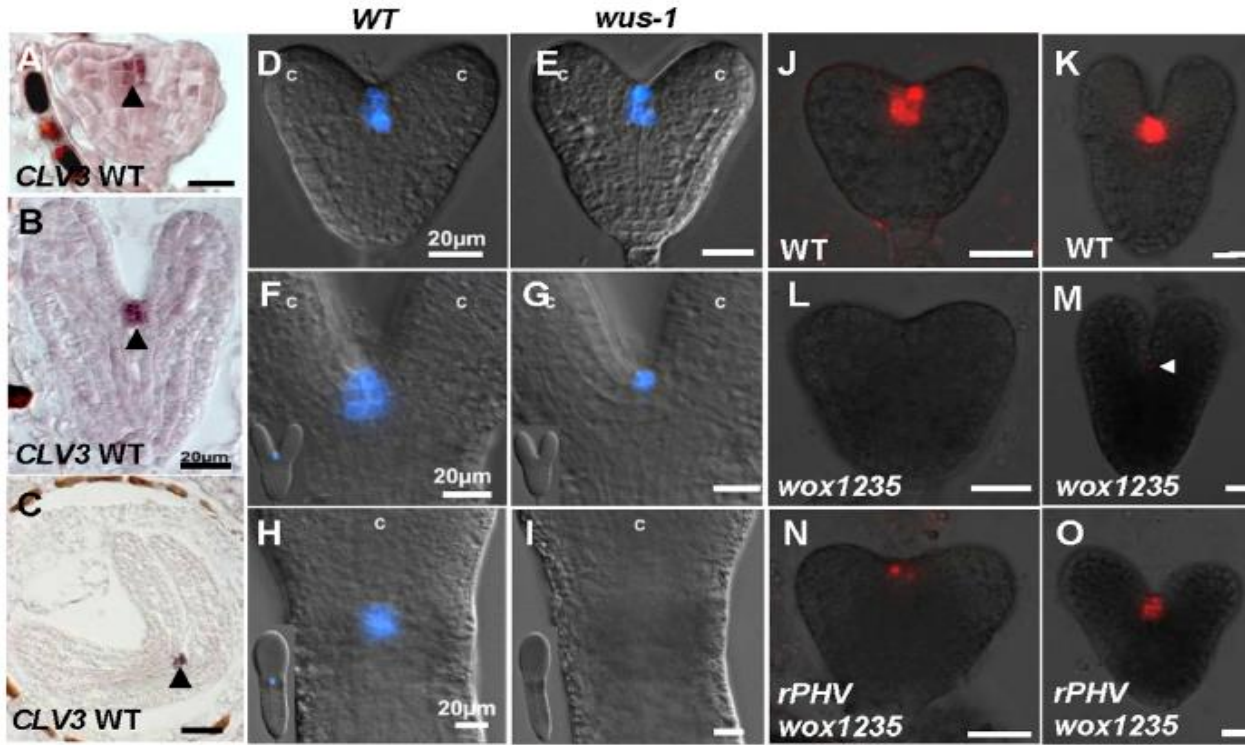
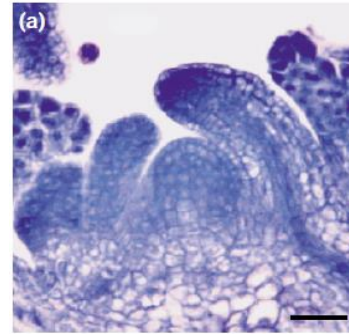
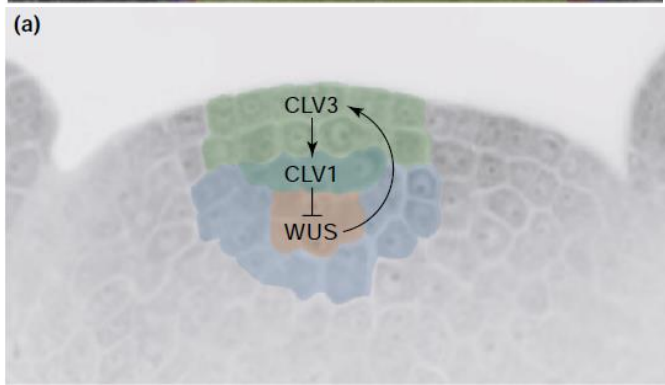
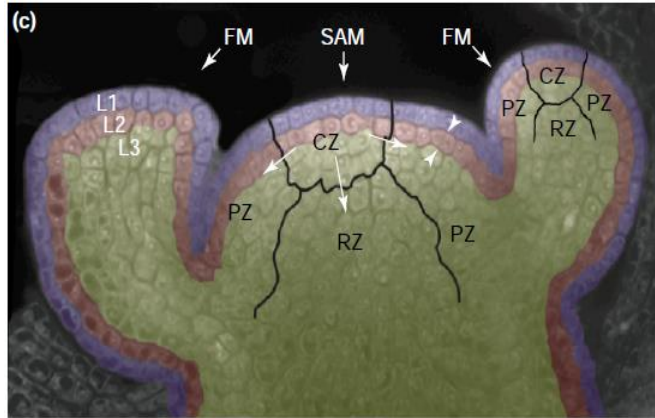
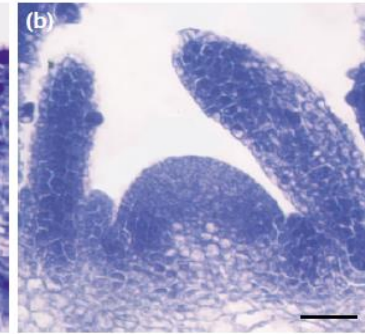


Image Source: Zhang et al. (2017), Dev Cell 40, 264–77.

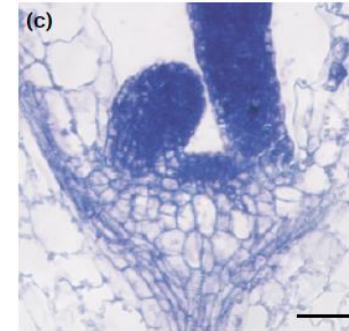
SAM Maintenance



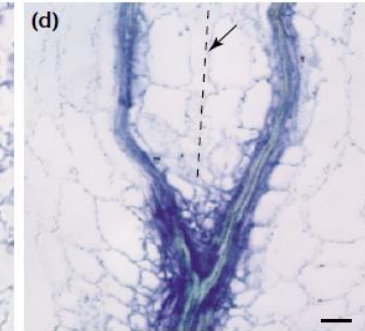
wild type



clavata1-4



wuschel-1



shootmeristemless-11

Image Source: Carles and Fletcher (2003), Trends Plant Sci., 8, 394-401.

SAM Establishment during Embryogenesis

Stem Cell Initiation of the *Arabidopsis* shoot meristem

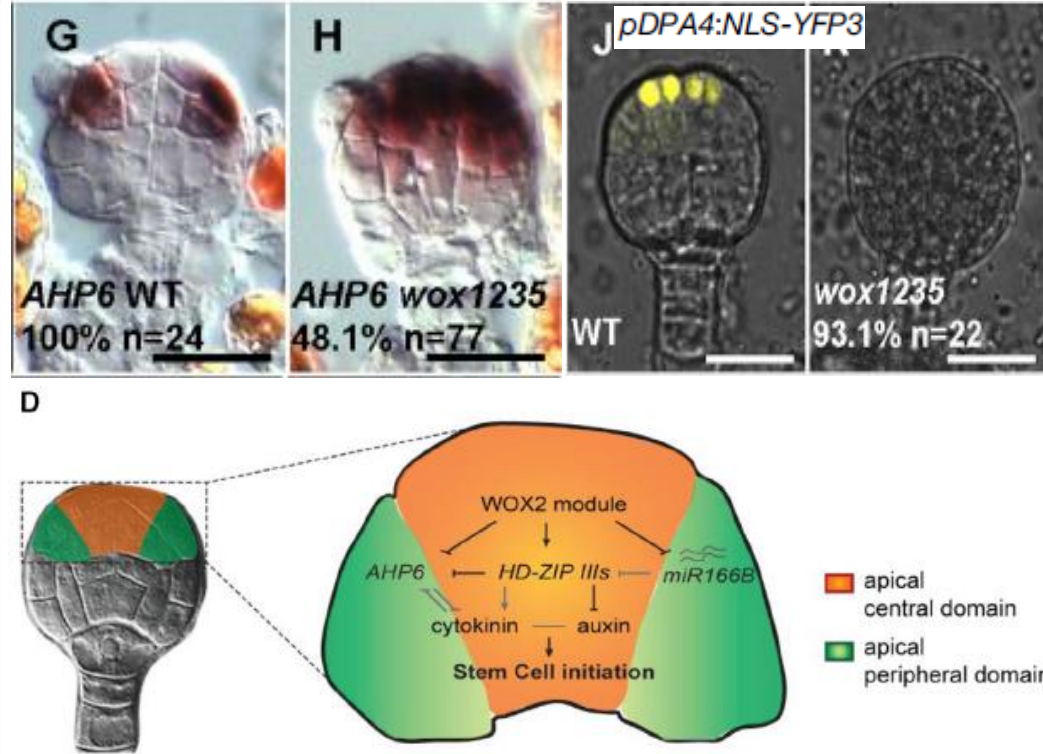
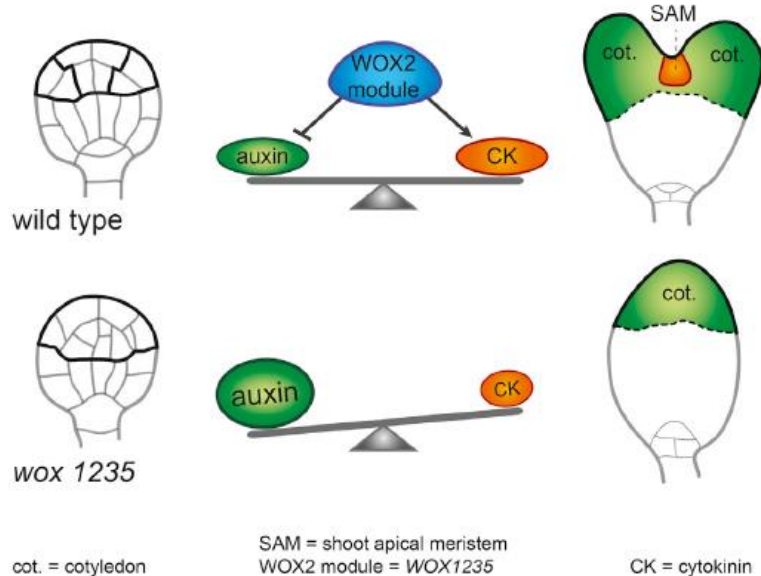


Image Source: Zhang et al. (2014), Plant Physiol., 165, 670-87.

SAM Maintenance: Hormonal Regulation

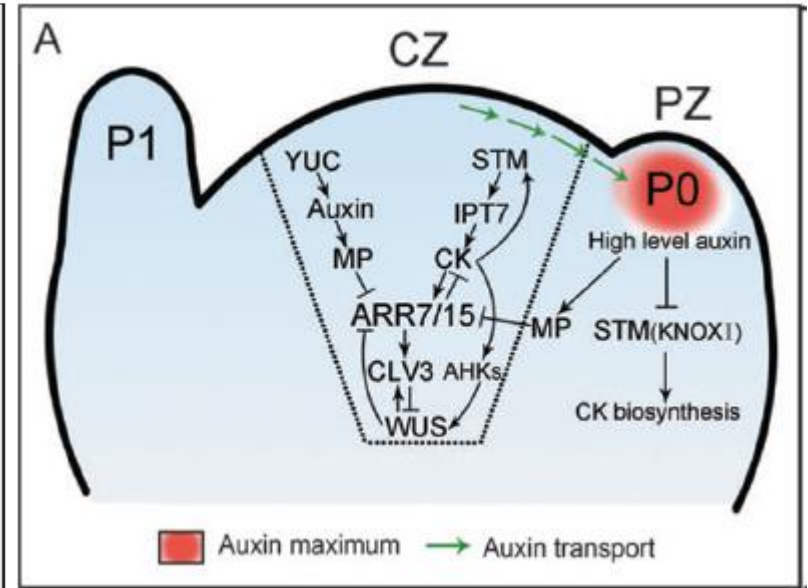
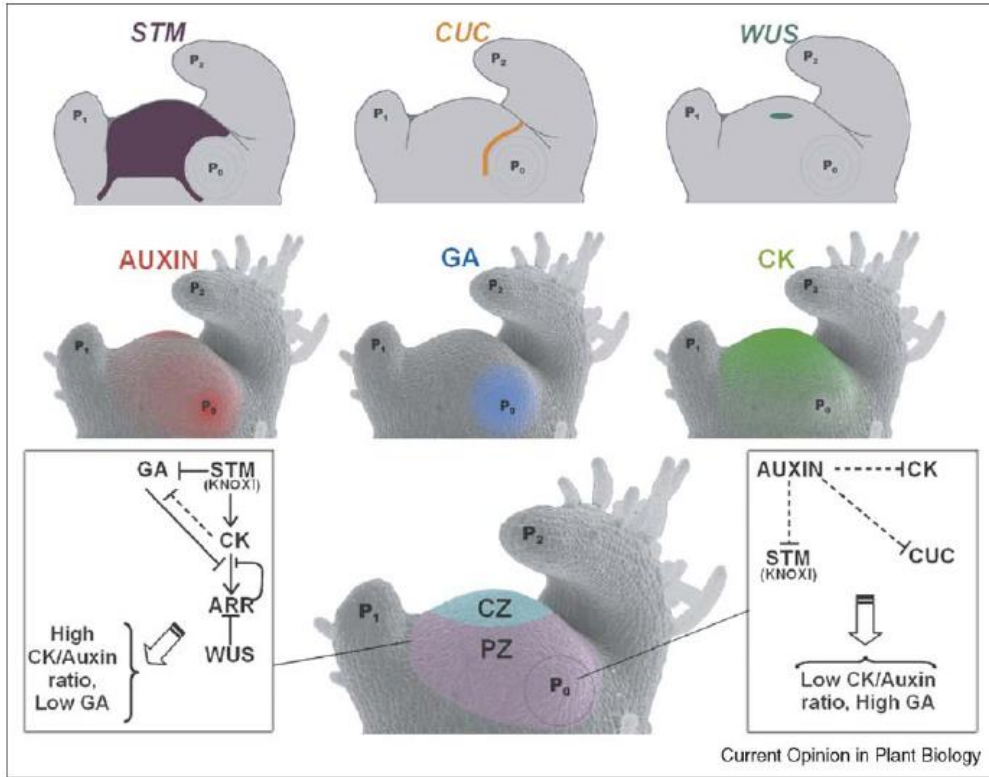
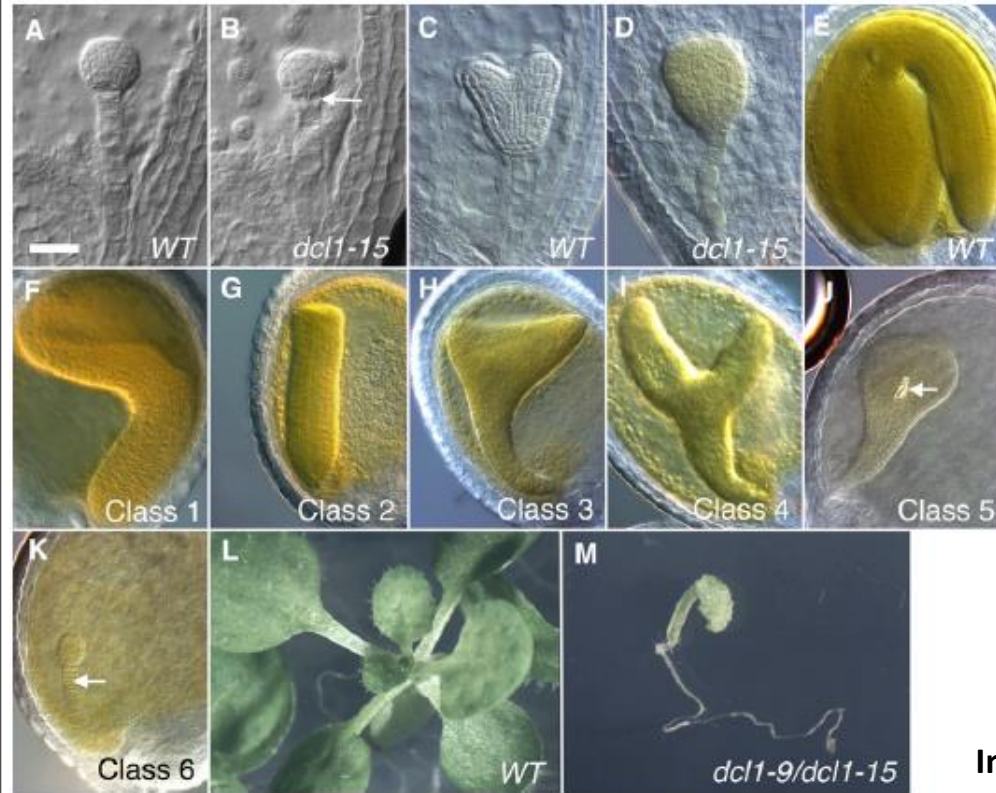


Image Source:

Shani et al. (2006), *Curr Opin Plant Biol.*, 9, 484-9.

Su et al. (2011), *Mol Plant*, 4, 616-25.

SAM Establishment during Embryogenesis: miRNA



DR5rev:GFP.

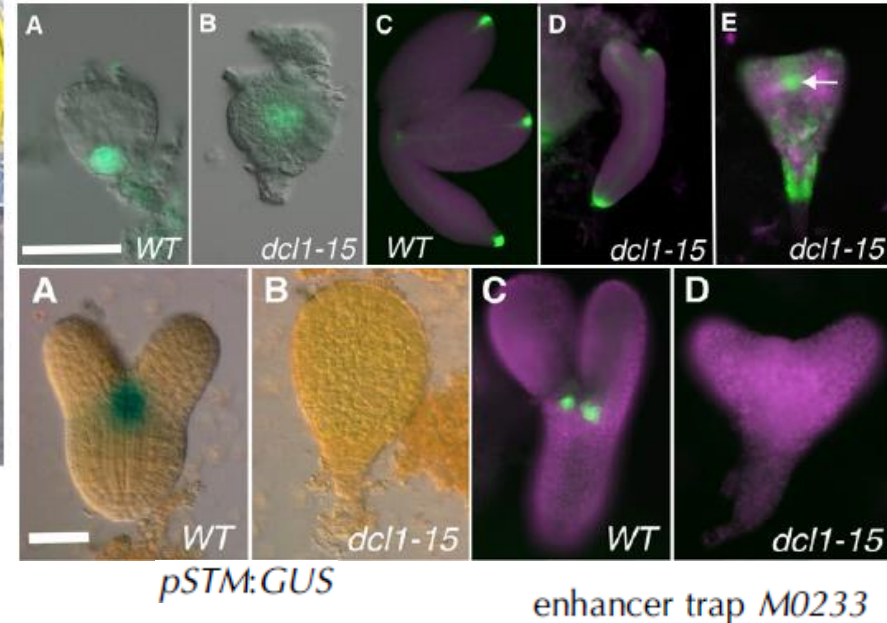


Image Source: Seefried et al. (2005), Exp Bot., 56, 2433-42.

SAM Maintenance: miRNA

A

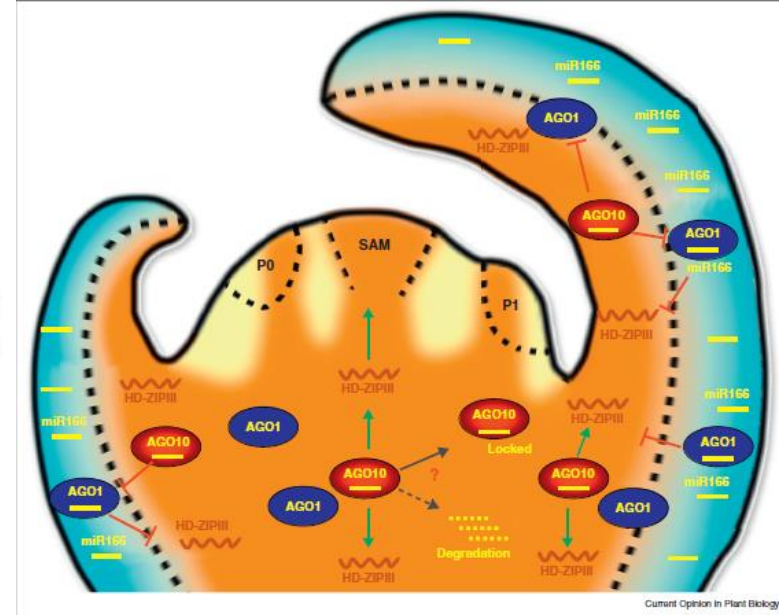
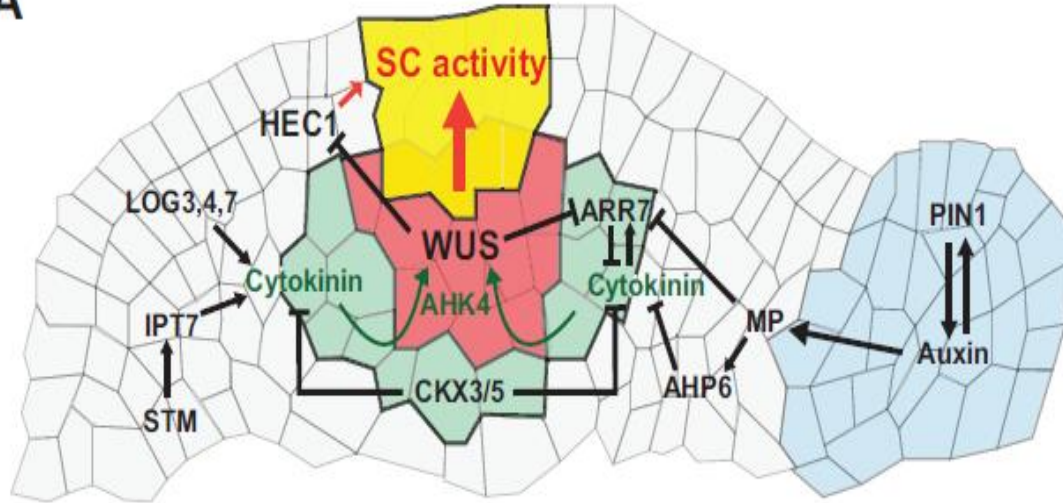


Image Source: Gaillochet and Lohmann (2015), *Development*, 142, 2237-49.
Zhang and Zhang (2012), *Curr Opin Plant Biol.*, 15, 652-8.