



ABSTRACT

“Vascular tissue formation in the early embryo”

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The first vascular tissue precursors are specified early during embryogenesis and will give rise to the multi-layered vascular bundle in the post-embryonic plant through local activation of oriented periclinal cell divisions. We have recently shown that this process is controlled by the auxin-regulated TMO5/LHW heterodimer of bHLH transcription factors. This dimer operates independently of tissue identity, but is restricted to a small vascular domain by integrating overlapping transcription patterns of the interacting bHLH proteins. We further demonstrate that one of the direct downstream target genes is involved in final step of cytokinin biosynthesis, suggesting that the TMO5/LHW dimer triggers periclinal cell divisions through local cytokinin activation. Moreover, during formation and growth, the vascular cells need to be patterned into xylem, phloem and intervening procambial tissues. Using a growing mathematical model and experimental validation, we show that our proposed hormonal interaction network is able to link growth and patterning of embryonic vascular tissues through local control of cell division orientation.