Cytoplasm	Male Parent				Origin of Cytoplasm
	BH2	CE1	F5DD1	C25-13	
	Pollen Fertility				
USDA (Jones)	F*	F	S	S	Teopod x iojap
Texas (Jones)	F	S	F	S	Golden June
Texas (Rogers)	F	S	F	S	Golden June
No. 4	F	F	S	S	ERF Composite (Pioneer)
No. 5	F	F	S	S	Honey June
No. 6	-**	F	S	S	BRC Composite (Pioneer)
No. 7	F	F	S	S	BRC
No. 8	F	F	S	S	BRC
No. 9	-	S	F	-	BRC
No. 10	F	F	S	S	BRC
No. 11	-	S	F	-	BRC
No. 12	F	S	F	S	BRC
No. 13	-	F	S	-	BRC

*F - fertile, S - sterile
** Cross not grown

Donald N. Duvick

2. An extreme nuclear-cytoplasmic interaction.

In a set of some twenty pop corn F_1 hybrids grown in yield test in Ohio in 1955 it was observed that each of two hybrids resulted in zero yield while the average yield of the remaining hybrids in the test was approximately 65 bushels per acre. To those accustomed to expect heterosis in F_1 crosses of unrelated lines, this is an exceptional phenomenon. These two crosses had one inbred line (P2-5-1-X) in common and in both crosses P2-5-1-X was used as the maternal parent. The following year P2-5-1-X was crossed reciprocally with four unrelated lines, two of which were dents and two pops. The resulting hybrids were compared in observation plantings in 1957. In all cases, hybrids involving P2-5-1-X as a seed parent were completely devoid of vigor, i.e., they exhibited less vigor than the weaker of the inbred parents; the leaves were characterized by an abnormal striping (resembling somewhat certain virus effects) and most of the plants were partially pollen sterile. Reciprocal crosses, on the other hand, exhibited normal hybrid vigor and phenotype. Thus, on the basis of these limited data, it would seem that P2-5-1-X is characterized by cytoplasm which is highly incompatible with nuclei of the strains with which it has been tested. It is, therefore, another example of cytoplasmic inheritance but one with drastic

phenotypic effect. It is interesting to note that P2-5-1-X itself shows some leaf striping abnormality but it is much less pronounced in the line than in its crosses in which P2-5-1-X is used as seed parent. P2-5-1-X possesses as much vigor as might be expected from most relatively homozygous lines.

Several similar cases of maternally inherited loss of vigor characterized by similar phenotypic alterations have been found in WF9, $WF9^S$, $WF9^T$ and in several hybrids or segregating populations of hybrids of WF9, $WF9^S$ and $WF9^T$ with other inbreds. Some of these types have been extremely variable in expression, but it has not yet been possible to determine whether this variability is due to a "mutability" of the cytoplasm or whether it is due to segregation of "resistant" and "susceptible" genotypes, with respect to the cytoplasm. One strain of this type has been backcrossed, as male, to a normal appearing strain of WF9 for two generations; the backcrossed plants as yet show no sign of the vigor reduction or striping characteristic of the male parent.

William L. Brown
Donald N. Duvick

PURDUE UNIVERSITY
Lafayette, Indiana
Department of Botany and Plant Pathology

1. Embryo transplantation in corn.

Hall reported in Hereditas (1954) that crossability between wheat and rye could be increased if the wheat plants used for the crosses grew from embryos which were transplanted onto rye endosperm. The wheat transplanted onto rye endosperm and pollinated with rye pollen produced about 5 times as many hybrid kernels as the wheat transplanted on wheat endosperm. This result encouraged me to investigate the effect of embryo transplantation on crossability between a dent-sterile popcorn and a dent corn inbred. The relative ease of controlled pollination, the large number of seeds on a single ear of corn, the large seed and ease in grafting would make this investigation easier than the wheat and rye experiment.

A technique was developed for transplanting an embryo from one seed to another. The seed is soaked in water until the embryo and the endosperm can be separated with the least damage. The length of time of soaking depends on the corn variety. In this experiment, 149-5AA was soaked for 15 hours and L317 for 12 hours. Corn starch paste, a rubber band, and a splint were used to hold the grafted seed together. The grafted seeds were planted in sterilized soil in small pots in the greenhouse within one hour after grafting.