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9 Jan 2023 (Mon), 4pm

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Hosted by: Dr YIN Zhongchao

Flower longevity and size on a jasmonic acid-mediated chromatin switch

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Flower longevity and size are important attributes of ornamentals, which are under strict genetic control. Mutants in the floral homeotic transcription factor AGAMOUS (AG), or its downstream regulators of the plant hormone jasmonic acid (JA) biosynthesis and signaling display enlarged petals with longer longevity and delayed abscission. How AG and its downstream JA pathway direct petal longevity and size is poorly understood. The growth curve observation of wild-type and mutant petals indicated that enlarged petals of *ag* and JA mutants are attributed to the enlarged petal cells associated with delayed abscission. Here, we identify a JA-regulated chromatin state switch that direct reprogramming of cell identities at the base of petals causing abscission. Before JA biosynthesis is triggered by AG in flowers, JASMONATE-ZIM DOMAIN repressors accumulate at the base of petals to recruit the co-repressor TOPLESS and histone deacetylase HDA19 and block activity of the MYC master regulators. Upon JA sensing, MYC transcription factors recruit MEDIATOR25 to deposit H3K9 acethyltransferases and to increase the DNA accessibility for induction of key downstream targets, such as *NAC DOMAIN-CONTAINING PROTEIN 102 (NAC102)*. NAC102 protein is specifically localized at the base of petals and induces proper autophagy and program cell death via activation of *AUTOPHAGY-RELATED PROTEIN 8A*. Our study reveals a mechanistic link between JA-mediated chromatin switch and subsequent reprogramming of cell identities for petal abscission.

Dr Toshiro Ito received his Ph.D from Kyoto University, Japan and worked for California Institute of Technology, USA as a postdoctoral fellow (1997-2003) and as a senior research fellow (2003-2005). He worked for Temasek Life Sciences Laboratory, Singapore (2005-2017) to lead the Plant Systems Biology Group. In 2015, he started the Plant Stem Cell Regulation and Floral Patterning Laboratory in Nara Institute of Science and Technology, Japan.

Recent Publications:

1. Wang,Y., Shirakawa, M., and **Ito T**. (2022) “Arrest, Senescence, and Death of Shoot Apical Stem Cells in Arabidopsis thaliana.” Plant and Cell Physiology, doi.org/10.1093/pcp/pcac155

2. Yamaguchi N, Matsubara S, Yoshimizu K, Seki M, Hamada K, Kamitani M, Kurita Y, Inagaki S, Suzuki T, Gan E-S, To T, Kakutani T, Nagano AJ, Satake A, **Ito T.** (2021) “H3K27me3 demethylases alter HSP22 and HSP17.6C expression in response to recurring heat in Arabidopsis.” Nature Comm 12, 3480 doi.org/10.1038/s41467-021-23766-w

3. Pelayo M A, Yamaguchi N, **Ito T**. (2021) “One factor, many systems: the floral homeotic protein AGAMOUS and its epigenetic regulatory mechanisms.” Current Opinion in Plant Biology 61:1020009