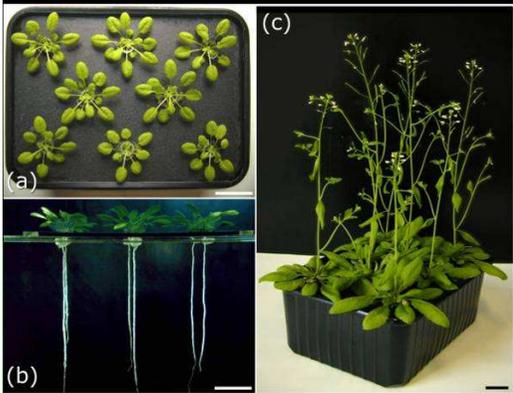


Gene activation cascade  
triggered by a single  
photoperiodic cycle inducing  
flowering in *Sinapis alba*

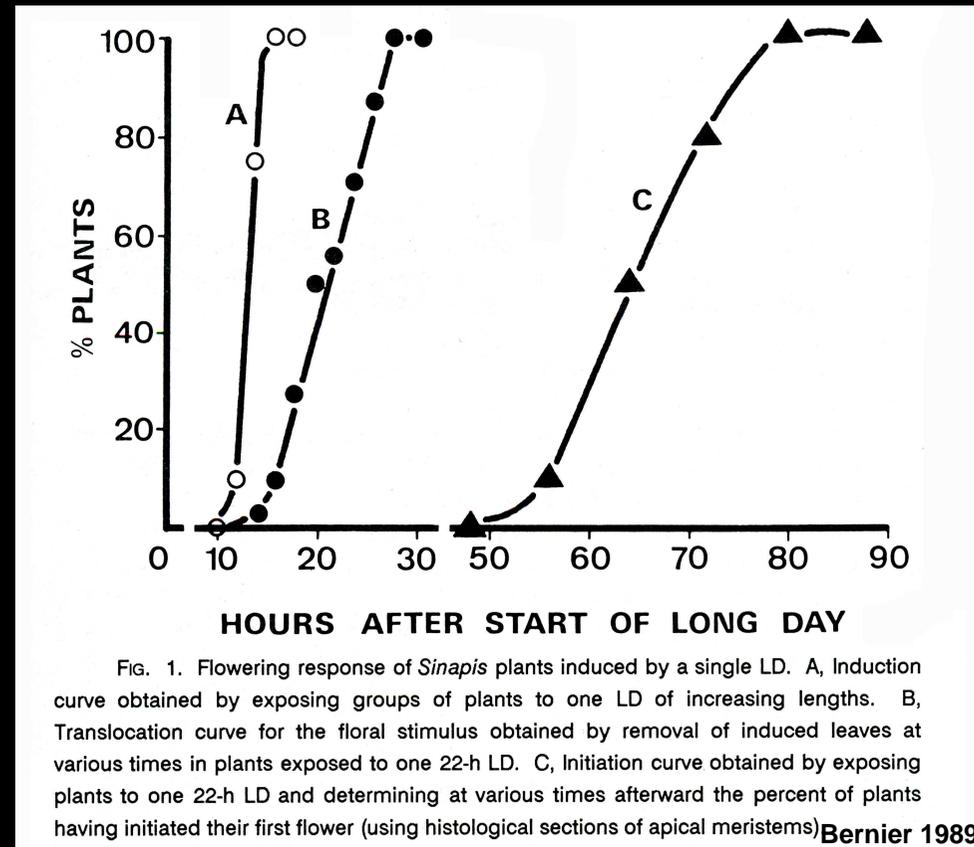
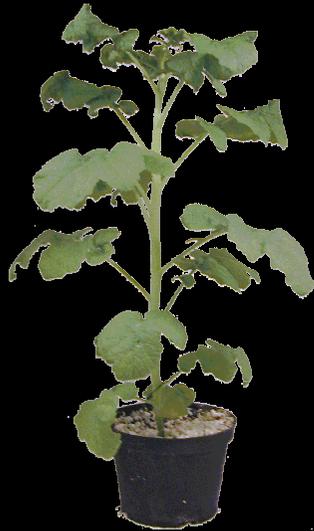
- Transpose genetics to physiological models  
→ mutual 'enrichment' of knowledge'



photoperiodic    autonomous    sympodial    biannual

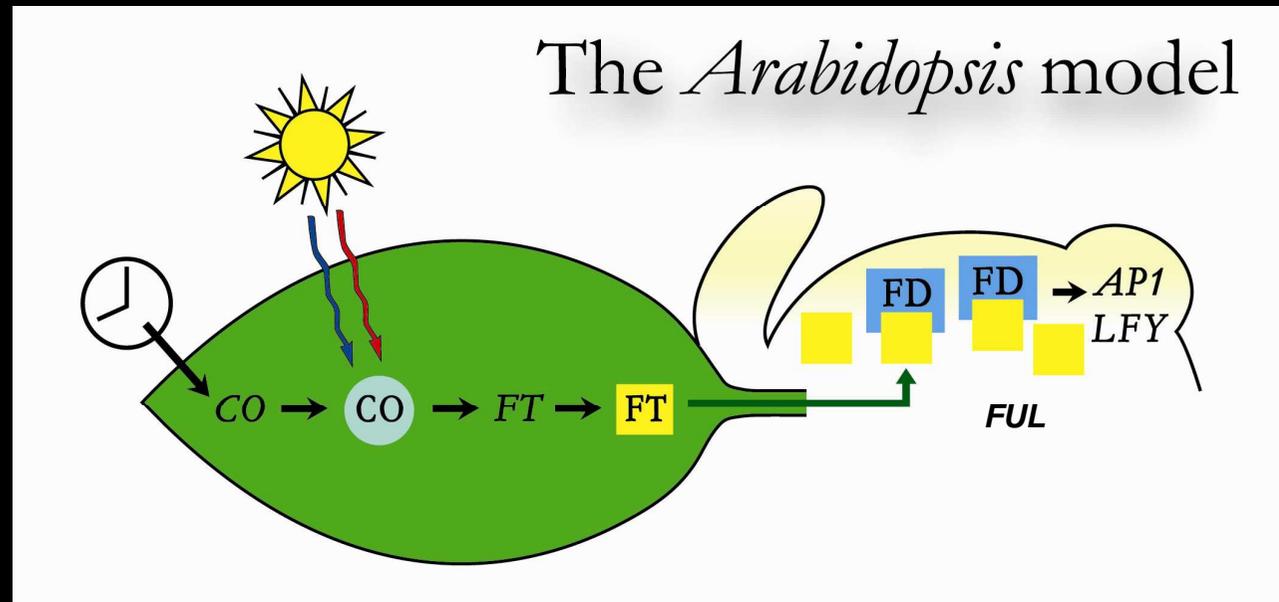


- 9-wk-old plants of *Sinapis alba* are induced to flower by a single long day (LD)





# from *CONSTANS* to *APETALA1*



- Cloning of *SaCO* and *SaFT*

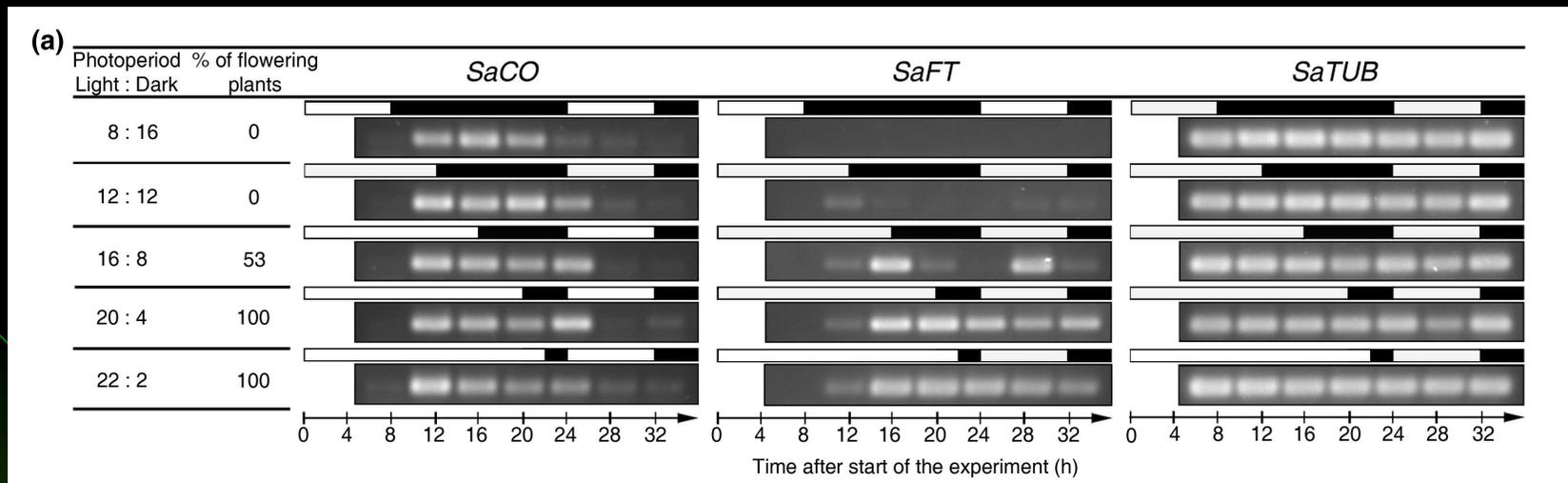


- Other probes available :

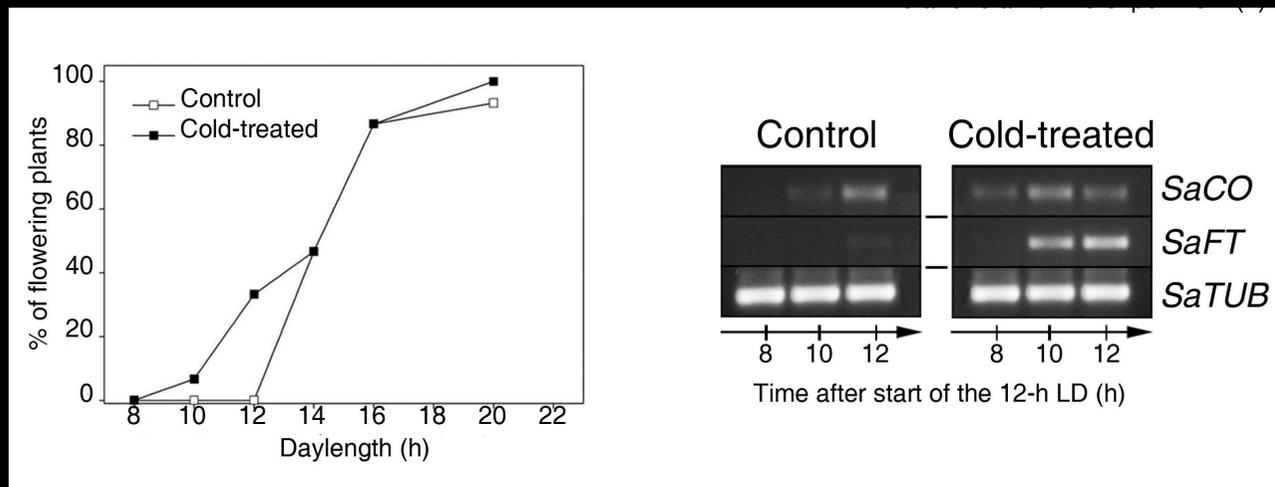
*SaSOC1* (*SaMADS-A*), *SaFUL* (*SaMADS-B*)  
*SaLFY*, *SaAP1* (*SaMADS-C*)

- ‘Induction’ curve :

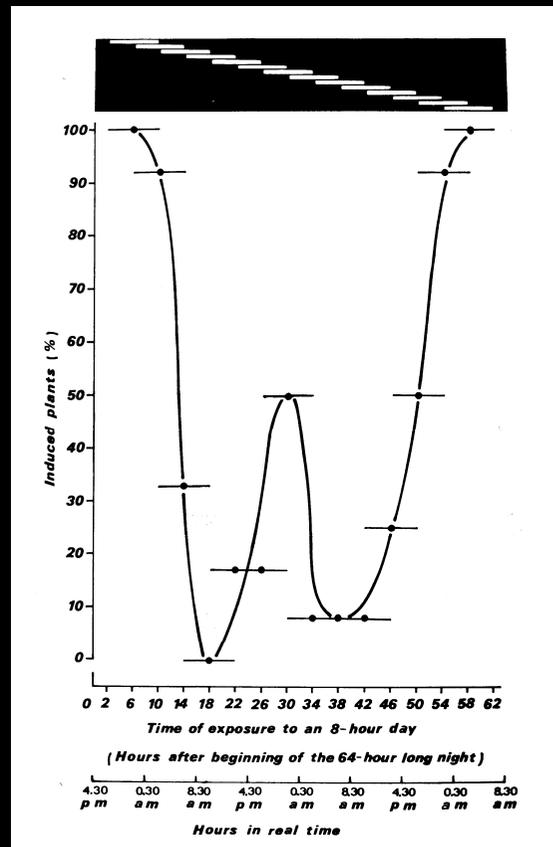
- critical photoperiod → *SaCO* gives the time
- Quantitative effect of the LD → *SaFT* is the rheostat



- Cold enhances plant responsiveness to photoperiod (D'Aloia et al., 2008. *New Phytol.* 178, 755-765)



- Plants are also responsive to a single 'displaced short day' (DSD)



Kinet et al., 1973.

- *SaFT* is expressed as an 'after-effect' of the DSD

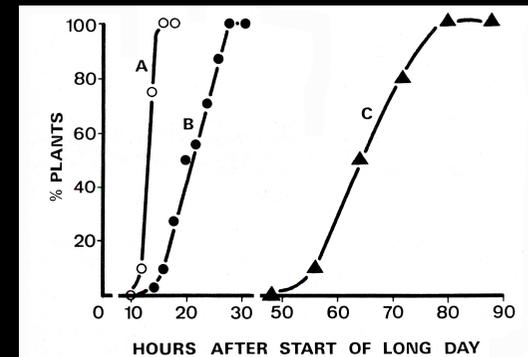
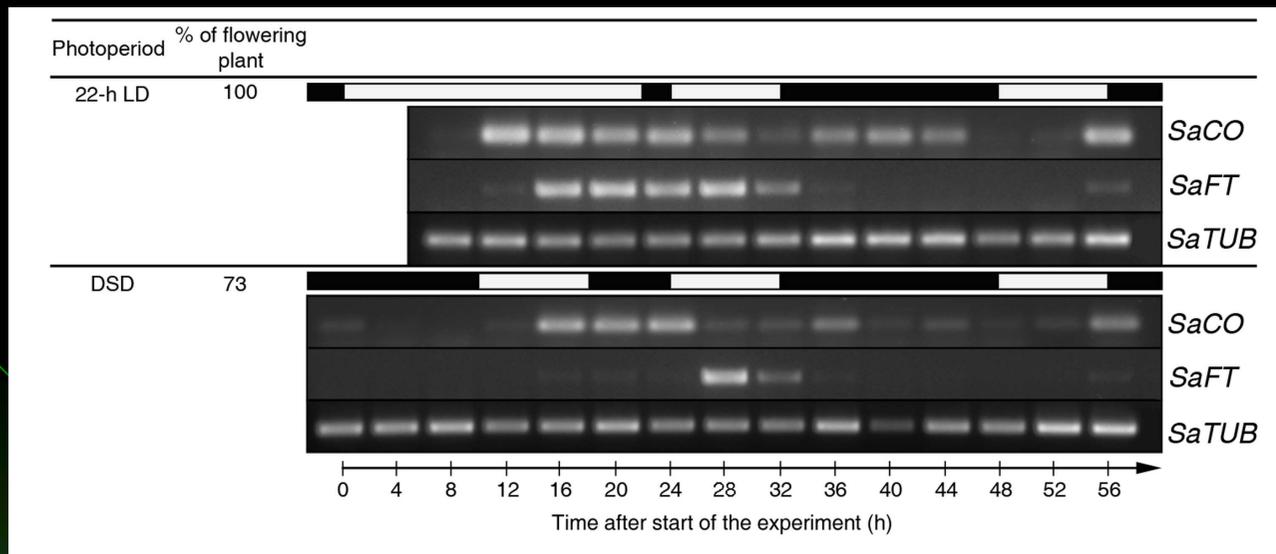
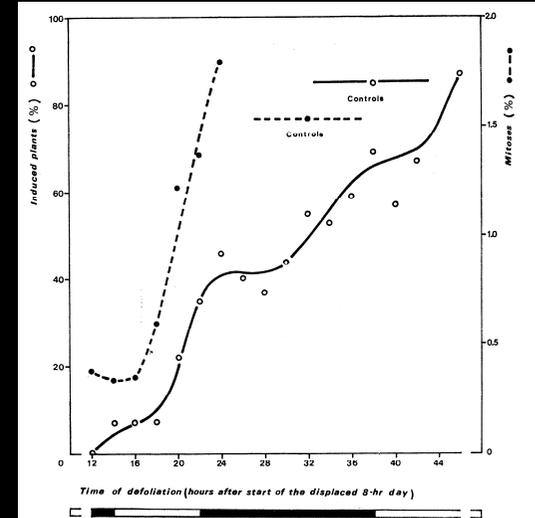


Fig. 1. Flowering response of *Sinapis* plants induced by a single LD. A, Induction curve obtained by exposing groups of plants to one LD of increasing lengths. B, Translocation curve for the floral stimulus obtained by removal of induced leaves at various times in plants exposed to one 22-h LD. C, Initiation curve obtained by exposing plants to one 22-h LD and determining at various times afterward the percent of plants having initiated their first flower (using histological sections of apical meristems).

Bernier, 1989



Effect of timing of defoliation on export of the mitotic stimulus and of the floral stimulus from leaves of plants exposed to a single displaced 8-hr day. Per cent of mitoses (right ordinate) determined 28 hr after the start of the displaced day.

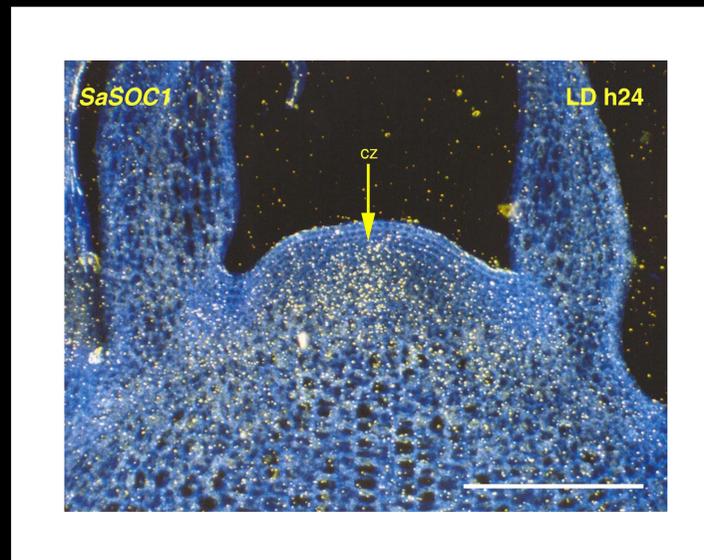
Bernier et al., 1974

- The 'after' events are important in threshold conditions

	22-h LD		DSD	
	with SD2	without SD2	with SD2	without SD2
Exp. 1	92.9	100	73.3	46.7
Exp. 2	100	86.7	80	28.6
Exp. 3	100	100	46.7	26.7

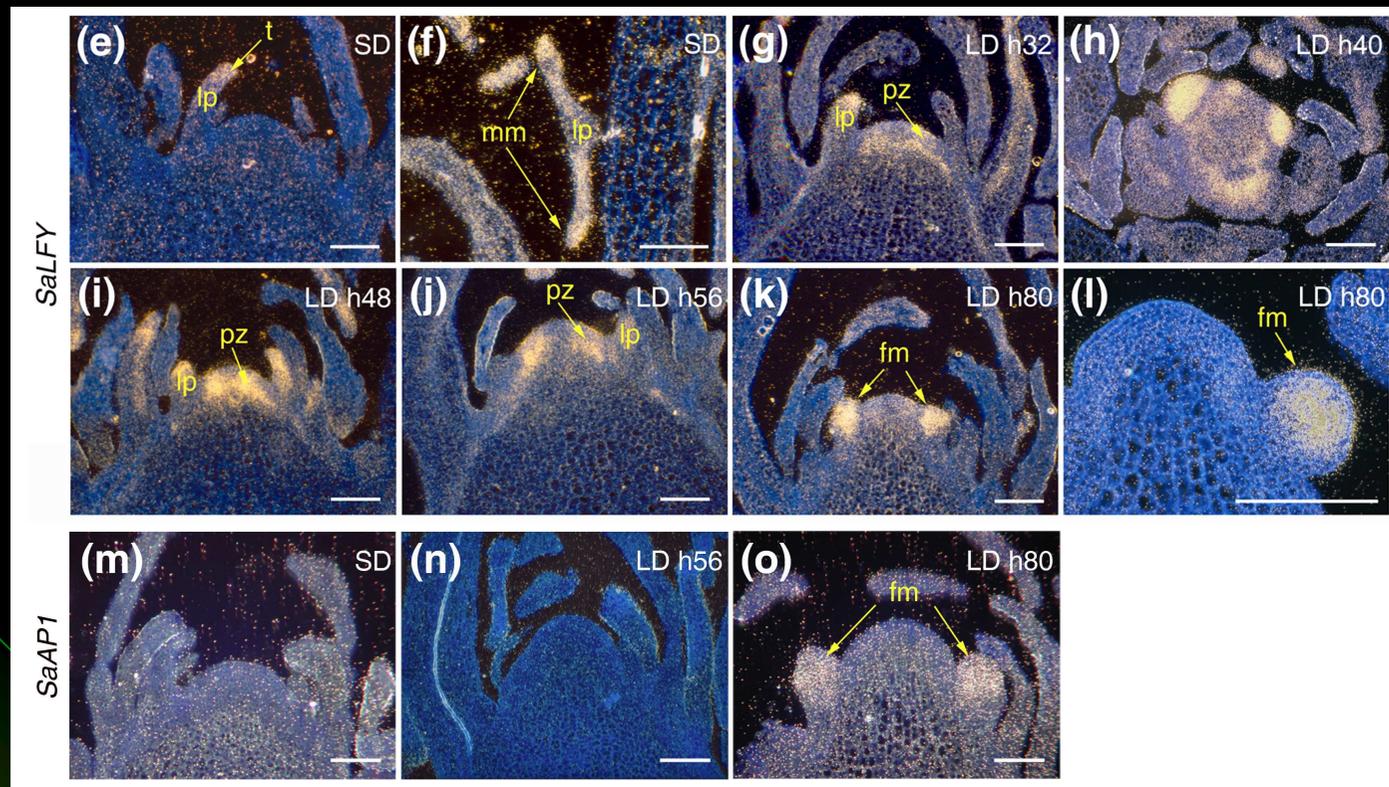
# Cascade in the SAM after a single 22-h LD

- *SaSOC1* is activated very early in L3 cells



See also Bonhomme et al., 2000. *Plant J.* 24, 103-111

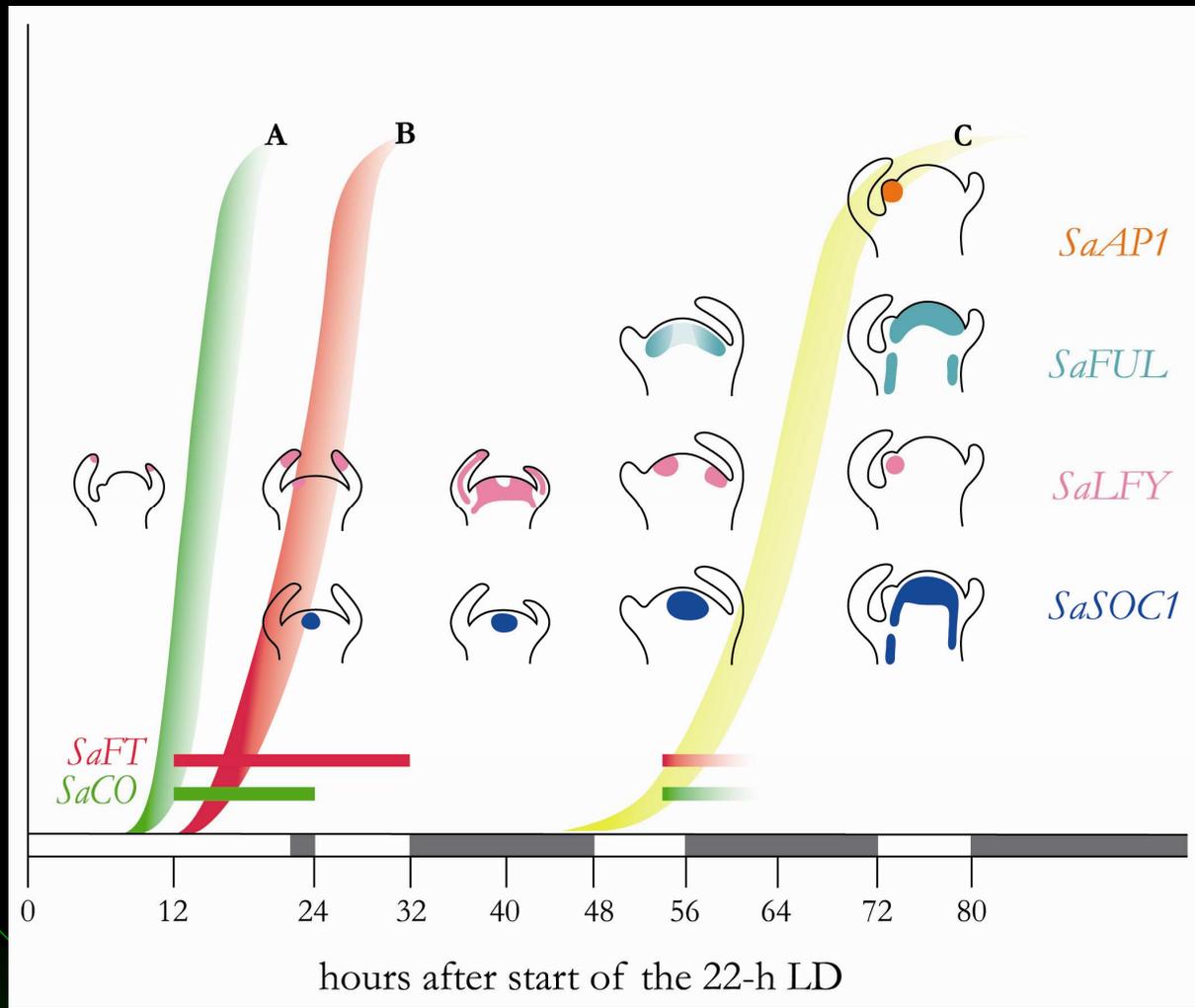
- *SaLFY* is activated in a ‘vegetative’ pattern before the ‘canonical’ activation in floral meristems



**Table 5.** *Timing of changes in growth parameters in the shoot apex of S. alba during floral transition induced by one LD*

Hours after start of LD	Changed growth parameter
24	Increased rate of leaf production (=decreased plastochron duration)
48	Increased growth of leaf primordia Increased meristem volume Increased length of apical internodes Decreased apical angle More precocious initiation of axillary meristems
72	Meristem doming Decreased plastochron ratio Increased phyllotaxis index

Bernier, 1997



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- **Delphine Bonhomme**
- **Françoise Bonhomme**
- **Prof. G. Bernier**



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