

## Overview of Kibo experiment candidates for around 2012

### 1. Experiment Title

Studies on gravity-controlled growth and development in higher plants using true microgravity conditions on the Japanese experiment module “Kibo” in the international space station

### 2. Principal Investigator

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### 3. Outline of Experiment

In STS-95 space experiments, we demonstrated that microgravity conditions substantially affected the growth and development of higher plants; almost all of the epicotyls bent in a direction distal to the cotyledons, hook formation in etiolated pea seedlings was inhibited, and the growth direction of roots was affected. In addition, we showed that auxin transport is essential for epicotyl bending for determination of growth direction by gravistimulation in the early growth stage of etiolated pea seedlings. A step forward in the understanding of the cellular mechanisms involved in gravimorphogenesis has also been achieved using true microgravity conditions in space, indicating that the morphology of plants is substantially influenced by gravistimulation as well.

In the present study, to clarify what relationships among auxin distribution, polar auxin transport in epicotyls, and direction of epicotyl growth in pea seedlings (*Pisum sativum* L. cv. Alaska) are examined using true microgravity conditions on the Japanese Experiment Module “Kibo” in the International Space Station. We also introduce the application methods of chemicals affecting polar auxin transport and the agravitropic mutant, such as “*ageotropum*” pea (from *Pisum sativum* L. cv. Weibull’s Weitor), whose roots and shoots lack the ability to orient with respect to gravity, resulting that the epicotyls show automorphosis-like bending in true microgravity conditions in space. Additionally, the involvement of the auxin facilitators PsAUX1 and PsPINs in the control of polar auxin transport as well as the expression of genes encoding these facilitators, and intracellular concentrations of auxin in gravimorphogenesis of higher plants will be also investigated using immunohistochemical analyses.



etiolated pea (*Pisum sativum* cv. Alaska) seedlings grown under microgravity conditions in space for 6.5 days