Title of Project : Integrative system of autonomous environmental signal recognition and memorization for plant plasticity

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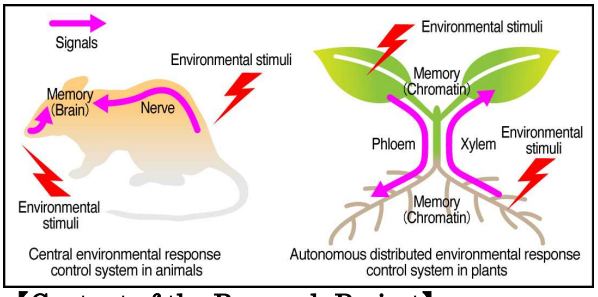
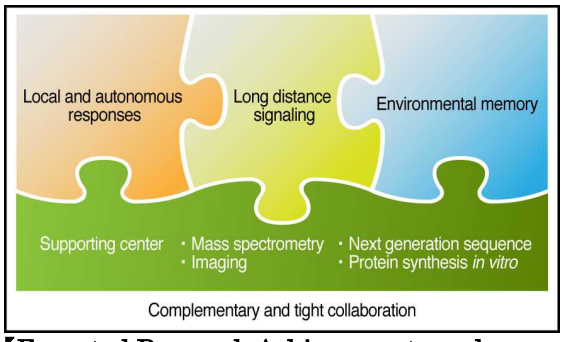
【Purpose of the Research Project】

In contrast to mobile animals which seek environments suitable for survival, in order to respond rapidly to diverse environmental changes, immobile plants have evolved an "autonomous distributed environmental response control system" to control incoming signals via a systemic information transmission system while carrying out an autonomous environmental response, the control of which is distributed by groups of cells and tissues. For this type of control via autonomous distribution, in addition to local stimulus receptor sites and an autonomous response system, there ought to exist a system for the spatiotemporal integration of the local response. However, these molecular species are virtually undescribed. We aim to clarify our current understanding of plants' dynamic environmental response control systems.



【Content of the Research Project】

In this area of research, researchers concentrating in the many diverse fields of plant science, by promoting the integration of hereto considered distinct areas of research such as "local and autonomous responses", "long distance signaling", and "environmental memory" in a coordinated manner, will be able to clarify our current understanding of the dynamic environmental response control system as a whole. In particular, it is thought that reconsideration of the system of fibrovascular bundles (merely regarded in textbooks as the organ which transports water and nutrients) in regards to environmental signals as the site of long distance signal transmission, could overturn conventional concepts regarding plant signal transmission. In addition, as plants lack brains, we believe that analysis of DNA, histone modifications, and changes in the dynamic state of chromatin within the nucleus (referred to as epigenetic regulation) will provide evidence that plants are endowed with distributed memory control systems which respond to environmental stimuli.



【Expected Research Achievements and Scientific Significance】

Hereto, a group that has researched plant environmental responses from the aspect of long distance signaling transmission and memory data processing systems is internationally unprecedented, and we hope that our area of research, which has greatly advanced the environmental response research field as an innovative field of research, will also strengthen our contribution to our nation's exceptional rise in scientific standards. In addition, through the establishment of both collaborative research positions at John Innes Centre・the Sainsbury Laboratory (UK) and Stanford University (USA) where cutting-edge plant research is being promoted, and a close-knit international research network, we hope that our area of research will help to usher forth a new tide of global research.

【Key Words】

Local and autonomous responses, Long distance signaling, Environmental memory

【Term of Project】 FY2015-2019

【Budget Allocation】 1,184,500 Thousand Yen

【Homepage Address and Other Contact Information】

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