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TEMASEK LIFESCIENCES LABORATORY

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The Auditorium (Level 1)

Hosted by: Dr Yin Zhongchao

Multistep termination of floral stem cell activities

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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.

In flower development, the robust stem cell activities are terminated to produce a fixed number of floral organs and eventually seeds for the next generation. In Arabidopsis, the floral stem cell activity is sustained by expression of the homeo-domain transcription factor WUSCHEL (WUS). Expression of WUS is terminated by multiple genetic pathways including the floral homeotic protein AGAMOUS (AG). In order to reveal spatio-temporal-specific regulation of floral stem cell activities, we have studied downstream activities of AG and other transcription factors by molecular genetic approaches. AG induces transcription of two transcription factors KNUCKLES (KNU) and CRABS CLAW (CRC), which function to terminate *WUS*. While KNU directly represses *WUS*, CRC controls floral meristem determinacy through the regulation of auxin homeostasis, thus repressing *WUS*. The zinc finger transcription factor SUPERMAN (SUP) is also involved in negative regulation of *WUS*. SUP is expressed at the boundary regions of stamen and carpel primordia. SUP interacts with components of Polycomb repressive complex 2 (PRC2) and fine-tunes local auxin signaling by negatively regulating the expression of the auxin biosynthesis genes *YUCCA1/4* (*YUC1/4*). I will discuss how multiple factors spatially and temporally coordinate floral meristem determinacy.

Recent Publications:

1. Sun, B., Zhoua, Y., Caia, J., Shanga, E., Yamaguchi, N., Xiao, J., Looi, L-S., Wee,W-Y. Gao, X., Wagner D., and **Ito, T.** (2019) “Integration of transcriptional repression and Polycomb-mediated silencing of WUSCHEL in floral meristems” ***Plant Cell***, 31: 1488–1505.

2. Wu, J., Ichihashi, Y., Suzuki, T., Shibata, A., Shirasu, K., Yamaguchi, N., and **Ito, T.** (2019) “Abscisic acid-dependent histone demethylation during post-germination growth arrest in Arabidopsis” ***Plant, Cell & Environment,*** 42:2198-2214.

3. Yamaguchi, N., Huang, J., Tatsumi, Y., Abe, M., Sugano, S.S., Kojima, M., Takebayashi, Y., Kiba, T., Yokoyama, R., Nishitani, K., Sakakibara, H., and **Ito, T.** (2018) “Chromatin-mediated feed-forward auxin biosynthesis in floral meristem determinacy” ***Nature Communications*** 9: 5290.