

2018 LPS GGD Best Paper Award: Heather Meyer

Fluctuations of the transcription factor ATML1 generate the pattern of giant cells in the *Arabidopsis* sepal

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Abstract Multicellular development produces patterns of specialized cell types. Yet, it is often unclear how individual cells within a field of identical cells initiate the patterning process. Using live imaging, quantitative image analyses and modeling, we show that during *Arabidopsis thaliana* sepal development, fluctuations in the concentration of the transcription factor ATML1 pattern a field of identical epidermal cells to differentiate into giant cells interspersed between smaller cells. We find that ATML1 is expressed in all epidermal cells. However, its level fluctuates in each of these cells. If ATML1 levels surpass a threshold during the G2 phase of the cell cycle, the cell will likely enter a state of endoreduplication and become giant. Otherwise, the cell divides. Our results demonstrate a fluctuation-driven patterning mechanism for how cell fate decisions can be initiated through a random yet tightly regulated process.

