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Winter-annual accessions of *Arabidopsis thaliana* are often characterized by a requirement for exposure to the prolonged cold of winter to initiate rapid flowering in the following spring. The block to flowering prior to cold exposure is due to high levels of expression of the flowering repressor *FLC*. Exposure to cold promotes flowering through a process known as vernalization that epigenetically represses *FLC* expression. Rapid-cycling accessions typically have low levels of *FLC* expression and therefore do not require vernalization. A screen for mutants in which a winter-annual type of *Arabidopsis* is converted to a rapid-cycling type has identified a histone H3 methyl transferase that is required for elevated *FLC* expression. Lesions in this histone methyl transferase, *EARLY FLOWERING IN SHORT DAYS (EFS)*, result in a reduction of the level of histone H3 lysine 4 trimethylation in *FLC* chromatin. *EFS* is also required for the expression of other genes in the *FLC* clade of flowering repressors such as *MAF2* and *FLC*. The requirement for *EFS* to permit expression of several *FLC* clade genes accounts for the ability of *efs* lesions to suppress delayed flowering due to the presence of *FRIGIDA*, autonomous-pathway mutations, or growth in non-inductive photoperiods.