

Salt-stress and CTD phosphatase-like 4 mediate transcriptional switching of snRNA to mRNA in *Arabidopsis thaliana*

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RNA polymerase II C-terminal domain (CTD) phosphorylation regulates transcription of both protein-coding mRNAs and non-coding RNAs (ncRNAs). However, understanding of role of CTD-phosphorylation in plant ncRNA transcription is still obscure. Here we used *Arabidopsis* CTD phosphatase-like 4 knock-down lines (*CPL4_{RNAi}*) and showed that *CPL4* functions in genome-wide, conditional 3'-extensions of small nuclear RNA (snRNA) and biogenesis of novel snR-Downstream Protein-coding Gene (snR-DPG) transcripts. Production of snR-DPGs is dependent on pol II snRNA promoter (PIIsnR), and *CPL4_{RNAi}* promotes readthrough of snRNA 3'-end processing signal and promote pol II transcription downstream of snRNA. Also discovered was a novel unstable *imRNA_{SSP14i}*, whose expression originates from 5' region of a protein coding gene. *imRNA_{SSP14i}* expression is driven by a PIIsnR and is conditionally 3'-extended to produce mRNA. In wild type, the snRNA-to-snR-DPG switching is induced by salt stress, and is associated with alteration of CTD phosphorylation status in the transcribing pol II complex. The snR-DPG transcripts occur widely in plants, suggesting that the transcriptional snRNA-to-snR-DPG switching is a mechanism ubiquitous in plants to regulate gene expression in response to environmental stresses.