Poster Presentation

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Molecular mechanism of strigolactone perception by DWARF14

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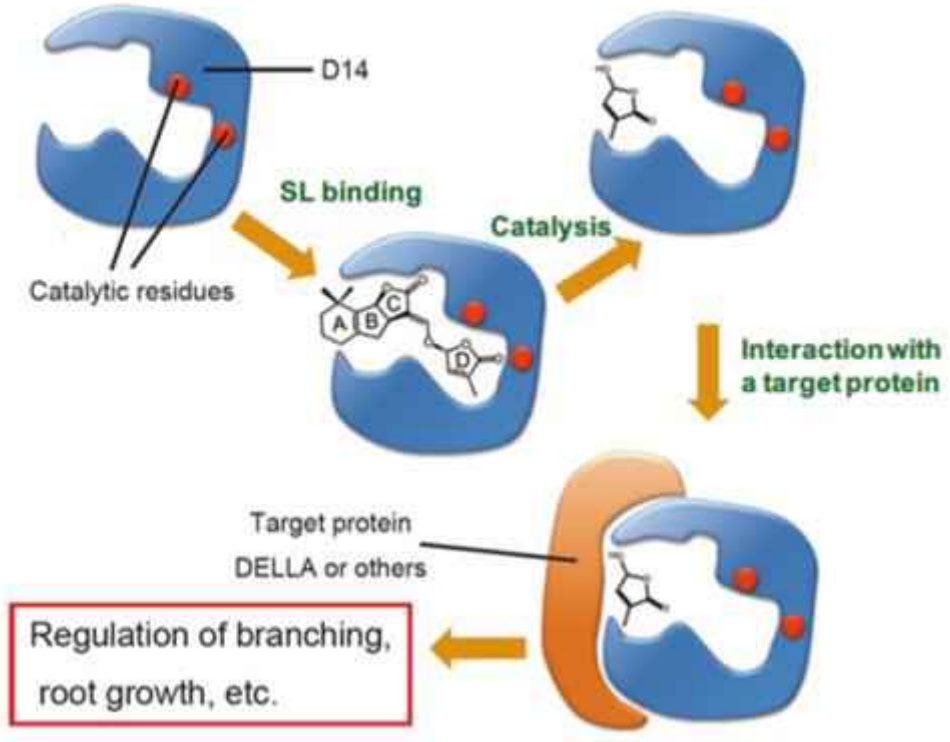
The terpenoid, small-compound strigolactones (SLs) are plant hormones that regulate plant shoot branching, which is an important agronomic trait that determines crop yields. An α/β-hydrolase protein, DWARF14 (D14), has been recognized to be an essential component of plant SL signaling. Recently, it has been demonstrated that D14 interacts with a gibberellin (GA)-signaling repressor SLR1 in an SL-dependent manner [1], which suggests that SLR1 mediates crosstalk between the SL and GA signalings in the regulation of plant shoot branching. Although D14 functions in SL perception to promote the interaction with SLR1, its molecular mechanism remains unclear. Here, we report the crystal structure of D14 in the complex with 5-hydroxy-3-methylbutenolide (D-OH), which is a reaction product of SLs. The structure was solved at a 2.10-Å resolution when an SL synthetic analogue, (−)-ent-2'-epi-GR7, was soaked into D14 crystals [1]. In the complex structure, D-OH was located at a site far from the catalytic residues including H297 and appeared to function as a plug for the catalytic cavity to induce an overall hydrophobic surface with a hydrophilic patch between the two α-helices in the cap structure of D14. In the binding site, the indole amine of Trp205 formed a hydrogen bond with the oxygen atom of the C2' hydroxy group, which arose from the catalytic reaction of D14, instead of a water molecule in the structure of apo D14. In addition, the side chain of Phe245 moved 1.3 Å toward D-OH. Mutational analyses of D14 showed that the interaction between D14 and SLR1 required an enzymatic activity of D14 and the residues Trp205 and Phe245 were essential for the SL-dependent SLR1-binding of D14. These results suggest that the D14−D-OH complex mediates the interaction with SLR1 in which the D-OH-induced surface and/or structural change is crucial.

[1] *H. Nakamura, Y.-L. Xue, T. Miyakawa et al., Nat. Commun., 2013, 4, 2613*



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