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## CYP90D1 and CYP90C1 have a fine-tuning function in the biosynthesis of brassinosteroids in *Arabidopsis*

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### Objectives

In order to elucidation of the regulation of brassinosteroid biosynthesis, we have identified and characterized two cytochrome P450s, which are possibly involved in brassinosteroid biosynthesis. As a result, we found that these two cytochrome P450s are involved in brassinosteroid biosynthesis and have important roles in connecting BR biosynthesis to light responses.

### Materials and Methods

#### 1. Material

Plant - *Arabidopsis thaliana* (Col-0), *rot3-1*, *cpd* mutants,  
*Agrobacterium* strain - C1C58rif/pBI121Hm

#### 2. Methods:

We isolated the ROT3 homolog gene, CYP90D1. Genetical and biochemical approaches were performed for characterization of function of the two cytochrome P450 genes. In addition, light

experiment was performed for the regulation of brassinosteroid biosynthesis by light signals.

### Results and Discussion

Brassinosteroids (BRs) are plant hormones that are essential for a wide range of developmental processes in plants. We found that the ROTUNDIFOLIA3 (ROT3) gene, which is involved in the regulation of leaf length in *Arabidopsis*, encodes the enzyme CYP90C1 that is required for an unknown late steps in the biosynthesis of BRs. The effects of impairment of these late reactions are far milder and organ-specific than those of defects in the early stages of BR biosynthesis. We also found that the most closely related gene to ROT3, CYP90D1, is involved in the fine tuning of the biosynthesis of BRs. Double mutants for ROT3 and for CYP90D1 have a synthetic dwarf phenotype, whereas *cyp90d1* single mutants do not have any phenotype. We also provide evidence for a connection between brassinosteroids and the response of plants to light through two cytochrome P450s, indicating CYP90D1 play important roles not only in BR biosynthesis, but also in connecting BR biosynthesis to light responses. Taken together, we shall discuss the role of fine tune of BR biosynthesis in leaf development as well as in plant growth.