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TEMASEK LIFESCIENCES LABORATORY

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The Auditorium (Level 1)
Hosted by: Dr Yin Zhongchao

Auxin-mediated regulation of floral stem cell growth and differentiation

Professor Toshiro Ito
Nara Institute of Science and Technology (NAIST), Japan



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.

To ensure successful plant reproduction and crop production, the spatial and temporal control of the termination of the floral meristem must be coordinated. In Arabidopsis, the timing of this termination is determined by AGAMOUS (AG). Following its termination, the floral meristem underdoes gynoecium formation. Two transcription factors, SUPERMAN (SUP) and CRABS CLAW (CRC), are involved in both floral meristem determinacy and reproductive development. However, how floral meristem termination is coordinated with reproductive development is not understood. We have identified mechanistic links between floral meristem termination and reproductive development through fine-tuning of auxin biosynthesis and homeostasis by SUP and CRC. SUP negatively regulates auxin biosynthesis in stamen primordia, while CRC controls auxin homeostasis through activation of auxin biosynthesis and repression of a putative transporter to generate proper auxin maxima. We propose a model describing how regulation of auxin in floral meristems mediates the transition from floral meristem termination to reproductive development.

Recent Publications:

1. Yamaguchi, N., Huang, J., Xu, Y., Tanoi, K., and **Ito, T.**.(2017) Fine-tuning of auxin homeostasis governs the transition from floral stem cell maintenance to gynoecium formation. Nature Communications, 8:1125. doi: 10.1038/s41467-017-01252-6.
2. Breuil-Broyer, S., Trehin, C., Morel, P., Boltz, V., Sun, B., Chambrier, P., **Ito, T.**, and Negrutiu, I. (2016) “Analysis of the Arabidopsis superman allelic series and the interactions with other genes demonstrate developmental robustness and joint specification of male-female boundary, flower meristem termination, and carpel compartmentalization.” Annals of Botany, 117: 905-923. DOI: 10.1093/aob/mcw023
3. Guo, S, Sun, B., Looi, L-S., Xu, Y., Gan, E-S., Huang, J. and **Ito, T.**. (2015) “Co-ordination of flower development through epigenetic regulation in two model species: rice and Arabidopsis.” Plant Cell & Physiology, 56:830-842. doi: 10.1093/pcp/pcv037.