DOMINANT MUTATIONS OF THE JAPANESE MORNING GLORY

Y. IMAI AND K. TABUCHI
BOTANICAL INSTITUTE, AGRICULTURAL COLLEGE, TOKYO IMPERIAL UNIVERSITY

As is generally the case, dominant mutations are rather rarely found in the Japanese morning glory, *Pharbitis Nil* (Imai 1927c). In this short note, the authors describe two dominant mutations, one that occurred vegetatively and the other seminally under their observation.

Margined-1. A vegetative mutation occurred which produced flowers with completely white margins in one individual of a family (No. 25) of pedigree RI-18. This family was showing segregation for white margins, a character due to the dominant gene margined-1 (Mr1), which is closely linked with contracted. The plant mentioned above originally bore flowers with partially white margins, due to the heterozygous composition Mr1/+; while in its later growth the main vine changed so that it bore flowers with perfectly white margins, the new character appearing in the flowers borne on the upper part of the main stem. Some flowers at the border between the mutant and non-mutant types had mosaic patterns, the margin being partly perfect and partly imperfect, as illustrated in Fig. 1. The quantitative alternation in degree from imperfect to perfect means a genetic change of Mr1/+ to homozygous Mr1, which was definitely proved by the examination of the progenies of the respective parts of the mosaic plant.

In other experiments the authors have noticed two independent cases in which flowers having a self-colored genotype had a small area of white margin. But the white part was so small and limited that such flowers did not give progeny having white margins. Presumably, in such cases also the recessive allelomorph of the gene for the white margin, probably mr1, mutates to the dominant allelomorph (Mr1), though very rarely.

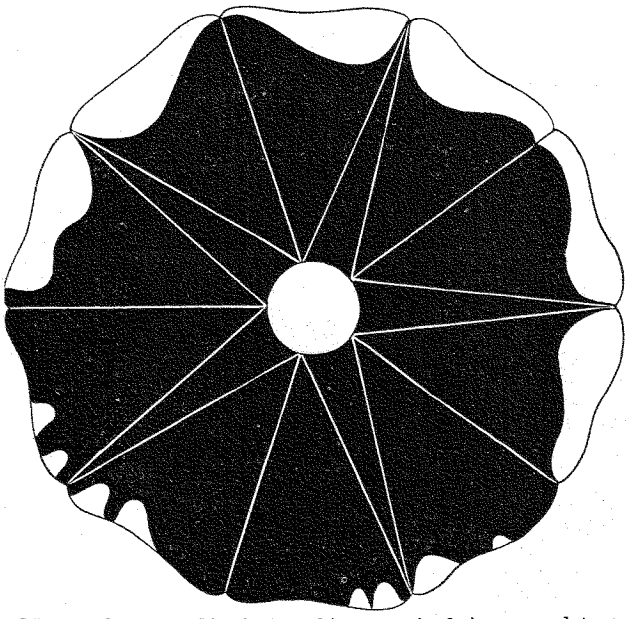

FIG. 1. Mosaic flower, half of the white margin being complete and half imperfect.

The original plant from which our morning glory has been evolved evidently lacked the white margin, that is, it had a self-colored flower. The appearance of the white-margined flowers in the history of this plant under cultivation was noted about three quarters of a century ago. We can see beautiful drawings of specimens having white margins in old illustrated books such as *Asagao-Hanaawase* (1853), *Santoitchô* (1854), etc., before which publications we have no illustrations for the white-margined flowers. The genetics of the white margins is complicated. Five genes, margined-1, margined-2, margined-inhibitor, margined-fluctuator and margined-reducer, have already been detected (Imai 1927a, 1927b). We can not tell in what order these genes appeared in this plant. But the occurrence of the mutation recorded in the present paper suggests the probable method by which margined-1 flower originated from a self-colored morning glory.

White-4. Three white-flower genes, white-1, white-2 and white-3, have been detected in this plant, their genetic behavior to the colored invariably being recessive (Imai 1929). A white flower may have any one of three combinations with respect to stem color and flower-tube color: (1) white tube with green stem, (2) colored tube with green stem and (3) white tube with colored stem. But the fourth combination, colored tube with colored stem, has never been observed. Even in the hybrid progeny of two whites, one having white tube with colored stem and the other colored tube with green stem, the combination of colored tube with colored stem can not be obtained among the white segregates. In such F_2, however, white flowers with white tubes and green stems are produced, being double recessive combination of the two white-flower genes, white-1 and white-2.

In 1926, when the authors were making observation on the flower color of the progeny of plant 361a, it came to their attention that one plant among a total of 109 bore white flowers. This was unexpected in this family, the other plants all bred true to colored flowers. The white flower had a colored tube notwithstanding the fact that its stem was colored—a new combination formerly lacking in the white-flower series. The white corollas of the mutant were wrinkled (Fig. 2), but show fluctuation to the perfect condition. The progenies of the sister plants of this white mutant all produced only colored flowers.

On selfing the white mutant, twenty-five plants were obtained in the subsequent generation; of these nineteen had white and six had colored flowers, which indicated that the white is a simple Mendelian dominant character. The white-flowered segregates were characterized by wrinkled corolla, colored tube and colored stem, as mentioned above. The flower color of the plants, which were segregated as recessives from the white mutant, were dilute purplish brown (Ridgway's "Color Standard and

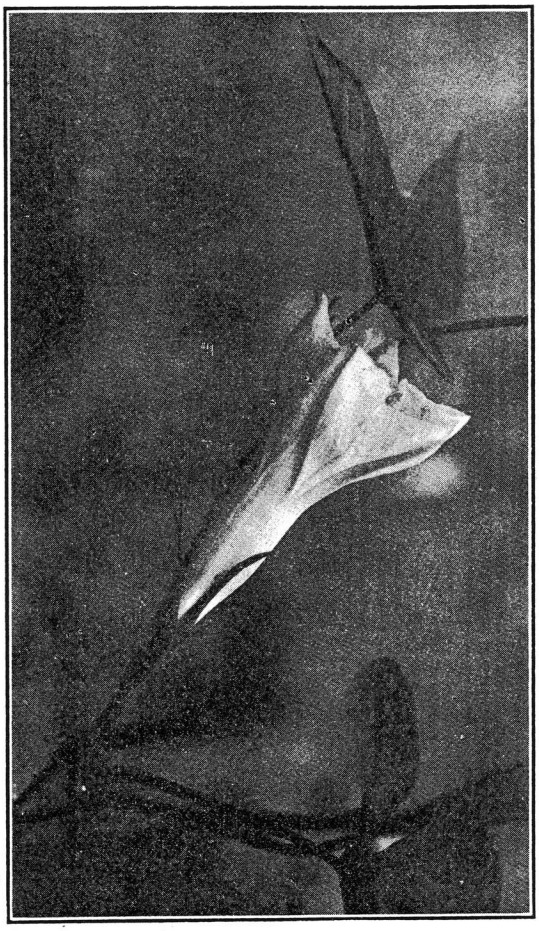

FIG. 2. The white-4 mutant.

Color Nomenclature'' (1912), Purplish Vinaceous), a type due to a mutable gene which is furnishing material for a special study. The further data gathered in 1928 proved the simple dominance of the white mutant character, which will be called white-4 (W4), to the colored condition mentioned above. A total of thirteen families which were heterozygous for white showed the segregation of 428 white and 156 colored flowers, where simple expectation is 438 and 146, respectively. Practically,

however, the case is much complicated by the mutable behavior of the gene contained in the segregates; the detailed account will be published later.

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