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Exploring underground networks: The transcriptional control of plant root development

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Tissue-specific gene expression is often thought to arise from spatially restricted transcriptional cascades. However it is unclear how expression is established at the top of these cascades. The SHORTROOT-SCARECROW transcriptional cascade is central to cell fate decisions in the Arabidopsis root cortex and endodermis (ground tissue). We experimentally derived a gene regulatory network for transcription factors in the Arabidopsis root ground tissue by enhanced yeast-1-hybrid assays. We then used this ground tissue gene regulatory network to dissect the regulation of the SHORTROOT-SCARECROW transcriptional cascade. We validated network predictions in planta and identified regulators of SCARECROW and SHORTROOT expression. Our results suggest that there is intercellular coordination of SHORTROOT and SCARECROW expression. Further, we leveraged cell type specific transcriptome data within a logistic regression to develop a model in which expression at the top of this transcriptional cascade is established through the opposing gradients of activators and repressors.

Biography

Erin E Sparks received her PhD in 2011 from Vanderbilt University and is currently a Post-doctoral Associate with Philip Benfey at Duke University. She has a longstanding interest in the molecular development of branched organs.

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