

Plant scientists unravel a molecular switch to stimulate leaf growth

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Cell division is essential for growth and development of all multicellular organisms. In plants, leaf growth consists of two different phases. A first phase is characterized by intense cell division, which leads to the formation of many new cells. During the second phase, cell division activity declines, the cells elongate and acquire a certain expertise. In a small leaf that just initiated from the stem, almost all cells are in the active division phase. Later on, when the leaf matures, cells at the top of the leaf switch to the specialization phase. The more time cells stay in the first phase, the more cells are being formed and the bigger the ultimate leaf size will be. It was already known that the protein **ANGUSTIFOLIA3 (AN3)** fulfils an important role in determining the timing and activity of cell division in the leaf. However, the precise mode of action of AN3 was not yet understood.

State-of-the-art techniques

To unravel a biological process on a molecular level, scientists typically develop plants in which genes are switched on or off. Studying the effect of these "aberrant" situations on plant growth can in some cases resolve the function of these genes. However, this approach often is like finding a needle in a haystack. Plant scientists of VIB and Ghent University therefore used various state-of-the-art techniques to study the effect of the "aberrant" molecular situation on all genes and all proteins at once. As such, the researchers could elucidate the function of AN3 in the model plant *Arabidopsis*.

Unpacking DNA to switch on gene activity

All cells of a particular plant contain the same genetic information, which is stored in their DNA. DNA is packed in a condensed structure, the chromatin. When certain genes need to be activated, the chromatin will be unpacked to make specific DNA regions accessible. This process is mediated by so-called "[chromatin remodeling](#)" complexes. An international team of scientists led by Dirk Inzé of VIB and Ghent University demonstrated that AN3 functions as part of a chromatin remodeling complex. More precisely, AN3 recruits the chromatin remodeling complex towards specific DNA regions that harbor cell division genes. As long as AN3 is active and keeps recruiting the chromatin remodeling complex, [cells](#) retain their division activity, resulting in plant organs with increased size. The AN3 protein complex regulates the length of the cell division phase in the [leaf](#) and hence the transition from [cell division](#) towards cell specialization.

More information: Liesbeth Vercruyssen et al. "ANGUSTIFOLIA3 binds to SWI/SNF chromatin remodeling complexes to regulate transcription during Arabidopsis leaf development." *The Plant Cell* online 17 januari 2014 [DOI: 10.1105/tpc 113.115907](https://doi.org/10.1105/tpc.113.115907)

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