

Shoot circumnutation and winding movements require gravisensing cells-mediated graviresponse

D. Kitazawa (1), Y. Miyazawa (1), N. Fujii (1), E. Nitasaka (2), H. Takahashi (1)

(1) Graduate School of Life Sciences, Tohoku University, Sendai, Japan, (2) Graduate School of Sciences, Kyusyu University, Fukuoka, Japan

(kitazawa@ige.tohoku.ac.jp / Fax: +81-22-723-8218 / Phone: +81-22-217-5726)

The stationary nature of plants distinguishes them from other organisms. Because of this unique nature, higher plants have evolved various mechanisms for responding to environmental cues, enabling them to utilize limited resources or to escape from environmental stresses. One of the most important mechanisms that plants have acquired is the ability to sense gravity and to use it as a basis for governing their growth orientation, a process known as gravitropism. In addition to gravitropism, oscillatory movement termed circumnutation and winding movement of climbing plants are also important mechanisms that allow plants to elevate their apical meristems to higher positions, and these movements are hypothesized to be gravity-related. However, the relationship between the graviresponse and these movements has not been clarified. To verify the necessity of the graviresponse in these movements, we used a climbing plant, namely Japanese morning glory as a model plant; for it has winding growth that allow us to approach the above-mentioned issues. We analyzed two distinct mutant lines of morning glory; *weeping1* and *weeping2*, both of which have loss of shoot gravitropism. Histological characterization revealed that *weeping1* has defect in development of gravisensing cells, i.e. endodermis, whereas *weeping2* has normally developed endodermis with their amyloplasts sediment in response to gravity. These observations suggest that these mutants have defect at a different point in the process of the graviresponse cascade. Moreover, both *weeping1* and *weeping2* are defective in circumnutation and winding movements, respectively. Thus, our results clearly show that graviresponse, circumnutation and winding movement are linked.