Protein Tells Flowers When Spring Starts

The bursting blooms of many types of flowers herald the onset of spring. New research is helping scientists unravel the cellular signaling that prompts the plants to blossom after their winter slumber. According to a report published in today's issue of the journal Science, the action of one protein that responds to daylight starts a chain reaction that allows flowering to commence.

Previous research had identified a protein called CONSTANS that manages a plant's flowering in response to changes in day length. In the new work, Steve A. Kay and his colleagues at the Scripps Research Institute identified a second protein, FKF1, that exerts control over CONSTANS and thus also regulates flowering. Using hybrid plants, the researchers determined that FKF1 physically interacts with a transcription factor (CDF1), which in turn suppresses CONSTANS. FKF1 serves to degrade CDF1, so mutant plants lacking the fKF1 gene have higher levels of CDF1. In addition, they also flower later than normal plants do and show lower levels of CONSTANS activity.

In wild plants, the longer days that accompany springtime allow the light-sensitive FKF1 to destroy more CDF1 in the afternoon, which in turn lifts the constraints on CONSTANS and allows flowering to proceed, the scientists say. FKF1 also promotes transcription of CONSTANS during the critical time period for flowering, the team reports, but that mechanism remains less well-understood.