

Added evidence for the single gene idea comes from numerous projects in which resistance is routinely transferred to susceptible lines. In extended, continuous backcrossing, the resistance factor continues to segregate as a unitary, essentially dominant gene. However, since, for example, resistance deriving from inbred 11 is clearly more potent during the advanced backcross generations than that from the other three sources, it seems clear that there is an allelic series at the resistance locus.

In recovering a few lines with resistance, the potency of the added gene seems to fade away upon reaching about BC₄ or BC₅. This is thought to be due to the fact that these exceptional lines lack complementary genes necessary for the expression of resistance. Added evidence for this explanation comes from the fact that inbred 44, while it has been found to be a source of excellent single gene resistance, is uniformly susceptible in its original state.

The dependence of the expression of the SCMV gene upon complementary genes is exactly parallel to the dependence of the Rf₁ - Rf₂ restoration system upon complementary loci, first noted by Shaver (MNL 30:160, 1956). It is again interesting to note that the inheritance of resistance to SCMV can appear perfectly simple, or relatively complex, depending entirely upon the type of material being observed. We propose the designation, Scm for the SCMV resistance locus.

D. L. Shaver

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH
PLANT PHYSIOLOGY DIVISION
Palmerston North, New Zealand

1. Maize genetics studies by protoplast fusion.

Use has been made of several lines of the well-documented chloroplast mutations and nuclear controlled chloroplast deficiencies of maize in studies to demonstrate genetic complementation by protoplast fusion. Because of the difficulty of initiating mitosis in fused protoplast heterokaryons, it was hoped that the appearance of chlorophyll

in chlorotic mutants could be used as a marker for complementation. Plants homozygous for the recessive *iojap* (*ij ij*) gene are striped and yield three types of protoplast upon treatment with 1% cellulase: those containing normal green chloroplasts, those with only mutant white ones, and those with a mixture of normal and mutant plastids. White deficient plants, homozygous for a terminal deletion of chromosome 9, (*wd wd*), are devoid of both carotenoids and chlorophyll and hence germinate as albinos. Fusion of green *iojap* protoplasts with white deficient protoplasts caused the formation of small light green plastids in the white deficient cytoplasm, as did the fusion of *iojap* protoplasts with a mixed plastid population to a *wd wd* protoplast. The fusion of green *iojap* protoplasts with white *iojap* protoplasts failed to induce chlorophyll synthesis in the white plastids. This is probably due to the fact that the double recessive *ij ij* induces white stripes by causing a high frequency of irreversible plastid mutations and the occurrence of cells with mixed plastid populations suggests that complementation in such a case is impossible. Fusion of white *iojap* and white deficient protoplasts also failed to bring about greening, and suggests that some chloroplast factor, only present in normal green plastids, is necessary for the complementation, as well as nuclear material.

Because of the possible diffusion of chlorophyll that might have occurred in the case of a fusion involving protoplasts with green plastids, similar experiments have been performed using protoplasts from the seedlings of plants homozygous for the recessive genes w_1 , w_2 and w_3 . Each is located on different chromosomes, 6, 10 and 2 respectively, and each gives rise to a white or off-white seedling. When protoplasts of w_3 seedlings were fused with either w_1 or w_2 protoplasts, complementation occurred, giving rise to pale green plastids, but fusion between protoplasts of w_1 and w_2 failed to result in any complementation. This would suggest that w_1 and w_2 are rather similar in their effect, and it has not escaped notice that it may even represent a reciprocal translocation.

The plastids which are formed as a result of this type of complementation do not green up to the extent that normal chloroplasts do, and contain only 15-20% of the normal amount of chlorophyll. Nevertheless,

it does seem that genetic complementation can occur; in the case of iojap/white deficient heterokaryons the deleted terminal portion of chromosome 9 is complemented, and the w_1 and w_2 genes can be complemented by w_3 . These findings open up the possible use of protoplast fusion studies in the dissection of gene expression and controlling gene-structural gene interactions in maize.

K. L. Giles

ESTACION EXPERIMENTAL REGIONAL AGROPECUARIA, INTA
Pergamino, Prov of Buenos Aires, Argentina

1. Mutant "branched silkless" found in flint inbred P578.

As described by Kempton (1) in 1934, the character "branched silkless" in corn was first discovered by E. B. Brown of the Office of Corn Investigations, USDA. Subsequently, the same character was found in sweet corn received through A. E. Longley from Nova Scotia, Canada.

The appearance of the present case of the mutant character "branched silkless" was observed first in 1967-68 in a strain of inbred line P578 of flint corn. As far as we know, this mutant was not observed before in corn from Argentina (2 & 3). It is postulated that the character appeared in inbred P578 by simple Mendelian segregation on continued selfing in a supposedly uniform and homozygous inbred line, or by natural spontaneous mutation in its genetic constitution.

This character behaves as a recessive in crosses with normal plants or supposedly non-branched silkless plants, giving first generation plants which are all normal. So far, the studies on its genetic inheritance and allelism are not completed. Its principal genetic effect is similar to that already described by Kempton (1), in that there is a characteristic modification in ear branching, florets, glumes and suppression or non-development of silks, resulting consequently in female sterility. On the contrary, there is a duplication of spikelets and florets with normal development in the tassel, giving a thicker and larger tassel than in normal plants.