recombination. No neoplasias were seen outside the GI tract, and *Blm* LOH was not evident in tumour tissue.

The results of Gruber *et al*. lend further weight to these findings. In a study of 1,244 Ashkenazi Jews with colorectal cancer (CRC), those with CRC were found to be twice as likely to carry the BLM^{Ash} allele as those Ashkenazi Jews without CRC. These findings, and those of Heppner Goss *et al*., indicate that BLM haploinsufficiency might compromise the maintenance of genomic integrity, perhaps by causing an increased mutation rate in heterozygous cells, so speeding their progression to tumorigenesis.

Jane Alfred

References and links

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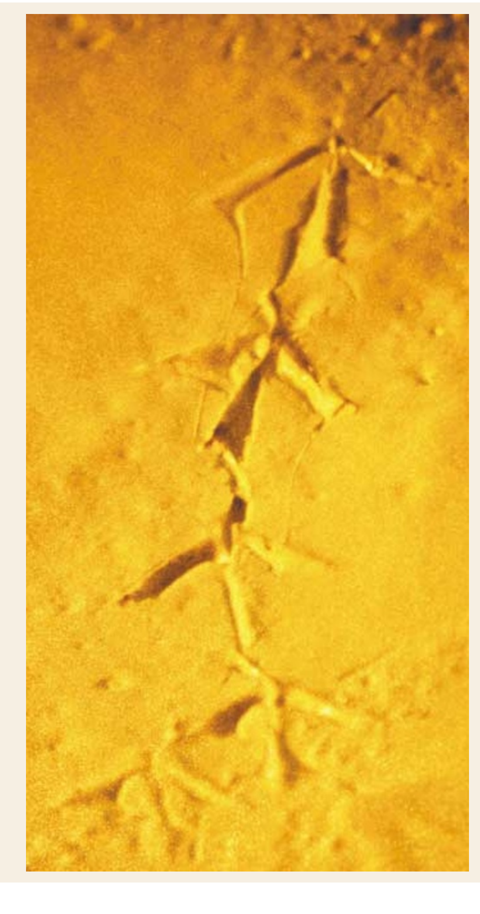
WEB SITE

Joanna Groden's lab: http://www.hhmi.org/research/investigators/groden.html



CIRCADIAN CLOCKS

How plants measure their days

How do some plants know to flower come the long days of summer? Although plant biologists have discovered some of the components of the circadian system that controls this so-called photoperiodic response, they have struggled to understand how both temporal and light information are integrated by plants to control flowering time. Now Marcelo Yanovsky and Steve Kay identify the *Arabidopsis* transcriptional activator CONSTANS (CO) as the point at which this integration takes place. They show, for the first time, that light has a direct effect on the ability of *Arabidopsis* to sense and measure a day's length, in addition to its well-known effects on establishing circadian rhythms.

CO is a key component of the photoperiodic response. Its expression is under circadian control — during short days, its daytime expression levels are low and rise only after sunset, whereas during long days, *CO* mRNA levels start accumulating towards dusk. A direct target of CO is *FLOWERING LOCUS T* (*FT*). Its expression also peaks at dusk during long days, at the time when the rise in *CO* daytime expression coincides with an illuminated part of the day. Could CO function therefore be light dependent?

To investigate this, the authors began by analysing the importance of the circadian control of CO for daylength discrimination in the *Arabidopsis* mutant *toc1*. This mutant flowers early in short days, and was used because its photoperiodic defect is due only to a circadian — and not to a light-response — defect. In *toc1* plants, overall *CO* expression levels remain relatively normal; however, the phase of *CO* expression is significantly advanced under short-day conditions, resulting in the accumulation of high levels of *CO* at the illuminated end of the day. *FT* also accumulates at this time under similar conditions in *toc1*, but not in wild-type, plants, indicating that the earlier shift in *CO* expression induces *FT* expression and that the circadian control of *CO* expression is required for daylength discrimination. Moreover, the high expression of *FT* during short days is probably the molecular defect that underlies the *toc1* phenotype, because the phenotype was abrogated when *FT* was mutated in *toc1* plants.

So, what is the role of light in this response? When the authors assayed *FT* expression in plants that constitutively express *CO*, these plants showed high but rhythmic (peaking at dusk) *FT* expression patterns under long-day conditions. This pattern, however, depended on exposure to light, indicating that CO regulation of *FT* is light dependent. Because *FT* levels are greatly reduced in plants that are mutant for the photoreceptor CRY2, and because these plants have apparently normal *CO* expression patterns, the authors considered it to be a strong candidate mediator of CO's light-dependent regulation of *FT*. In fact, they found that both CRY2 and the photoreceptor PHYA are required for light-induced upregulation of *FT* expression and that this response requires functional CO.

These findings strongly indicate that daylength can regulate flowering time through the coincidence of light — as detected by CRY2 and PHYA — with a particular circadian phase, as manifested by high levels of *CO* expression. Together these events cause a rise in *FT* expression, which triggers flowering. The pathways that control this flowering feat are, however, in need of further illumination.

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References and links

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WEB SITE

Steve Kay's lab: http://www.scripps.edu/cb/kay