

CHROMATIN CONTROL OF PLANT GROWTH AND PLASTICITY

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Growth is a complex trait that is steered by developmental, physiological and biochemical pathways. We study the genetic and epigenetic control of organ growth in plants using the *Arabidopsis* leaf as the experimental system. Mutational analysis showed that growth and development of the leaf is controlled by many genes (Micol, 2009). At the cellular level, leaf growth is mainly determined by cellular parameters such as cell division rate, cell number and cell size. A number of transcription factors have been identified that control leaf initiation and early stages in patterning and growth. However, mutant classes with narrow leaves identified chromatin related complexes that activate transcription as important regulators of growth upstream of or in addition to transcription factors. The conserved chromatin modifying complexes, HISTONE MONOUBIQUITINATION1 (HUB1) and Elongator have a role in RNAPII transcription elongation and both affect leaf and root growth by regulating cell number (Nelissen *et al.* 2005; Fleury *et al.* 2007; Falcone *et al.*, 2007).

Elongator contains a GCN5-type histone acetyl transferase subunit which is specifically expressed in the shoot and root meristems and targets specific auxin-related genes during RNAPII transcription elongation as demonstrated by transcriptome analysis followed by chromatin immuno precipitation (Nelissen *et al.*, 2010; Bruno *et al.*, 2011). Auxin-related phenotypes in venation patterning and plant architecture, and auxin sensitivity in the Elongator mutants showed the biological relevance of the transcriptional regulation by Elongator. The specificity of Elongator in gene regulation will be further investigated through the identification of upstream signaling and downstream targets. We postulate that the intrinsic activity or allelic strength of histone modifying complexes might contribute to the leaf size and shape and plant architecture in species and that their putative cross-talk to the environment might regulate plasticity in growth.



Figure 1. Phenotype of wild type (left) and elongator mutant (right) rosette

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