P011 A timing mechanism for stem cell maintenance and differentiation in *Arabidopsis* reproductive organ development

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In plant reproduction, floral stem cells are regulated by well-coordinated interplay of cell-cell signaling and transcriptional events. The maintenance of stem cells in the floral meristem is terminated after the production of a fixed number of floral organ primordia. The *Arabidopsis thaliana* homeodomain protein WUSCHEL (WUS) induces the floral homeotic gene *AGAMOUS (AG)*, and in turn AG represses *WUS* expression. This feedback pathway plays a major part in floral meristem control. Here we show that KNUCKLES (KNU) mediates the repression of *WUS* in the floral meristem. AG directly induces the transcription of *KNU*, which encodes a C2H2-type zinc finger protein with a conserved transcriptional repression motif. In turn, KNU represses *WUS* transcription to abolish stem cell activity. We also show the timing of *KNU* induction is key in balancing proliferation and differentiation in flower development. Delayed *KNU* expression results in an indeterminate meristem, whereas ectopic *KNU* expression prematurely terminates the floral meristem. Furthermore, proper *KNU* regulation requires AG-dependent changes of a repressive histone modification of the *KNU* locus. Based on these data, we propose a molecular mechanism controlling the developmental timing by the negative feedback loop in plant stem cell maintenance and differentiation.