## IN THE NEWS

**Human embryo cloning** Advanced Cell Technology's (ACT) announcement that it has created human embryos for therapeutic cloning made headlines across the world but received a mixed reception. As *The Guardian* (UK) summed up, **'The announcement … has been hoped for and feared in equal measure and will arouse fierce passions on all sides.'**

Some embryos were produced by somatic-cell nuclear transfer and survived to six cells, whereas others were created by parthenogenetic activation, as published in *E-biomed: The Journal of Regenerative Medicine*. Despite ACT's upbeat media briefings, most newspapers reported the experiments as failures, as the embryos died before stem cells could be isolated. **' "It's a complete failure," said Dr George Siedel, a cloning expert at Colorado State University. ' (*New York Times*).**

This research raises many ethical and regulatory dilemmas for governments. Although US federal funds cannot be used for such research, privately funded scientists are under no such restriction. **'Several members of congress yesterday vowed to place the legality issue on top of their agendas.' (*Washington Post*).**

In the UK, therapeutic cloning research is regulated by the Human Fertilization and Embryology Authority, but the ProLife Alliance has recently argued successfully that **'the Act setting up the HFEA did not give it authority over embryos produced other than by normal fertilisation.' (*The Daily Telegraph*).**

Religious and anti-abortion groups also condemned the research. Italy's Archbishop of Ravenna said **'… scientists claim that human life doesn't exist until implantation … An embryo has dignity from the first moment.' (*La Repubblica*).**

*Jane Alfred*

PLANT GENETICS

# Flowering time!

**One of the most important steps in the life of any organism is the transition to the reproductive phase of development. In plants, this corresponds to the decision to flower, which, as well as being influenced by intrinsic factors, is induced by two environmental stimuli: day length (photoperiod) and an extended exposure to cold temperatures (vernalization). Two papers now report advances into how plants respond to these two external stimuli. Gendall *et al.* have found a gene that is required for a cell's memory of the vernalized state, whereas El-Assal *et al.* have identified a genetic variant that is responsible for natural variation in *Arabidopsis*' response to day length.**

**Vernalizing plants show a characteristic delay between their exposure to cold and flowering, as if cells retained a memory of the cold spell and later acted on it by activating floral-promoting genes. By cloning and characterizing the *VERNALIZATION 2* (*VRN2*) gene, Gendall *et al.* have come one step closer to finding out the mechanism behind this memory, which is stable over several cell divisions. Cold temperatures are thought to reduce *FLOWERING LOCUS C* (*FLC*) expression, and consequently repress floral-promoting genes. The *VRN2* gene was previously recovered in a screen for mutants with a reduced sensitivity to vernalization, and encodes a nuclear protein similar to the Polycomb group of transcriptional repressors. Could there be a link between the function of VRN2, the delayed response to vernalization and *FLC* expression? The authors found that, although VRN2 does not affect the downregulation of *FLC* mRNA in response to the cold, it is required to maintain the repression of *FLC* after the plant returns to normal temperatures. Vernalization might therefore have an epigenetic basis — an idea that was further confirmed by the enhanced DNase sensitivity of the *FLC* promoter in a *vrn2* mutant.**

**Plants at different latitudes respond differently to flower-inducing environmental stimuli, and several QTL for natural variation in flowering time have been identified. Now, El-Assal *et al.* have found that a single genetic lesion in a major-effect QTL is responsible for the difference in flowering response to photoperiod of two *Arabidopsis* strains — one from Northern Europe (L*er*) and one from the Tropics (Cvi). Cvi plants flower earlier than most strains (including L*er*) when days are short. The authors show that a QTL previously found to account for most of the difference in the photoperiod response for flowering time between L*er* and Cvi corresponds to the *CRY2* gene, which encodes the blue-light photoreceptor cryptochrome 2. Remarkably, the difference in day-length sensitivity between L*er* and Cvi is due to one amino-acid substitution in *CRY2*. The Cvi variant of *CRY2* is a dominant allele that confers its characteristic short-day flowering when transformed into L*er* plants, probably by preventing light-induced depletion of the CRY2 protein.**

**El-Assal and colleagues have proven the now established value of using quantitative natural variation for finding new genes or gene functions. In an accompanying article, Maloof *et al.* report that a single mutation in a different photoreceptor affects intraspecific variation in seedling emergence, another light-dependent process. Although we're probably still some way from describing how plants integrate environmental cues that promote flowering with genetically determined factors, the signs are that the field is blooming.**

*Tanita Casci*

### References and links

**ORIGINAL RESEARCH PAPERS** Gendall, A. R. *et al*. The *VERNALIZATION 2* gene mediates the epigenetic regulation of vernalization in *Arabidopsis*. *Cell* **107**, 525–535 (2001) | El-Din El-Assal, S. *et al.* A QTL for flowering time in *Arabidopsis* reveals a novel allele of *CRY2*. *Nature Genet.* **29**, 435–440 (2001) | Maloof, J. N. *et al.* Natural variation in light sensitivity of *Arabidopsis*. *Nature Genet.* **29**, 441–446 (2001)

**WEB SITE**

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