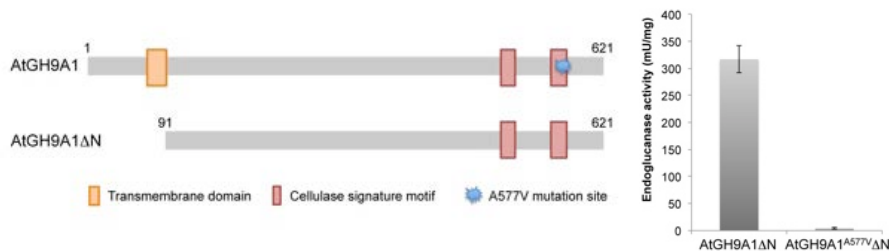


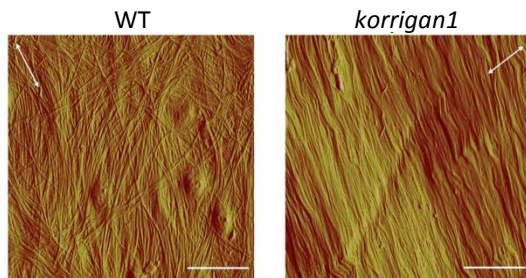
A novel allele of *korrigan1* abolishes endoglucanase activity and affects the organization of cellulose microfibrils

Scientific Achievement

We show that KORRIGAN1 (KOR1) is associated with CESA complexes (CSCs) and that its endoglucanase activity is important for normal cellulose synthesis.



Left: A nucleotide substitution in *korrigan1* resulted in an amino acid substitution (A577V) within the second of its glycosyl hydrolase family 9 active site signature motifs. Right: KOR1^{A577V} abolishes its endoglucanase activity.



Atomic force microscopy (AFM) images of the inner cell wall of hypocotyls revealed that *korrigan1* lost the typical multilayer cellulose microfibril organization and showed abrupt kinks in cellulose microfibrils.

Lei L, Zhang Z, Strasser R, Lee CM, Gonneau M, Mach L, Vernhettes S, Kim SH, Cosgrove DJ, Li S, Gu Y (2014) The *jiaoyao1* mutant is an allele of *korrigan1* that abolishes endoglucanase activity and affects the organization of both cellulose microfibrils and microtubules. *Plant Cell* 26 (6), 2601-2616.

Significance and Impact

This study advances our understanding of how plant cells establish and maintain the transverse orientation of cellulose microfibrils during cell expansion. Our study also suggests the potential for discovery of additional roles for KOR1 in plant development and cellulose synthesis.

Research Details

- Identified a novel A577V missense mutation in the cellulase signature motif of KOR1;
- KOR1 associates with CSCs at multiple locations;
- KOR1^{A577V} abolishes the endoglucanase activity of KOR1 but it does not affect its interaction with CESAs *in vitro*;
- AFM and SFG spectra analysis showed that *korrigan1* mutant contains more transversely oriented cellulose microfibrils and better meso-scale packing than those in wild type.