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IN BRIEF

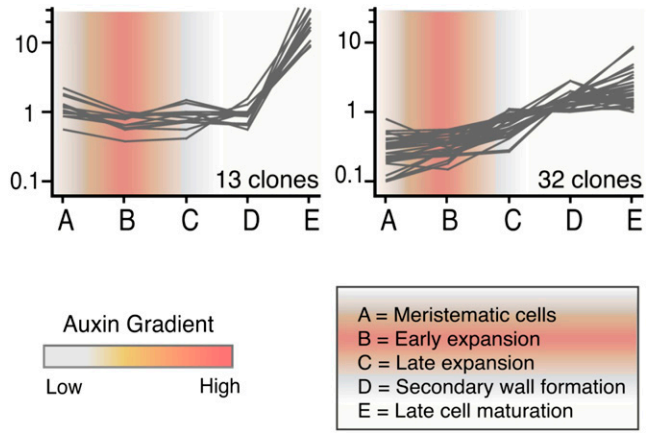
Probing the Role of Auxin in Wood Formation

Auxins constitute an important class of phytohormone involved in many aspects of plant growth and development (reviewed in Teale et al., 2006). Although auxin is believed to play a pivotal role in wood formation, the cellular and molecular events that drive this process are poorly understood. Since an auxin concentration gradient coincides with the developmental gradient of secondary xylem cells, it has been proposed that auxin is a morphogen that directly regulates wood development (Uggla et al., 1996).

In this issue, **Nilsson et al. (pages 843–855)** examined the role of auxin in wood formation in the stems of hybrid aspen (*Populus tremula* × *Populus tremuloides*). Using microarray analysis, they identified 632 genes that responded to manipulated changes in auxin concentration. Several genes known to be auxin responsive (e.g., members of the AUX/IAA family) were correctly identified in their assay, and they further confirmed their findings by tracking the auxin responsiveness of five of the identified genes by RT-PCR. Closer analysis revealed that expression of most auxin-responsive genes had limited correlation with the auxin concentration (see figure): even although maturing secondary xylem cells have lower levels of auxin than cells in the cambium, they expressed the auxin-responsive genes at higher levels. Therefore, the authors suggest that auxin-responsive genes may be more sensitive to changes in auxin concentration than to the absolute concentration of auxin.

The researchers went on to evaluate the effect of auxin signaling on wood production by developing transgenic lines of hybrid aspen with a demonstrated impairment in auxin responsiveness. In addition to having fewer cell divisions in the cambial zone, these mutants produced smaller fiber and vessel cells than wild-type trees. Thus, auxin appears to be involved in regulating the cell divisions that give rise to secondary xylem cells and also in their subsequent expansion and development.

These results suggest that auxin plays an intricate role in wood formation instead of acting as a simple morphogen that directly governs this process. The authors propose that auxin regulates wood formation by modulating the expression of a few key regulators, which in turn control the gene expression required for normal wood formation. Other phytohormones, such as ethylene and giberellin, are also likely to be involved in this process.



Expression of auxin-responsive genes does not usually mirror auxin concentration. Auxin-responsive cDNA clones identified by microarray analysis were clustered according to their expression in developmental zones (A to E) across the hybrid aspen stem. Two such clusters are shown.

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