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Genetic Rule of the Pattern of Crystalline Inorganic Components in the Plant: Patterns of Quartz Bodies and Calcium Oxalate Crystals

It has already been confirmed that the pattern of crystalline inorganic components in a plant follows a genetic rule, and this fact was elucidated further by observations of such patterns of quartz bodies in wheat leaves and calcium oxalate crystals in willow leaves.

The pattern of crystalline inorganic components[1-14] in a plant seems to be under some genetic rule, and the fact[2] that this is one of important characteristics inherent in the plants has already been revealed by the author. In order to further elucidate this genetic regularity of the pattern of crystalline inorganic components, detailed observations were made on these patterns using the quartz bodies (SiO_2)[5] in the leaves of wheat and calcium oxalate crystals in the leaves of willow trees as models. It was thereby found that the patterns of crystalline inorganic components in a plant follow the genetic rule as listed below.

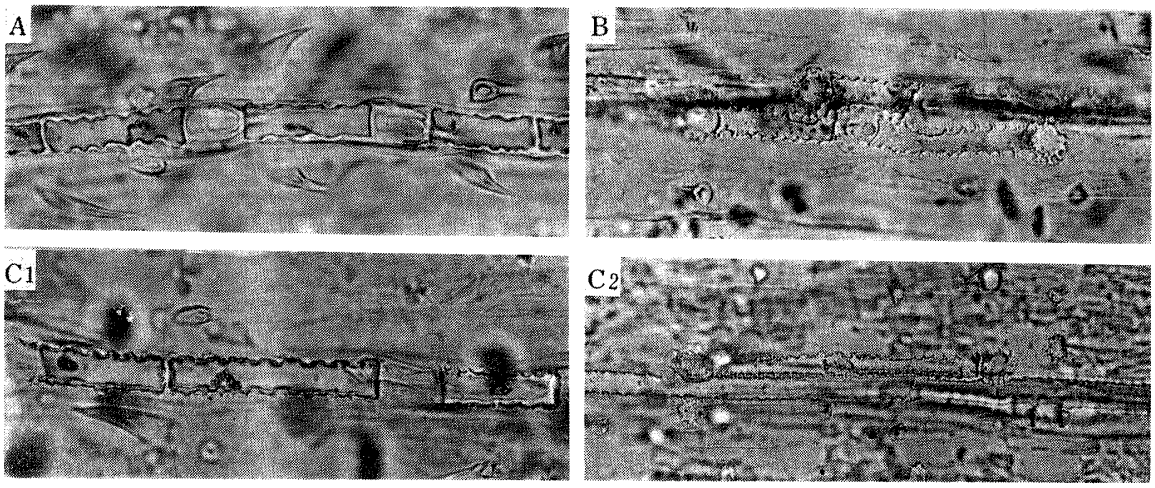

Fig. 1. Patterns of Quartz Bodies in the Flag Leaves of Wheat

A: *Triticum aegilopoides* (genome symbol AA, 101-1$^{a)}$), ×400
B: *Aegilops uniaristata* (genome symbol M^uM^u, 19-1$^{a)}$), ×400
C_1: Synthesized amphidiploid AAM^uM^u, from *T. aegilopoides* × *A. uniaristata*, ×400
C_2: Synthesized amphidiploid AAM^uM^u, from *T. aegilopoides* × *A. uniaristata*, ×200
a) obtained from Plant Germ-Plasm Institute, Faculty of Agriculture, Kyoto University

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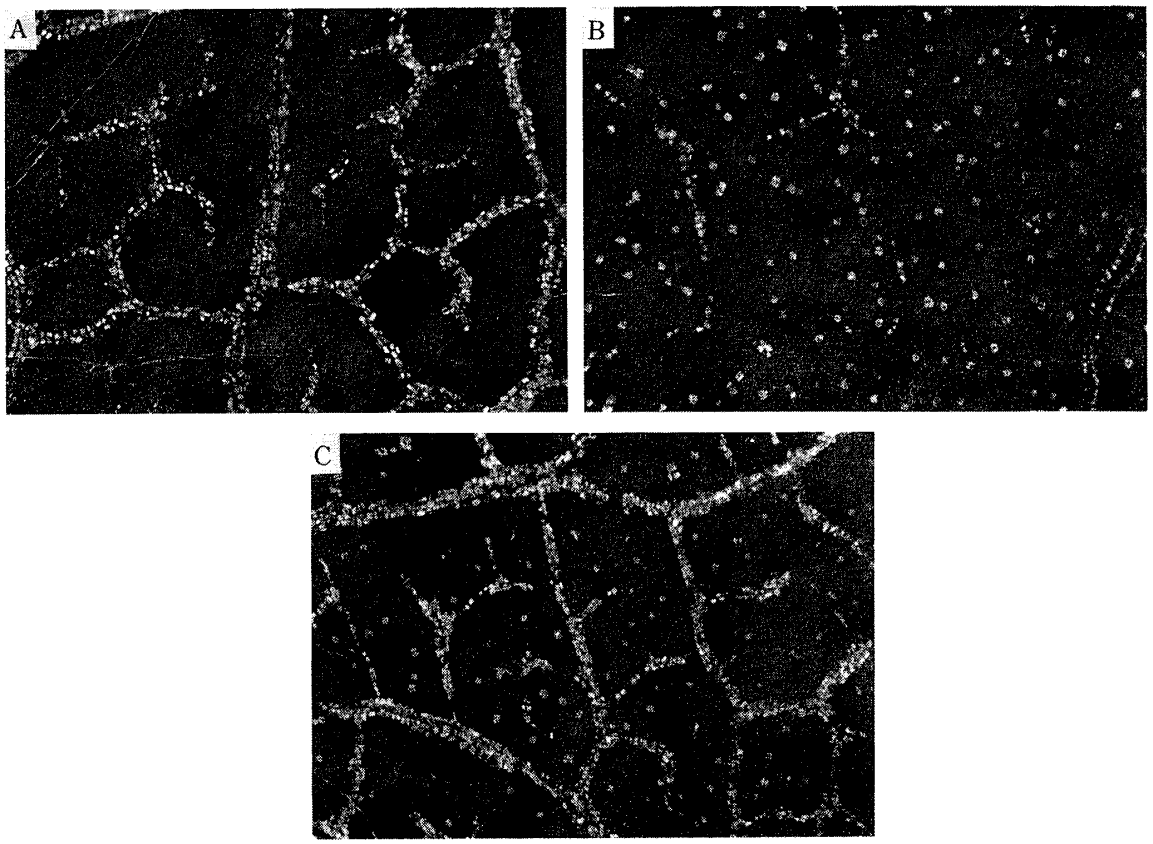

Fig. 2. Patterns of Calcium Oxalate Crystals in the Leaves of Willow Trees[a)]

A: *Salix integra* ($2n=38$), ×100
B: *Salix japonica* ($2n=38$), ×100
C: *S. integra* × *S. japonica*, ×100
a) obtained from Department of Botany, Faculty of Science, Kyoto University

For the genetic examination of the pattern of crystalline inorganic components, especially in the case of the pattern of quartz bodies in wheat leaves, synthesized tetraploid and hexaploid wheat with different genome constitution derived from various diploid species were used, and quartz body pattern in these wheat leaves was examined in comparison with genome analysis. Pattern of crystalline inorganic components was made by the "low-temperature plasma ashing method for biological tissues" devised by the author:

(1) The pattern inherent in the parents (designated as the primary pattern) are inherited by their progenies.

(2) The patterns appearing in the progenies are regulated by the patterns inherent in their parents.

These results signify that "a group of plants having the same or closely similar pattern of crystalline inorganic components come from the common ancestor or are in a close relationship" and this fact can be predicted with a high reliability. Application of this rule is not limited to wheat and willow plants but it is believed with high probability that the rule applies to all the plants in nature.

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