

Rescheduled

Biochemistry and Molecular Biology  
Spring 2008 Colloquium Series

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**University of Georgia**

Friday, February 1, 2008  
10 a.m.  
1425 Biomedical & Physical Sciences Building

**Transcriptional regulation of secondary wall biosynthesis**

**Research in the Ye Laboratory**

Secondary walls are the major constituent of wood, which is the most abundant biomass produced by plants. Secondary walls are composed mainly of cellulose, lignin and hemicellulose. To make secondary walls, genes involved in the biosynthetic pathways of cellulose, lignin and hemicellulose need to be coordinately switched on. Understanding the molecular switches controlling secondary wall biosynthesis in wood is of importance in basic plant biology as well as for potential genetic engineering of wood quality and quantity in tree species. We have been using fibers in *Arabidopsis* as a model to study the molecular mechanisms underlying secondary wall biosynthesis. We have analyzed at the genome level the genes that are activated during secondary wall biosynthesis in fibers. We uncovered key roles of several transcription factors in regulating secondary wall biosynthesis. One of these transcription factor, SND1, together with its homolog were found to be master switches activating the biosynthetic pathways of the secondary wall components (Plant Cell, 18, 3158-3170, 2006; Planta, 225, 1603-1611, 2007). In addition, we discovered a number of additional players in the SND1-mediated transcriptional regulation of secondary wall biosynthesis. We hypothesize that a transcriptional network is involved in the activation of secondary wall biosynthetic genes during wood formation. Further studies of the transcriptional network regulating secondary wall biosynthesis will likely enable us to genetically alter the biosynthetic pathways of individual secondary wall components, and knowledge gained from such studies promises to lead to better strategies for genetic manipulation of fiber or wood quality and quantity.

**References**

Zhong, R., and Ye, Z.-H. (2007). Regulation of cell wall biosynthesis. Curr. Opin. Plant Biol. doi: 10.1016/j.pbi.2007.09.001.

Zhong, R., Richardson, E.A., and Ye, Z.-H. (2007). The MYB transcription factor MYB46 is a direct target of SND1 and regulates secondary wall biosynthesis in *Arabidopsis*. Plant Cell doi: 10.1105/tpc.107.053678.

Zhong, R., Richardson, E.A., and Ye, Z.-H. (2007). Two NAC domain transcription factors, SND1 and NST1, function redundantly in regulation of secondary wall synthesis in fibers of *Arabidopsis*. Planta 225, 1603-1611.

Zhong, R., Demura, T., and Ye, Z.-H. (2006). SND1, a NAC domain transcription factor, is a key regulator of secondary wall synthesis in fibers of *Arabidopsis*. Plant Cell 18, 3158-3170.