Understanding directional growth in plants through cell wall mechanics

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Directional growth is critical for organismal function and can occur at cell and organ scales. In plants, directional organ growth is critical for responses to the environment (tropisms), navigation of space, and basic survival events such as emergence from the soil. We have been studying the directional growth of the young seedling, with respect to emergence from the soil. In the model species Arabidopsis thaliana, early seedling directional growth occurs through elongation of the hypocotyl, which sits between the shoot tip and root system. Hypocotyl elongation is a classic example of anisotropic growth, where growth in the longitudinal direction exceeds that in the radial direction; anisotropic growth has functional roots – if the goal is to get out of the soil quickly, more upward growth should be advantageous. Or is it? We have identified an environmental condition which causes hypocotyls to grown less anisotropically. Our recent data indicates that in some cases less anisotropy is advantageous for seedling emergence. We will explore the mechanisms behind this shift in anisotropic growth with a focus on two main mechanical parameters: cell wall material anisotropy and cell wall elastic asymmetry.

Short Bio:

Siobhan A. Braybrook is an Assistant Professor of Molecular, Cell, and Developmental Biology at UCLA. Her lab is interested in understanding how cell walls, in plants and algae, regulate and contribute to organismal growth and success. Their works spans from cells to whole organisms, from biology to materials science, from molecules to ecology.