

# Newly discovered signaling pathway ensures that plants remember to flower

August 20 2009

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Electron micrograph of the common wallcress, *Arabidopsis thaliana*. Image: Jürgen Berger

(PhysOrg.com) -- Why do some plants blossom even when days are short and gray? Scientists at the Max Planck Institute for Developmental Biology have found the answer to this question: An endogenous mechanism allows them to flower in the absence of external influences such as long days. A small piece of RNA, a so-called microRNA, has a central role in this process, as a decline of its concentration in the shoot apex triggers flowering.

MicroRNAs are very short RNA snippets that have emerged in recent years as essential regulators of gene function in both plants and animals. By binding to complementary motifs in a [messenger RNA](#), they inhibit its translation into protein. This process thus blunts the activity of the corresponding gene.

In Tübingen, developmental biologists have discovered that the common wallcross, *Arabidopsis*, uses this [regulatory mechanism](#) to switch from vegetative to reproductive development. A group of related regulators, the SPL proteins, play an important role in promoting the onset of flowering. In young plants, production of SPL proteins is prevented by high levels of microRNA156.

Jia-Wei Wang and colleagues demonstrate that independent of external cues, the concentration of the microRNA declines over time, like sand running through an hourglass. When the [microRNA](#) concentration falls below a certain level, enough SPL proteins are produced to activate the flowering process even in the absence of other regulators that measure day length or external temperature. This in turns allows a sufficiently old plant to flower, even in an unfavorable environment.

Interestingly, the SPLs do double duty, since they have supporting roles when plants flower in response to long days. Furthermore, both the SPLs and other regulators eventually converge on a similar set of targets crucial for flowering.

"Flowering is crucial for the long-term survival of plants. The redundancy of environment-dependent and -independent mechanisms ensures that [plants](#) do not wait forever until flowering. Better flower once, then never", explains Detlef Weigel, director at the Max Planck Institute for Developmental Biology.

[More information:](#) Jia-Wei Wang, Benjamin Czech, Detlef Weigel;

miR156-regulated SPL transcription factors define an endogenous flowering pathway in *Arabidopsis thaliana*; *Cell*, August 21, 2009; doi: 10.1016/j.cell.2009.06.014 .

Source: Max-Planck-Gesellschaft ([news](#) : [web](#))

Citation: Newly discovered signaling pathway ensures that plants remember to flower (2009, August 20) retrieved 20 April 2024 from <https://phys.org/news/2009-08-newly-pathway.html>

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