

The plant cell's corset

September 2 2009

We still have a lot to discover about the mechanism in plants that ensures cell growth in a specific direction. However it is clear that a structure of parallel protein tubes plays an important role. Simon Tindemans investigated this structure during his doctoral research at the FOM Institute for Atomic and Molecular Physics, The Netherlands. According to him small 'catastrophic collisions' are a crucial part of the process leading to its creation.

Unlike humans, plants cannot depend on a skeleton for their rigidity. Instead nearly all [cells](#) have to contribute to this. If a plant becomes taller, and therefore the cells longer, then the cell wall must be extended in a certain direction. This direction-sensitive growth is enabled by the microfibrils in the cell wall, which are wrapped around the cell in a certain direction like a corset.

The position of this 'corset' reflects the underlying pattern of parallel microtubules, rigid thin [protein](#) tubes, which are located on the inside of the [cell wall](#) and the cell membrane.

Tindemans carried out his research within the NWO programme Computational Life Sciences. He wanted to know how the microtubules in plant cells, which 'crawl' like worms over the inside of the cell membrane, all acquire the same orientation.

Analyses and simulations revealed that the arrangement of microtubules is mainly caused by 'catastrophic collisions'; after such a collision a growing microtubule begins to shrink. Simulations also revealed that the

cell could determine the direction of the 'corset' by means of small localised changes in the characteristics of the microtubules.

Source: NWO

Citation: The plant cell's corset (2009, September 2) retrieved 26 April 2024 from <https://phys.org/news/2009-09-cell-corset.html>

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