NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

SEMINAR

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Hosted by Dr Xu Jian

Molecular epigenetic understanding of winter cold-induced chromatin silencing in Arabidopsis

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Plants must adapt to local environment and make adaptive adjustments in growth and development responding to environmental inputs, and in many plants when to make a transition to flowering is signaled by seasonal cues. In high latitudes, naturally-growing Arabidopsis ecotypes typically overwinter before flowering, and this winter-annual growth habit is genetically determined by two loci, among which FLOWERING LOCUS C (FLC) encodes a MADS-box transcription factor that inhibits flowering. Winter cold or prolonged cold exposure leads to repressive histone modifications such as histone 3 lysine-27 trimethylation (H3K27me3) on FLC chromatin to silence FLC expression. When temperature rises in spring, the silenced FLC state is epigenetically maintained in subsequent growth and development, enabling plants to flower, but this state is reset in next generation. We found that a cis-regulatory DNA element and two homologous trans-acting epigenome readers function together to mediate winter cold-induced H3K27me3 at FLC. Furthermore, we have uncovered that shortly after fertilization a seed-specific pioneer transcription factor de novo activates FLC expression to reset the cold-induced silenced state inherited from gametes. These findings will be presented in the talk.