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On the Cover: Maintaining proper ratios among cell types in the vascular tissue is essential for plant growth and development, not only because both the xylem and the phloem are indispensable for long-distance transport of water and nutrients but also because other cell types play important roles as well. As the site of lateral root formation, the pericycle increases the length and complexity of the root system, but not all pericycle cells can produce lateral roots. Instead, evidence suggests that the pericycle consists of two cell types—one abutting the xylem, and the other associated with the phloem—and that only the xylem-associated pericycle can form lateral roots. The phytohormones auxin and cytokinin are known to be antagonistic to each other in vascular tissue patterning. Auxin is required for xylem differentiation and lateral root formation, whereas cytokinin promotes phloem specification but inhibits lateral root formation. SHORT-ROOT (SHR) is an important regulator of root morphogenesis in Arabidopsis. In addition to its well-characterized role in ground tissue patterning, SHR also controls stem cell renewal, vascular tissue patterning, and lateral root formation, but the underlying mechanisms remain unclear. In this issue, Cui et al. (1221–1231) report dissecting the SHR developmental pathway by a method (chromatin immunoprecipitation followed by microarray analysis) that reveals the genome-wide locations of SHR direct targets. Their results indicate that SHR promotes the formation of xylem and xylem-associated pericycle by reducing the level of cytokinin through a CYTOKININ OXIDASE. In the *shr* mutant, the cytokinin level is elevated, and the xylem domain and associated pericycle are diminished, whereas the phloem domain and associated pericycle are enlarged. The image shows clusters of SHR direct targets that are preferentially expressed in the quiescent center (upper panel) or the pericycle (lower panel), as well as the expression pattern of a cell type-specific GFP marker for the phloem-associated pericycle at increasing concentrations of exogenous cytokinin (from left to right: 0, 0.5, and 1 μM). Cover design and images by H. Cui.

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Continued from preceding page

BIOENERGETICS AND PHOTOSYNTHESIS

CELL BIOLOGY AND SIGNAL TRANSDUCTION

DEVELOPMENT AND HORMONE ACTION

Continued on next page

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SYSTEMS BIOLOGY, MOLECULAR BIOLOGY, AND GENE REGULATION

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