

VERNALIZATION AND THE EPIGENETIC MEMORY OF WINTER

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Certain plants, such as biennials or winter annuals, require relatively long periods of cold exposure to initiate flowering. Cold exposure renders the meristem of such cold-requiring species competent to flower, and this acquisition of competence is known as vernalization. A vernalization requirement ensures that flowering does not occur prematurely before the onset of winter. Molecular and genetic studies of vernalization in *Arabidopsis* have revealed that the state of expression of the gene FLOWERING LOCUS C (FLC) is a major component of meristem competence. FLC encodes a MADS-domain protein that acts as an inhibitor of flowering: high levels of FLC expression prevent the shoot apical meristem from initiating flowering. Exposure to prolonged cold causes an epigenetic switch of FLC to an unexpressed state and this repression of FLC renders the shoot apical meristem competent to flower. I think it is reasonable to refer to this vernalization-mediated acquisition of the ability to flower as an epigenetic switch. This is a switch that is mitotically stable in the absence of the inducing signal; in this case, a stable acquisition of competence in meristem cells after cold is no longer present. The modifications of FLC chromatin that are involved in this epigenetic switch will be discussed.