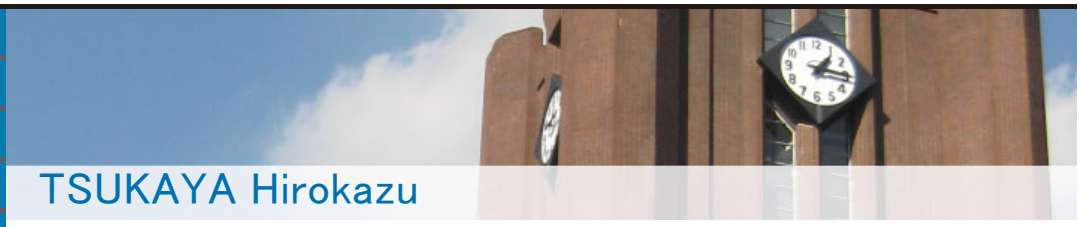

TSUKAYA Hirokazu

塚谷 裕一 （つかや ひろかず）
TSUKAYA Hirokazu

Title Professor
Affiliation Department of Biological Sciences (Plant Science), Department of Biological Sciences (UG), Department of Biological Sciences (GR), Graduate School of Science
E-mail tsukaya@bs.s.u-tokyo.ac.jp
Room 211, Faculty of Science Bldg.2, 2F
TEL |

Research Field

Molecular and developmental genetics of plants

Research Subject

Understanding of <plant life> via new findings on genetic regulation of leaf shape/size and on mechanisms of leaf shape diversity

Current Research

The leaf is the fundamental unit of the shoot system, which is composed of the leaf and stem. The diversity of plant forms is mostly attributable to variation of leaf and floral organs, which are modified leaves. Moreover, leaf shape is sensitive to environmental stimuli. The leaf is therefore the key organ for a full understanding of plant morphogenesis. The genetic control of the development of leaf shapes, however, has remained unclear. Recently, studies of leaf morphogenesis reached a turning point after our successful application of the techniques of developmental and molecular genetics using the model plant, "Arabidopsis thaliana" (L.) Heynh.

I. Mechanisms of leaf development
Focusing on the mechanisms that govern polarized growth of leaves in "Arabidopsis thaliana", we have identified four genes for polar-dependent growth of leaf lamina: the "ANGUSTIFOLIA (AN)" and "AN3" genes, which regulate the width of leaves, and the "ROTUNDIFOLIA3 (ROT3)" and "ROT4" genes, which regulate the length of leaves. AN and ROT3 genes control cell shape while "AN3" and "ROT4" genes regulate cell numbers in leaves. In addition to the polar-dependent leaf shape control, we have focused on the mechanisms of organ-wide control of leaf size, which are reflected in the ‘compensation’ phenomenon (reviewed in Tsukaya 2008). Additionally, the accumulation of knowledge on the basic mechanisms of leaf shape control, have enabled us to conduct Evo/Devo studies of the mechanisms behind leaf-shape diversity.

II. Biodiversity of leaf form
We are also interested in the biodiversity of wild plants. For example, we have found a new species of the genus "Oxygyne, O. yamashitae" from Yakushima island (Yahara and Tsukaya 2008).

Keywords

Leaf morphogenesis; arabidopsis; Arabidopsis thaliana; Developmental genetics; Evo-devo; Organ size control; biodiversity

Links

http://www.biol.s.u-tokyo.ac.jp/users/bionev2/top_j.html
Research Video
ResearcherID