



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

Root Branching: Lateral Root Development

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Root System Architecture

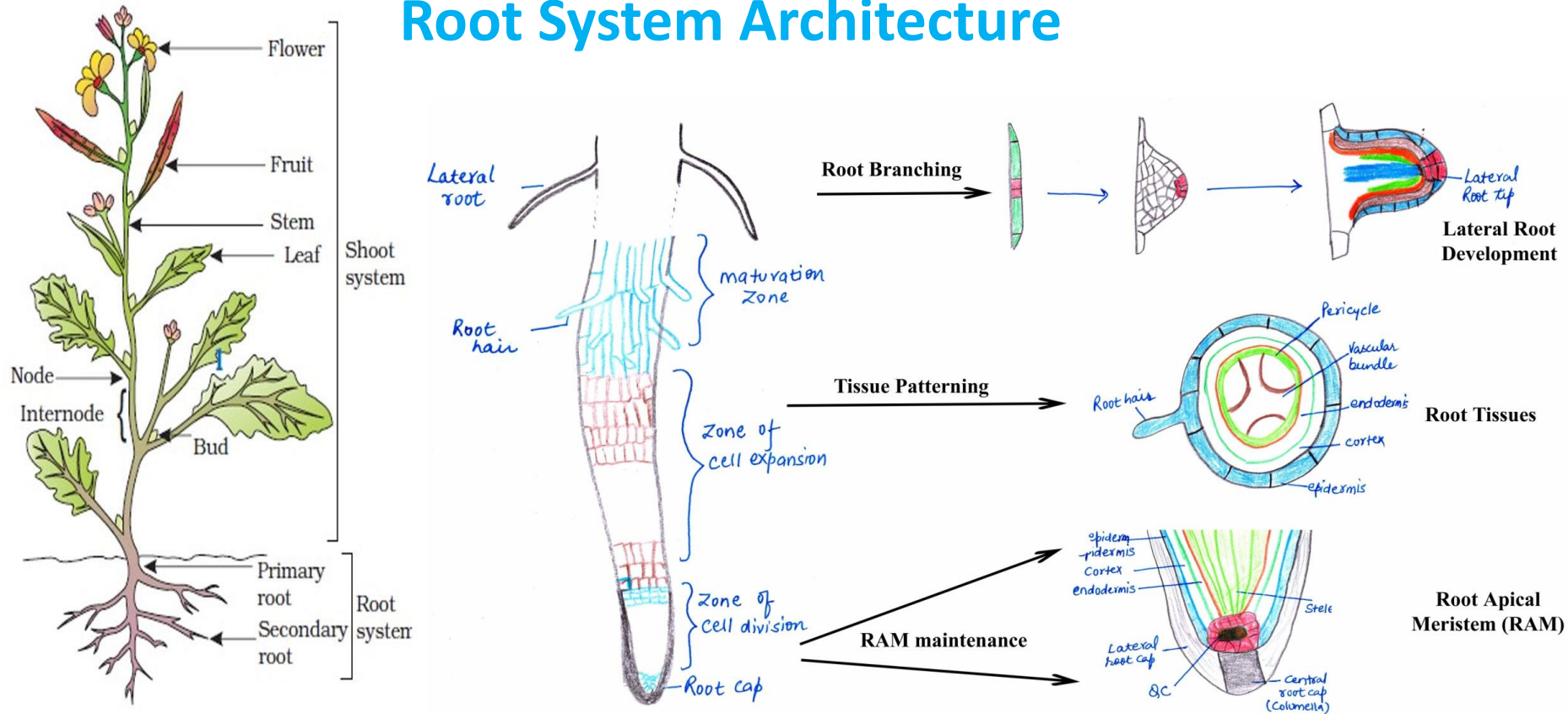


Image Source: NCERT, Class XI, Biology

Root System Architecture: Root Branching

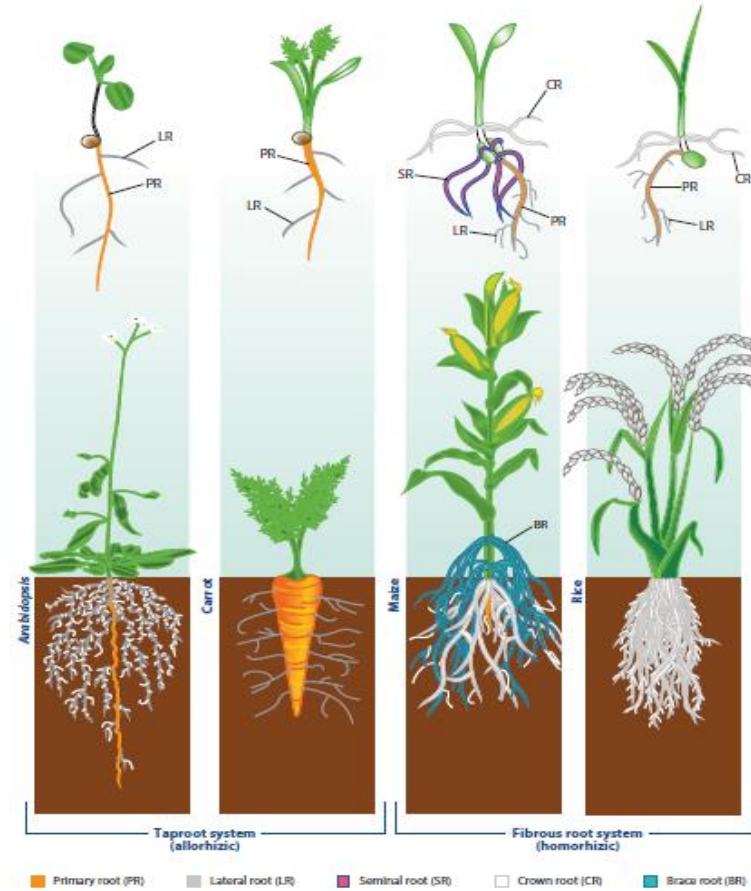


Image Source: Bellini et al. (2014)
Annu. Rev. Plant Biol., 65:17.1–17.28

Root Branching in Arabidopsis: Lateral Root Development

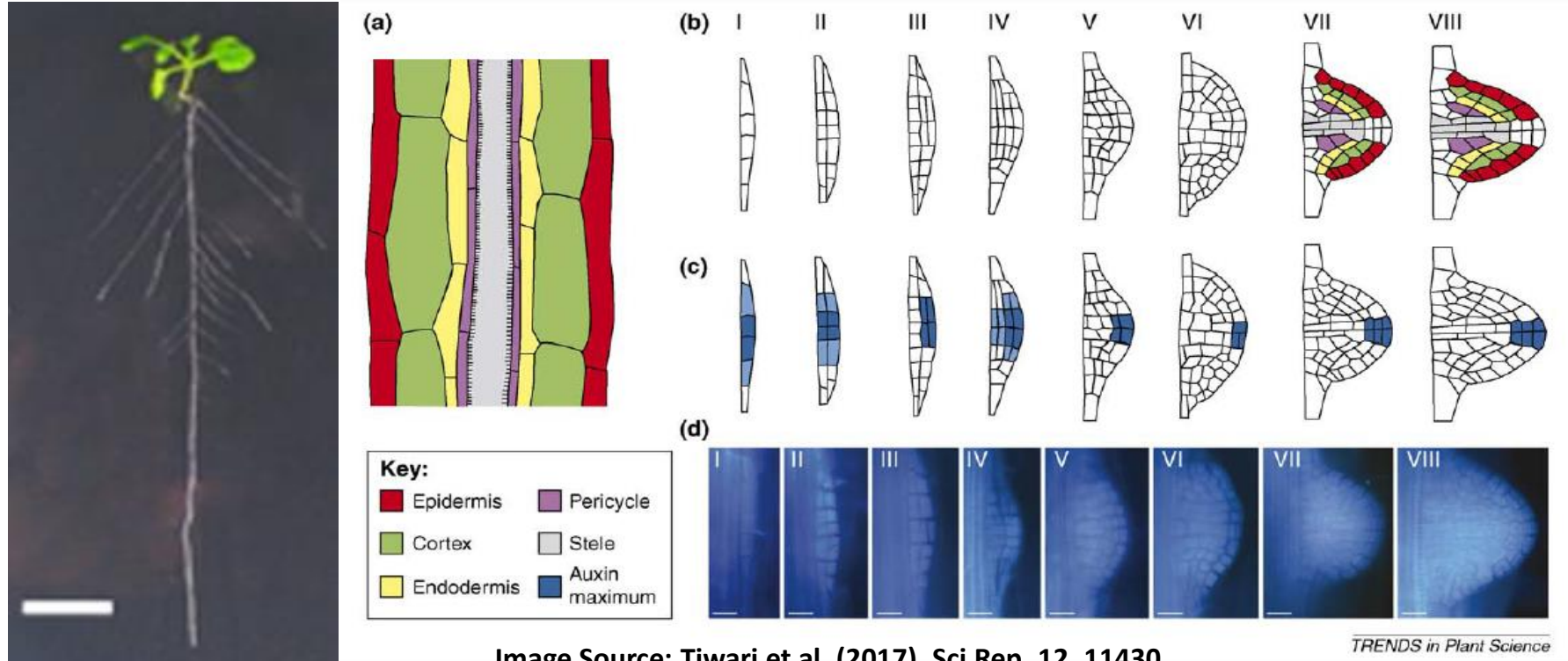


Image Source: Tiwari et al. (2017), Sci Rep. 12, 11430.
Pe ret et al. (2009), Trends Plant Sci., 14, 399-408.

TRENDS in Plant Science

LRP Establishment: Xylem-pole pericycle cell

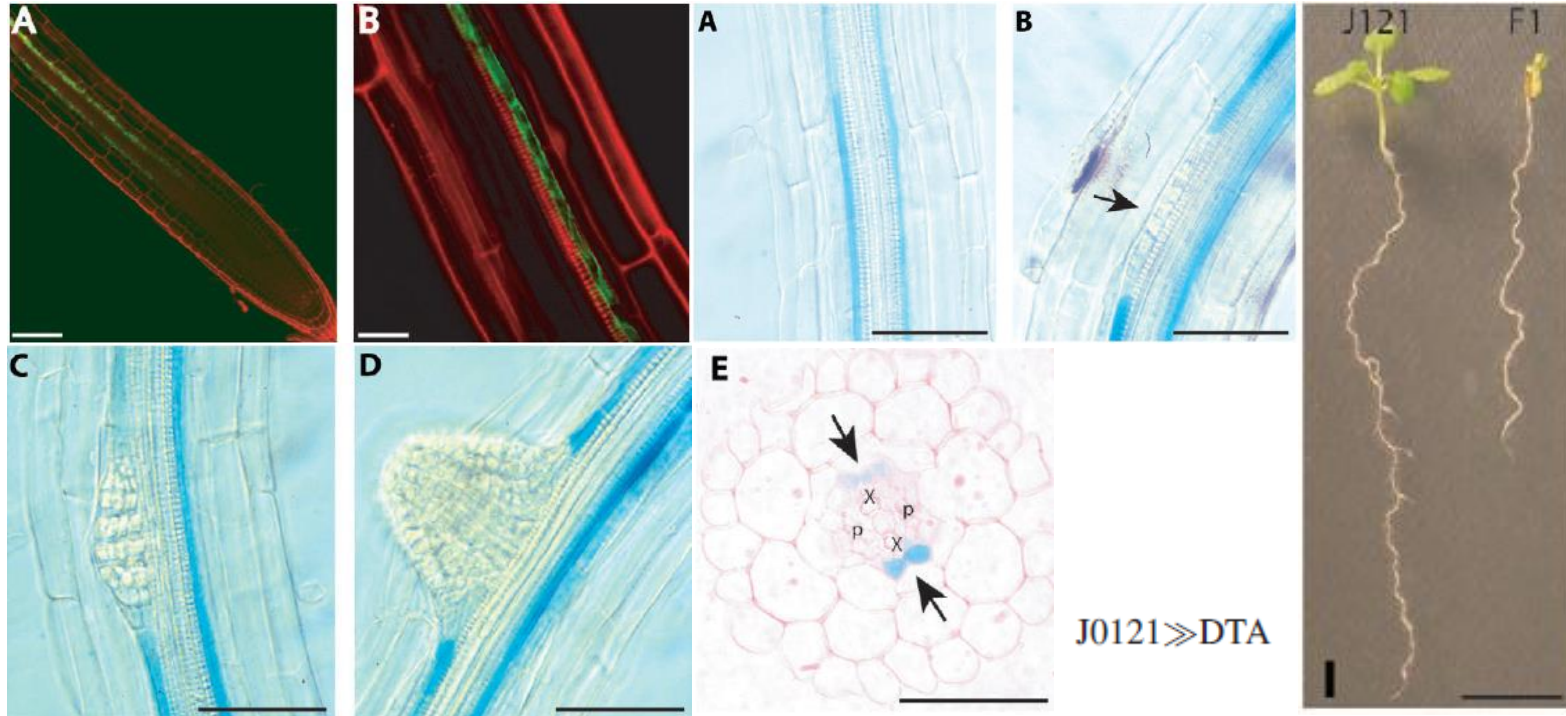


Image Source: Laplace et al. (2005), J Exp Bot., 56, 2433-42.

Auxin Regulates LR Development

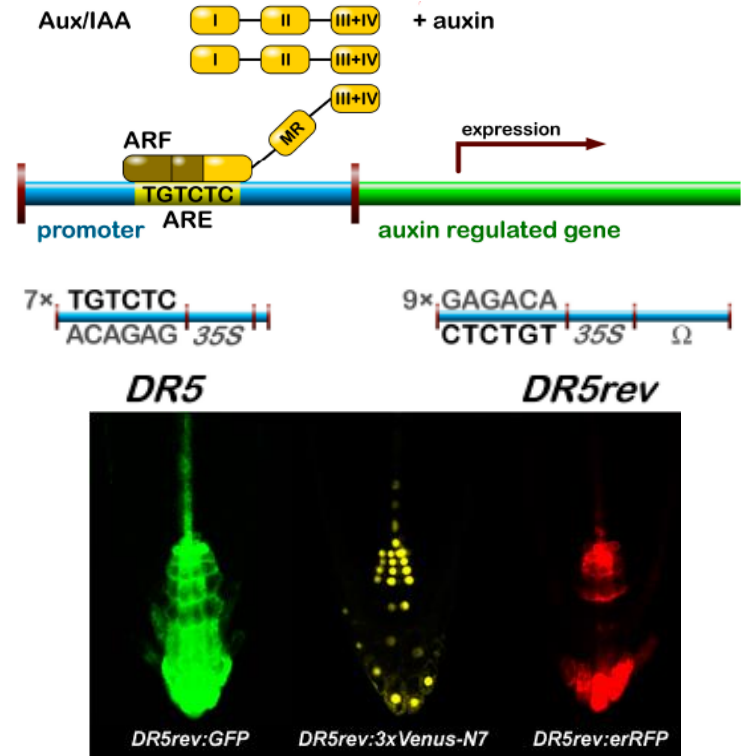
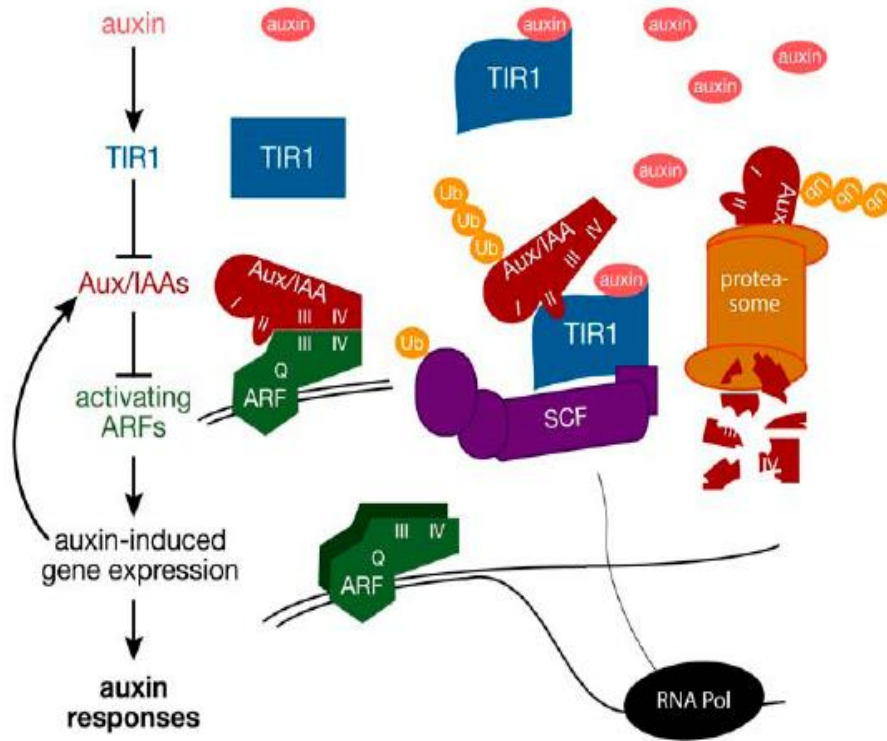


Image Source: Woodward & Bartel (2005), Plant Cell, 17, 2425–29.; Pařízková et al. (2017), Int J Mol Sci., 18, 2736.

Auxin Regulate Aux/IAA-ARF-LBD module controls LR Development

SOLITARY-ROOT (SLR)/IAA14

Auxin Response Factor: ARF7/ARF19

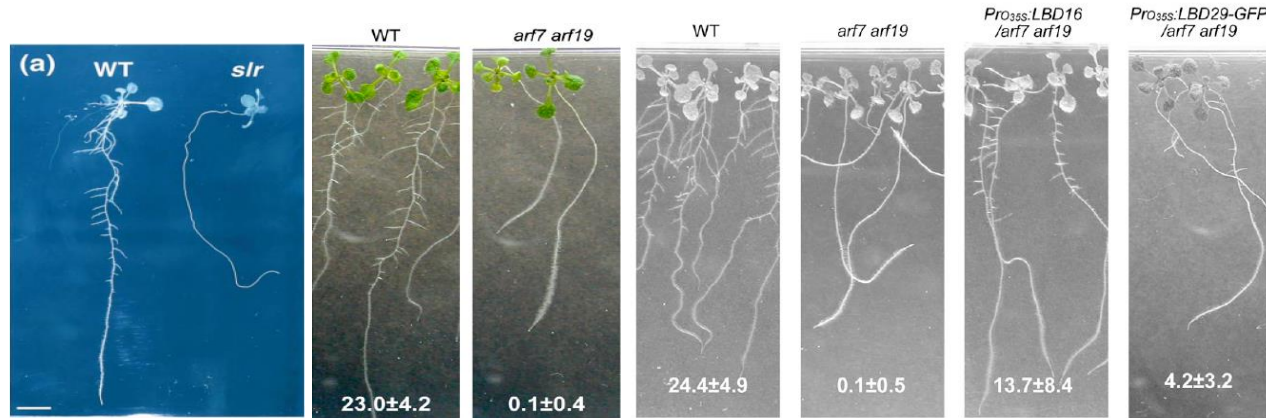
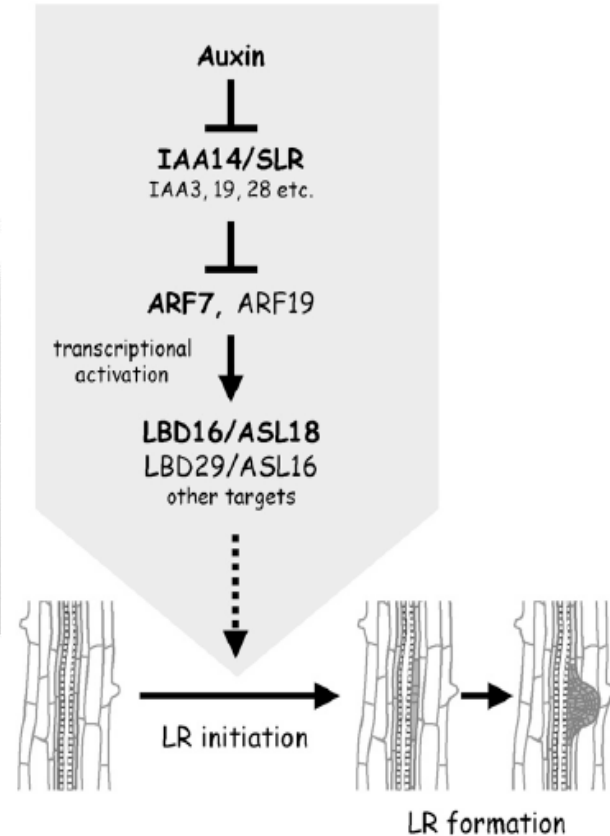


Image Source: Fukaki et al. (2002), Plant J., 29, 153-68.
Okushima et al (2007) Plant Cell, 19, 118-30.



Auxin Regulates Positioning of Lateral Roots

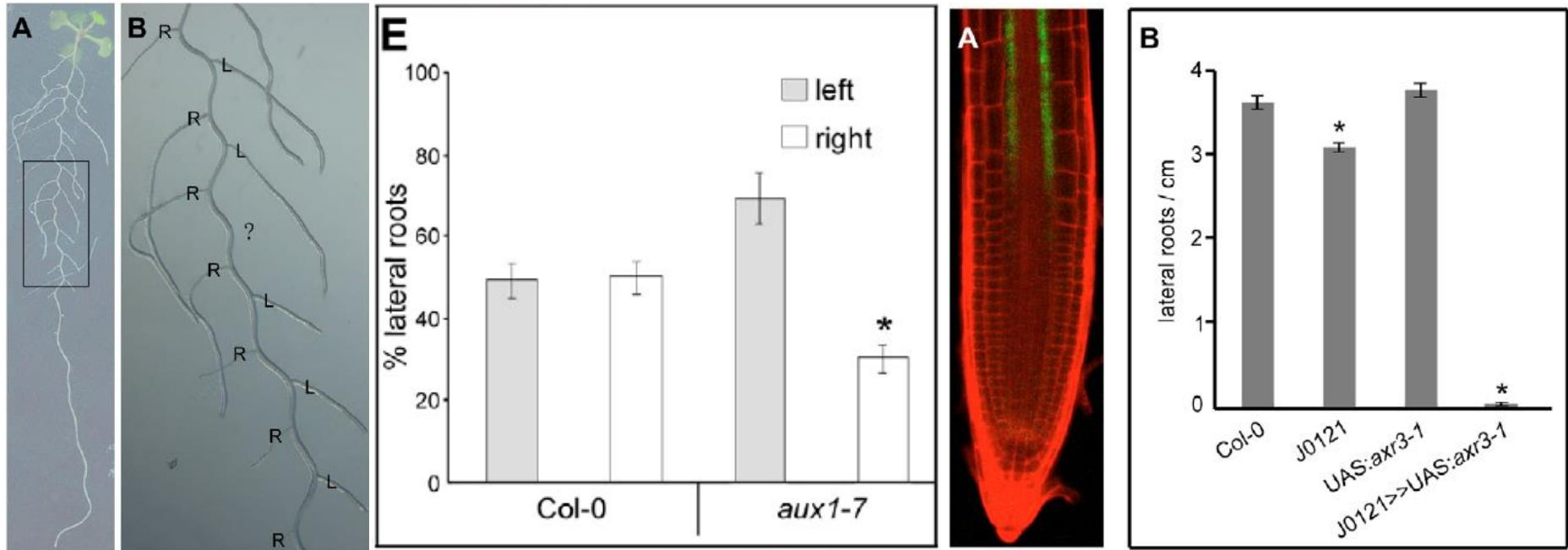


Image Source: De Smet et al (2007) Development 134, 681-90.

Auxin Regulates LR Founder Cell Specification

pDR5>>GUS

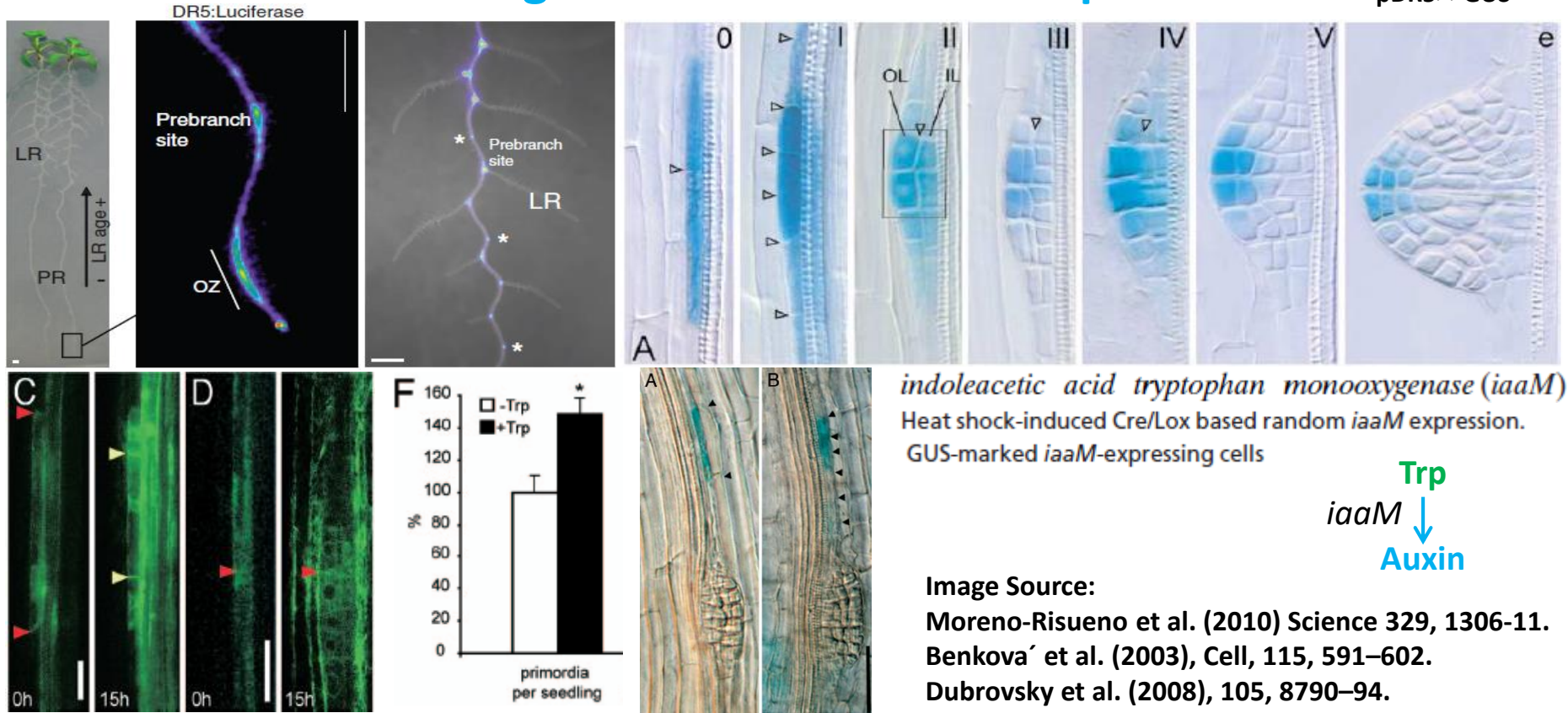


Image Source:

Moreno-Risueno et al. (2010) Science 329, 1306-11.

Benkova' et al. (2003), Cell, 115, 591-602.

Dubrovsky et al. (2008), 105, 8790-94.

Establishment of asymmetry in LR Founder Cell

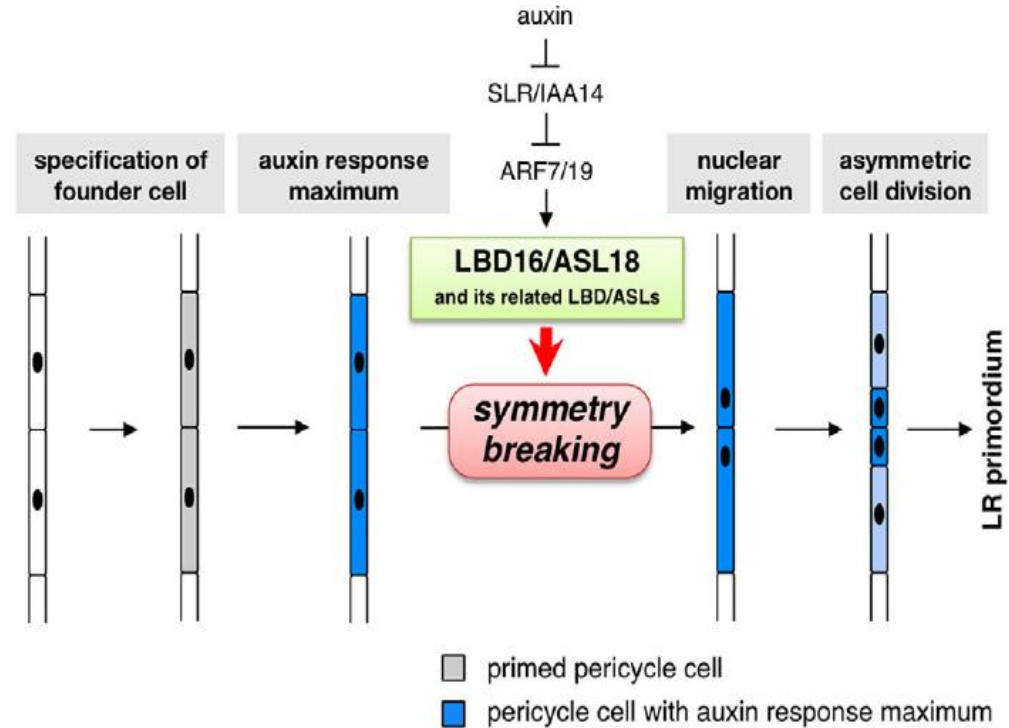
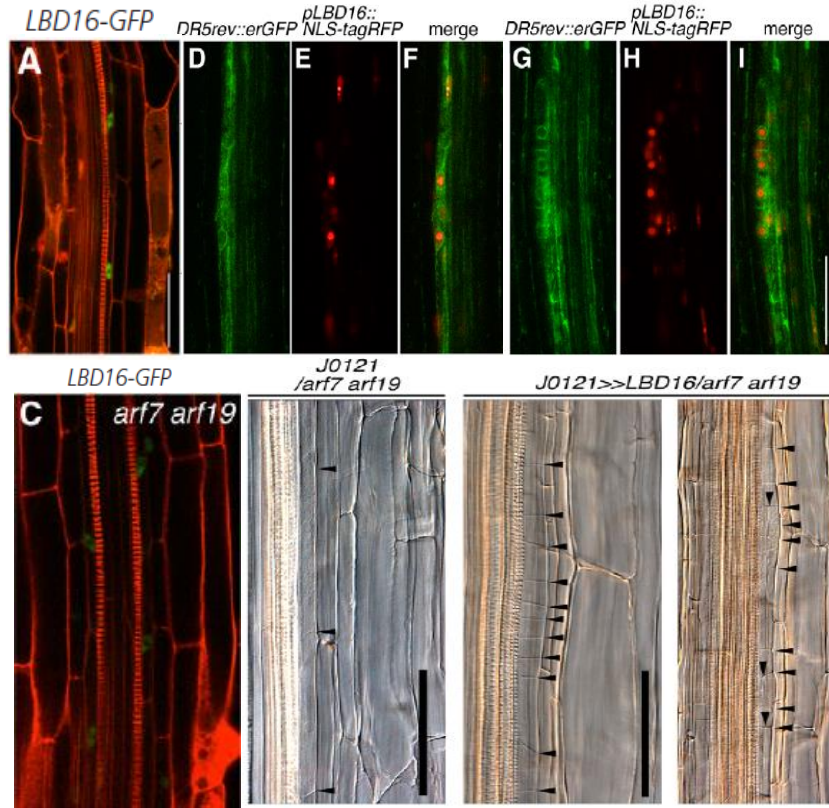


Image Source: Goh et al (2012) Development 139, 883-93.

Auxin Regulates Polar Nuclear Migration during LRFC Specification

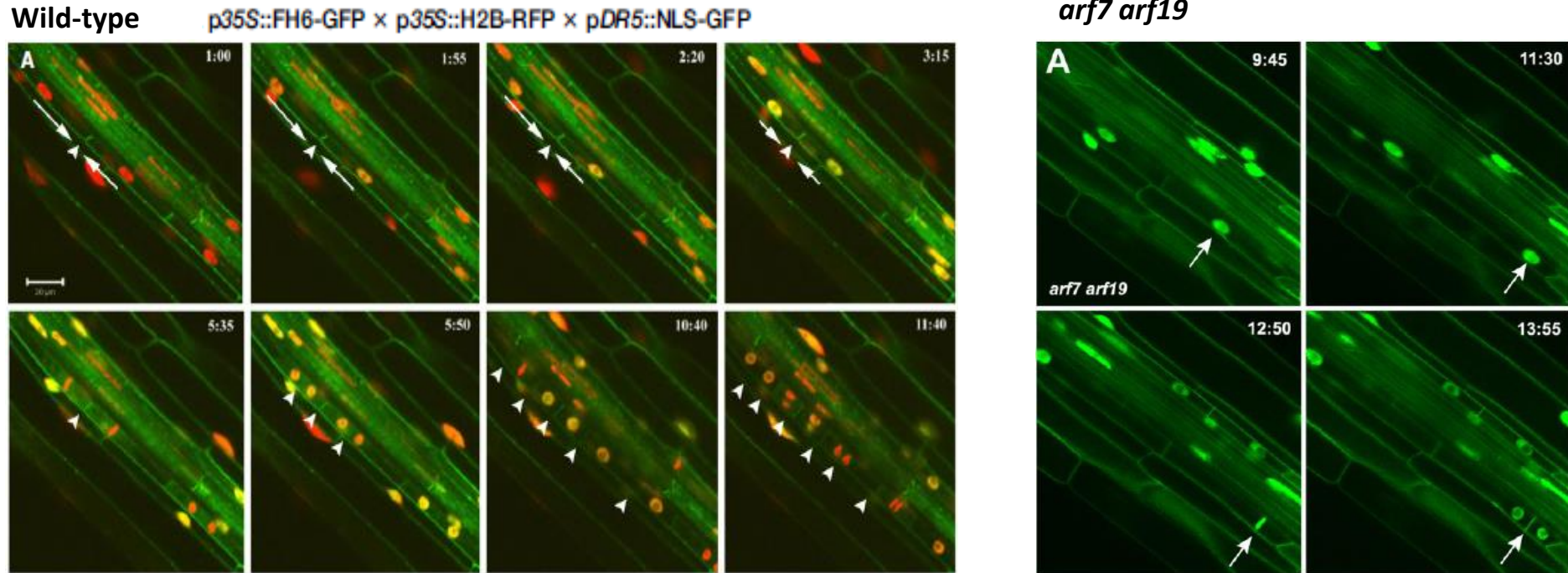
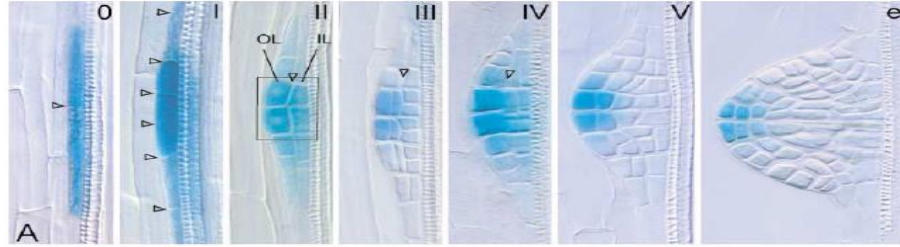


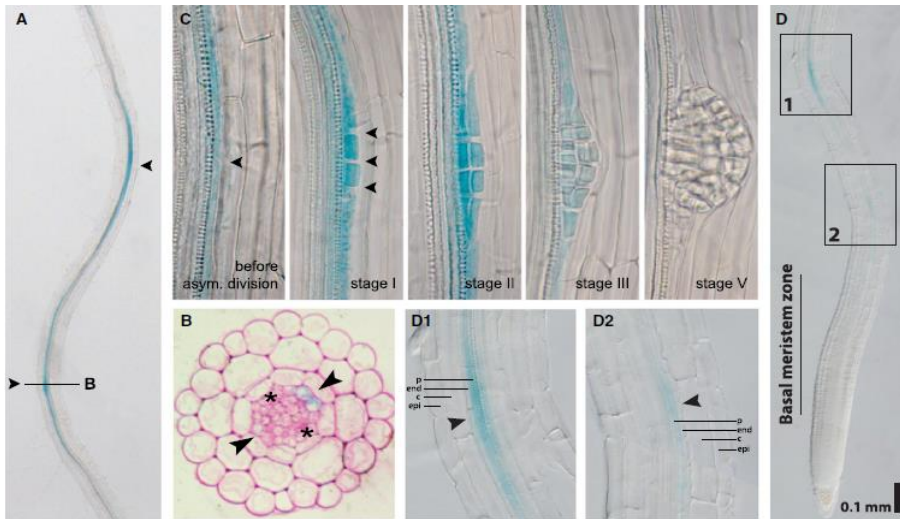
Image Source: De Rybel et al (2010) Current Biology 20, 1697–1706.

Aux/IAA28-GATA23 regulates LR Founder Cell Identity

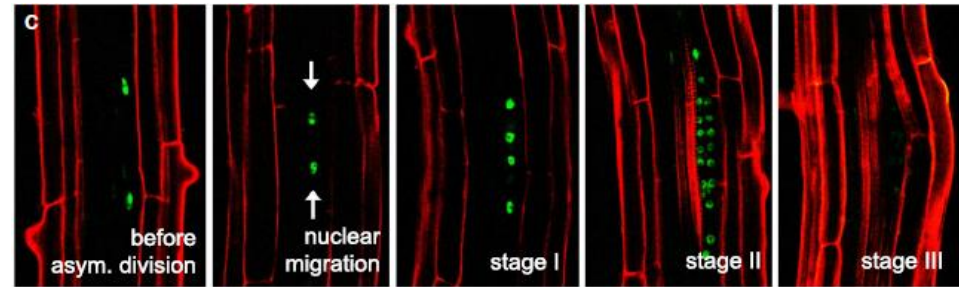
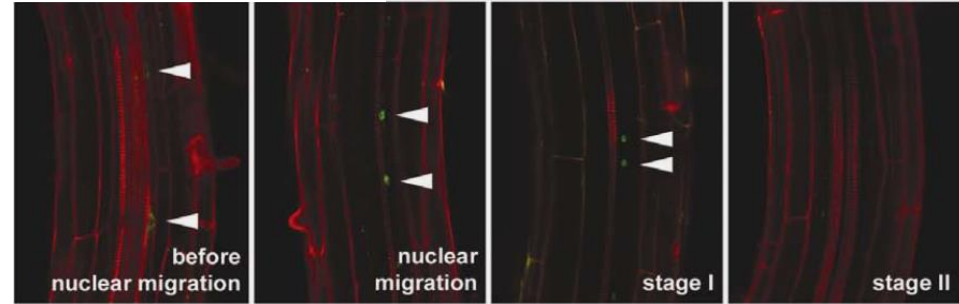
pDR5::GUS



pGATA23::GUS



pGATA23::GATA23-GFP



pGATA23::NLS-GFP

Image Source: Benkova' et al. (2003), Cell, 115, 591–602.
De Rybel et al (2010) Current Biology 20, 1697–1706.

Aux/IAA28-GATA23 regulates LR Founder Cell Identity

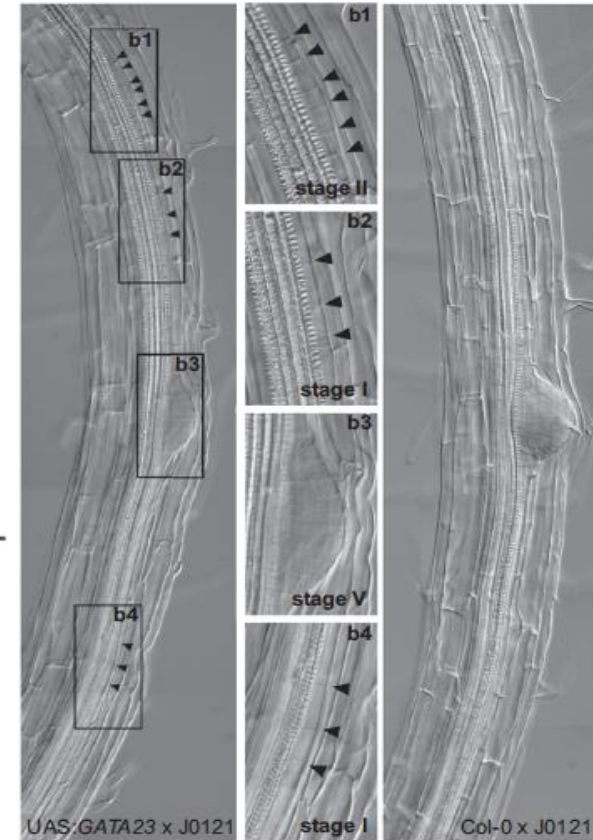
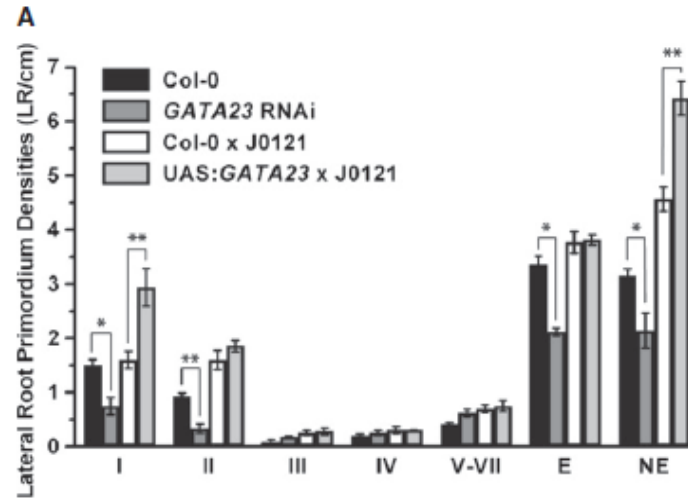


Image Source: De Rybel et al (2010) Current Biology 20, 1697–1706.

Auxin Regulates LR Development through Multiple Modules

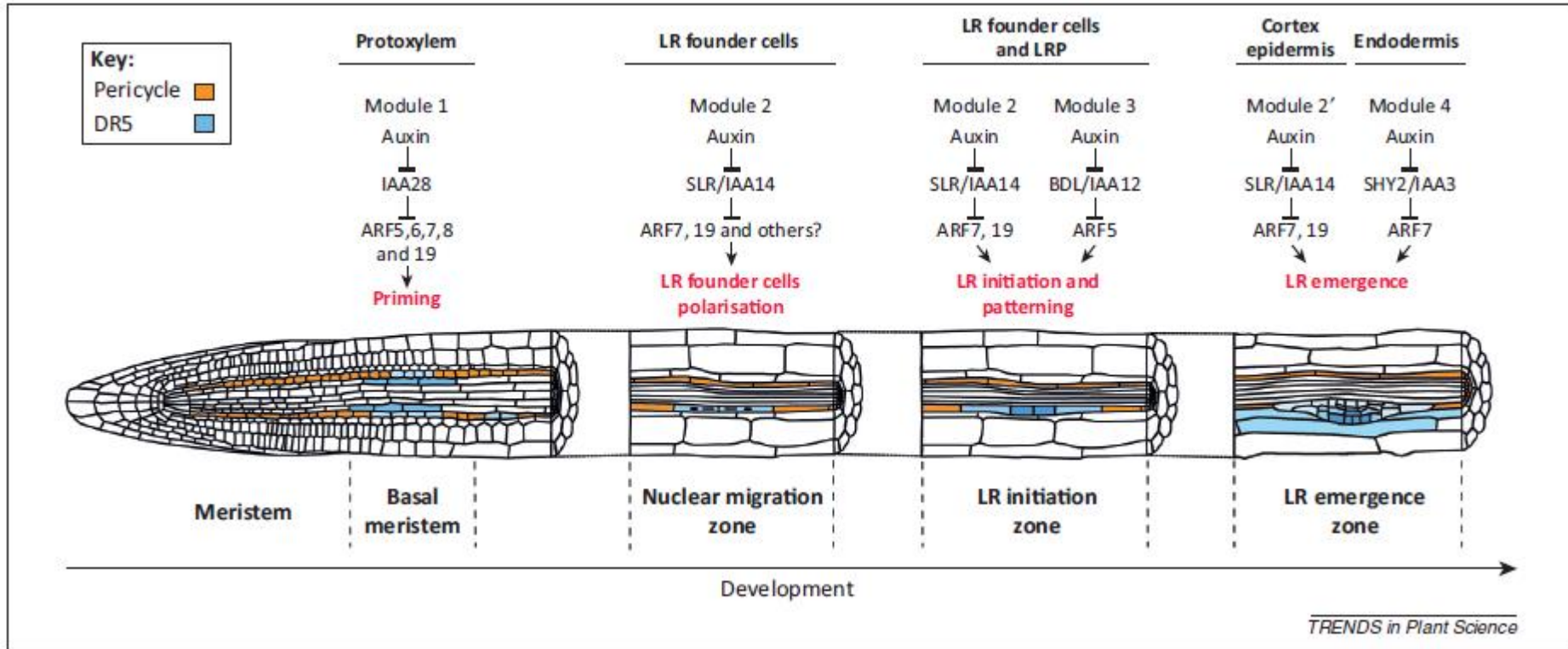


Image Source: De Rybel et al (2010) Current Biology 20, 1697–1706.; Lavenus et al., (2013) Trends Plant Sci. ,18, 50-8.