T-PIRC つくば機能植物イノベーション研究センター
Tsukuba-Plant Innovation Research Center

AMED TOMATO National BioResource Project

PTraD Initiative 形質転換植物デザイン研究拠点

University of Tsukuba
Plant Transgenic Design Initiative
50th PTraD Research Seminar
T-PIRC Research Seminar

Date and Time: 2019/9/24 (Tue) 14:00 –15:00
Place: Gene Research Center, Seminar Room (211)

Exploring the Biosynthesis and Evolution of Plant Specialized Metabolism in the Solanaceae

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Plants are master chemists and exhibit tremendous variation in their metabolic capacity. Plant metabolism is classified as primary (or general) and specialized (or secondary). Primary metabolism is conserved across diverse species while specialized metabolism evolves rapidly and often results in lineage-specific pathways and metabolites. This metabolic diversity arises through large scale gene duplications of enzyme families followed by neofunctionalization, giving rise to catalytic novelty and resulting in the vast array of plant specialized metabolites observed across the plant kingdom. Plants utilize specialized metabolites for defense against abiotic and biotic stresses as well as for signaling beneficial interactions with symbionts and pollinators. The bioactivity of plant specialized metabolites has led to their co-option by humans for use as flavorings, fragrances, insecticides, narcotics, and medicines.

Tropane alkaloids are a medicinally important class of specialized metabolites that have evolved more than once in the plant lineage and have been particularly well studied in the Solanaceae family due to their pharmacological properties. We are utilizing genomics enabled biochemistry to investigate the biosynthesis and evolution of tropane alkaloids and have identified several new enzymes that contribute to the biosynthesis of the pharmaceuticals hyoscyamine and scopolamine in *Atropa belladonna* (Deadly Nightshade). In addition, untargeted liquid-chromatography mass spectrometry based metabolite profiling of lines with altered tropane profiles is revealing the existence of many novel metabolites and a greatly expanded tropane-related metabolic network. In this seminar, progress on these research projects, and brief introduction of the study using NBRP resources, will be provided.

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