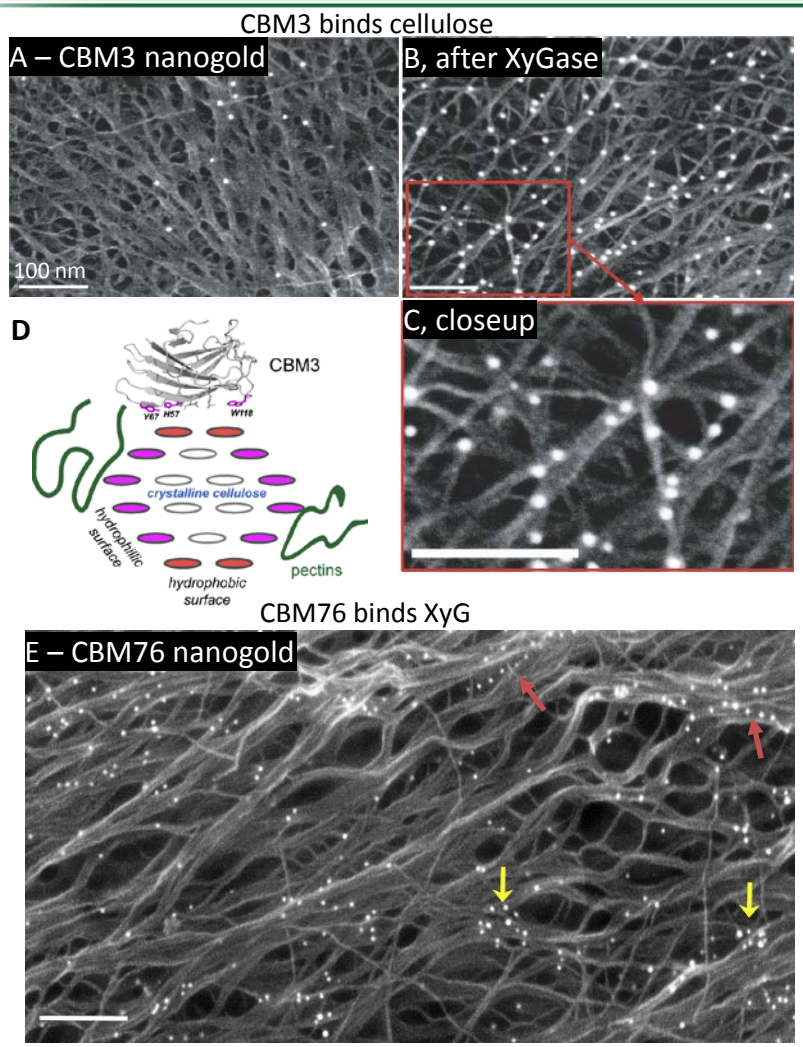
Nanoscale localization of xyloglucan (XyG) in plant primary cell walls (PCW)



Y Zheng, X Wang, Y Chen, E Wagner and DJ Cosgrove (2018). "Xyloglucan in the primary cell wall: assessment by FESEM, selective enzyme digestions and nanogold affinity tags." Plant J **92: 211-226**

Scientific Achievement

Based on novel FESEM-based methods, we find that XyG is bound in an extended form to the hydrophobic face of cellulose microfibrils and in coiled forms in the space between microfibrils.

Significance and Impact

This study provides direct evidence on four key points of PCW structure: which cellulose surfaces bind XyG, how much surface is covered, what is the XyG conformation in the PCW, what is the extent of XyG-cellulose tethering.

Research Details

The cell-side surface of onion scale epidermal PCW was treated with pectate lyase to remove pectin, then labeled with CBM3 or CBM75 conjugated to nanogold and imaged by FESEM w/backscattered electron detection.

A-C: CBM3-nanogold binding before and after xyloglucan-ase treatment. D: cross section of a cellulose microfibril with proposed CBM3 binding to hydrophobic face (image by Mei Hong, MIT).

E: CBM76-nanogold binding detect XyG distribution; red arrows show extended conformations; yellow arrows show apparent coiled conformations.