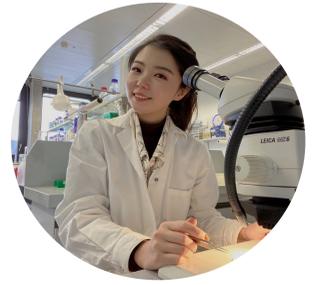


Chromatin-based controls in the reproductive lineage

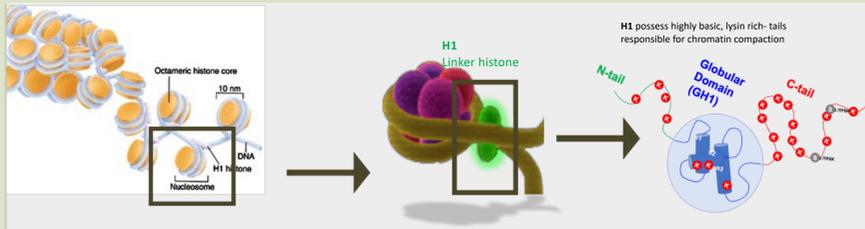
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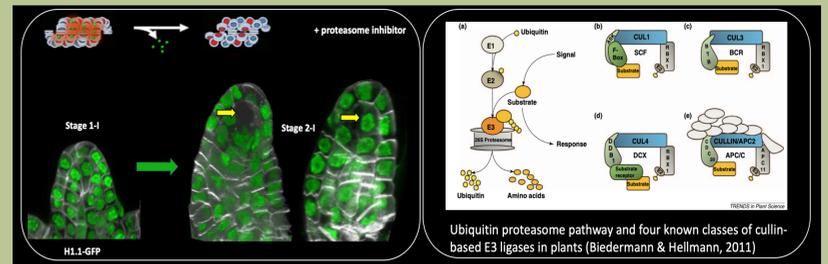
Background



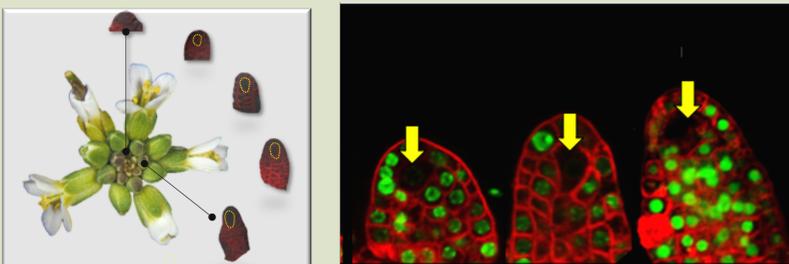
- Gene expression is controlled by chromatin structure and composition.
- Linker histones (H1) are fundamental architects of chromatin structure in eukaryotes, controlling compaction and nucleosome spacing.
- H1 influences the epigenetic landscape including DNA methylation and histone modifications (Rutowicz et al 2019).
- We are interested in the role of H1 in the establishment of the reproductive lineage in Arabidopsis.

Is H1 eviction regulated by ubiquitination and proteasome-mediated protein degradation?

H1 eviction is blocked by proteasome inhibitors (Syngolin, Epoxomicin)

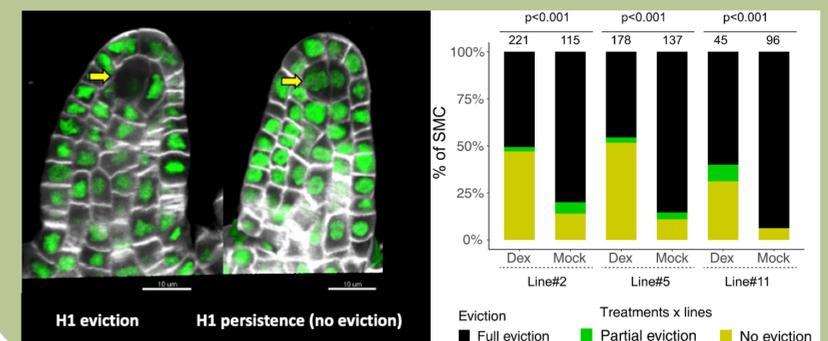


H1 eviction during SMC differentiation

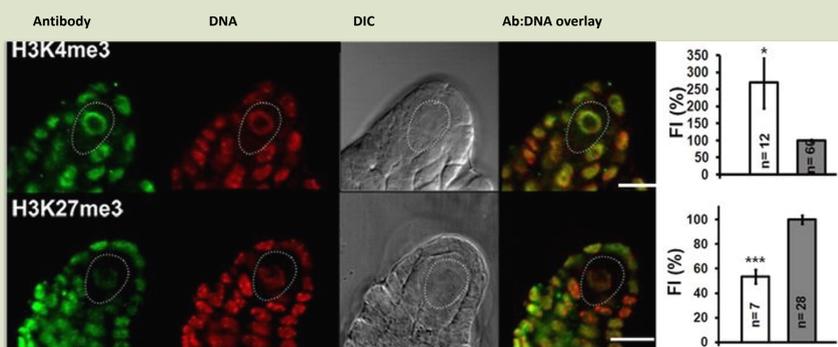


- Gradual development of the Spore Mother Cell (SMC, yellow) in the ovule primordium
- H1 (green signal) is evicted at the onset of SMC differentiation

Downregulation of CULLIN4 blocks H1 eviction

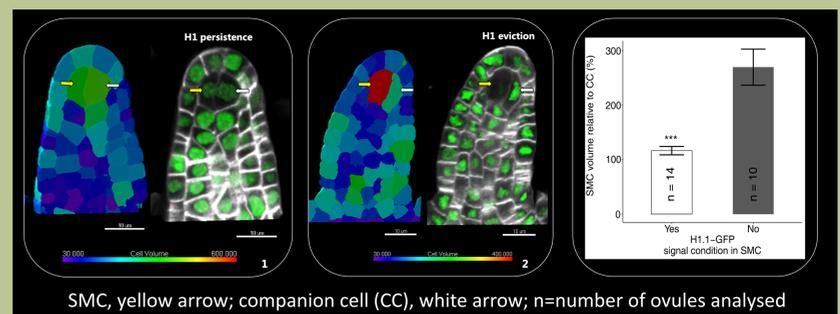


The chromatin of the SMC is epigenetically distinct from that of the surrounding somatic cells.

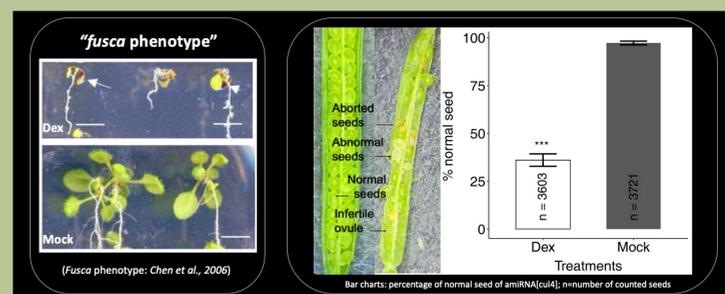


Whole-mount immunostaining ovule primordia (Method: She et al JoVe 2014). Bar charts: average ratio of Antibody:DNA signal (FI) relative to the nucleolus (100%). White, SMC; gray, nucleolus, n=number of measured nuclei

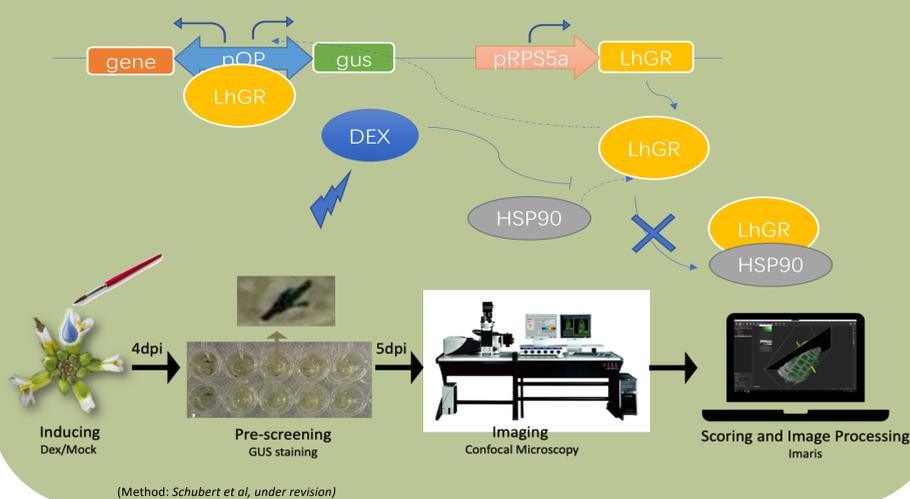
Impact of H1 persistence in SMC: lack of cell differentiation (reduced growth)



The Dex inducible CUL4 mutants recapitulate known phenotypes

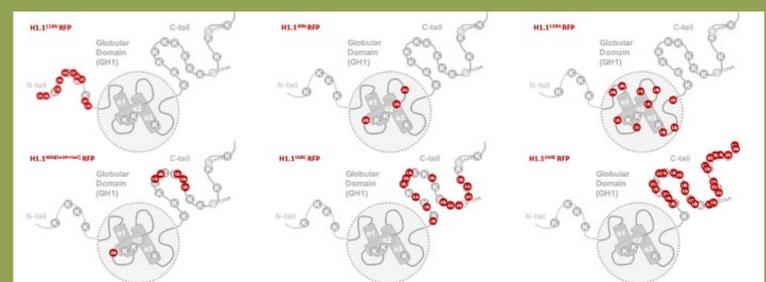


Our system: Dex inducible mutants



Outlook

- Mapping H1 ubiquitination sites controlling H1 degradation



- Characterize the impact of H1 maintenance in SMC on chromatin reprogramming and meiosis
- Engineer ubiquitination-resistant variants
- Detect ubiquitinated H1 isoforms

Reference

Chen, H., Shen, Y., Tang, X., Yu, L., Wang, J., Guo, L., ... & Deng, X. W. (2006). Arabidopsis CULLIN4 forms an E3 ubiquitin ligase with RBX1 and the CDD complex in mediating light control of development. *The Plant Cell*, 18(8), 1991-2004.

She, W., Grimanelli, D., Rutowicz, K., Whitehead, M. W., Puzio, M., Kotliński, M., ... & Baroux, C. (2013). Chromatin reprogramming during the somatic-to-reproductive cell fate transition in plants. *Development*, 140(19), 4008-4019.

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