K55 is a Kansas inbred out of Pride of Saline, a white variety widely grown in the west central plains. NC77 is a very late white inbred of a white southern prolific variety. I153 is a short stalked early yellow inbred out of a U.S. Department of Agriculture open pollinated selection 133 of unknown origin. T he slightly reddish pericarp suggests that it may have come from Northwestern Dent. There are several selections of this old inbred, all with restoring ability, such as A344, A293, W153R. NY16 out of Webber Dent is another early inbred that gives good restoration with all T sterile inbreds and single crosses with which it has been tested.

D. F. Jones

2. Independence of cytoplasm and genes.

A sterile inbred, C106T, restored by Ky21 has been selfed for 8 generations. It has produced only fertile plants after it was reduced to homozygosity for the restoring genes. When this fertile inbred, carrying sterile cytoplasm, was crossed by normal C106 the F_1 generation was all fertile and the selfed F_2 grown last year in three separate progenies gave 37 normally fertile and 11 completely sterile plants where 36 and 12 were expected in a monofactorial segregation. For 8 generations the sterile cytoplasm has persisted in fully fertile plants. Also C106T restored by Ky21 was backcrossed on to C106T for 5 generations then selfed 2 generations to give an all fertile progeny. One of these restored fertile plants was crossed by normal C106 and in the F_2 generation selfed grown last year gave 19 fertile and 5 completely sterile plants. This is clear evidence that different cytoplasms and genes can remain together in the same organisms for many generations without altering each other.

D. F. Jones

3. Producing restored sterile hybrids.

There are several ways of producing hybrid corn seed without detasseling now in commercial use. The method of producing two lots of seed of the same genotype, one on a sterile seed parent and one on a normally fertile seed parent by detasseling, and mixing these two lots of seed in various proportions is being widely used. This is a temporary measure and will be superseded by the use of restoring pollinators as soon as these are available. Various ways of using restoring pollinators are being tried.

The method that eliminates all detasseling in the production of the foundation single crosses as well as the final double cross is to use sterile inbreds as the seed parent of both single crosses. The pollinator for the seed parent single cross must be an inbred that has been tested for non-restoration. The pollinator for the pollen parent single cross must be a good restorer. The formula for this type of double cross is:

(A-Tff x B-ff)(C-Tff x D-TFF) where A B C D are the four inbreds, T is the Texas type of sterile cytoplasm, FF the necessary T restoring gene or genes in the homozygous condition, and ff their recessive alleles. This combination will usually give about 50 percent of the plants shedding normal amounts of pollen in the farmer's fields. This method eliminates all detasseling in the propagation of the inbreds and also in the production of both single crosses as well as the final hybrid. It also gives an automatic check on fertility restoration in the seed production fields, and may give an increased heterotic effect. Any loss of fertility restoring ability will show up in the form of sterile plants in the pollinator rows. Many of the outcrosses in the sterile inbreds and the sterile seed parent will show up in fertile tassels and can be rogued out.

Other methods can be used to give from 25 to 100 percent restoration in the final hybrid. If sterile inbreds are not available the pollinator single crosses can be made by detasseling or by hand pollination. The following different formulas can be used:

	Percent Restoration
(A-Tff x B-ff)(C-FF x D-FF)	100
" " (C-ff x D-FF)	50
" " (C-Ff x D-Ff)	50
" " (C-ff x D-Ff)	25
" " (C-TFF x D-TFF)	100
" " (C-Tff x D-TFF)	50
" " (C-TFf x D-TFf)	66
" " (C-Tff x D-TFf)	50

The percent restoration listed applies when only one restoring gene is needed. Actually the amount of pollen shed will vary widely as shown by the test crosses listed above and from the results of experimental and commercial hybrids already in production. Some of the methods listed above that give 50 percent restoration in the farmer's fields will not give full pollen production in the pollinator single cross in the seedsman's crossing fields and allowance must be made for this to have enough pollen shedding plants to give a good set of seed. All combinations must be tested thoroughly under different soil and seasonal conditions both for pollen restoration and combining ability in the region in which the hybrids are to be grown.

Most corn produces too much pollen and higher yields can be expected in the combinations with less than 100 percent pollen production. An interaction between sterile cytoplasms and restoring genes seems to be a factor for increased production and deserves further study.

D. F. Jones