$\underline{C}^m$ to $\underline{F}$. Additional mutants are being sought and a genetic and immunological analysis of those mutants described herein is underway.

References:

Schwartz, D. 1973. The $\underline{Adh}_1{}^{FC^m}$ "Operon". Maize Genetics Cooperation Newsletter 47: 53.

Schwartz, D. and Toru Endo. 1966. Alcohol dehydrogenase polymorphism in maize-simple and compound loci. Genetics 53: 709-715.

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## 3. Further studies on the cause of variation in the frequency of chromatin loss induced by B chromosomes.

In the 1972 Maize News Letter we reported different rates of chromatin loss induced by B chromosomes when two plants of the high-loss strain were used as the pollen parent in crosses with two different genetic lines. When plant 30785-24 with 7 B's, homozygous for the $\underline{A}_1$ allele and the 3L knob, was used as the pollen parent onto $\underline{d}\ \underline{lg}_2\ \underline{a}$ silks, 12.7% of the $F_1$ kernels had colorless aleurone. Pollen from the same plant gave 21.7% colorless kernels when crossed to $\underline{a}\ \underline{B}\ \underline{Pl}$ testers. A sibling plant 30785-23 with 8 B's yielded 8.9% colorless seeds when its pollen was placed on $\underline{d}\ \underline{lg}\ \underline{a}$ silks and 19.5% colorless kernels on the $\underline{a}\ \underline{B}\ \underline{Pl}$ tester. These data are explicable if in the $\underline{d}\ \underline{lg}_2\ \underline{a}$ crosses there is preferential fertilization of the egg by the deficient sperm, while in the $\underline{a}\ \underline{B}\ \underline{Pl}$ crosses the deficient sperm preferentially unites with the polar nuclei to form the endosperm. Preferential fertilization, however, proved to be not responsible for the dissimilar rates since for both pollen parents, the high rate of endosperm loss in the $\underline{a}\ \underline{B}\ \underline{Pl}$ crosses was not associated with low embryo loss; there was no compensating increase in embryo loss if endosperm loss was low and vice versa.

Two alternative explanations were considered. One of these ascribed the dissimilar rates of loss to environmental differences of an unknown nature. Circumstantial evidence in support of this hypothesis is the fact that for both plants 23 and 24 the pollen used in crosses with

the a B Pl strain came from the main stalk while pollen from tillers was used in the d lg a crosses. Since the second microspore division in the tillers took place at a later time and under different environmental conditions than it did in the main stalks, and if the mechanism responsible for chromatin loss is sensitive to climatic or edaphic factors, a difference in rate of loss in the tiller and main tassel would not be unexpected.

The second alternative was based on a hypothetical difference in genetic constitution of the main stalk and tiller. Elimination of several B chromosomes from the tiller at the time it arose from the main stalk could reduce the number of B chromosomes in the tiller to a level which would modify the rate of A chromatin loss. In order to account for the genetic data, the 7 B's in the main stalk of plant 24 would be reduced to 3 B's in the tiller and in plant 23 the change would be from 8 in the main stalk to 3 in the tiller. This specific number of B's eliminated is necessitated because plants with 3 B's have approximately half the rate of loss as do individuals with 4 or more B's. Plants with two or fewer B's have little or no chromatin loss in their microspores.

Lending some credence to this hypothesis was the finding by Puteyevsky and Zohary (1970) that in Dactylis variation in number of B's occurred during tiller differentiation. A similar situation might hold for maize. The postulated variation in numbers of B's between tiller and main stalk is amenable to experimental test. In the summer of 1972, pollen mother cells were taken from the main stalk and tillers of 9 plants of the high-loss strain. In no case was a difference found in number of B's between the tiller and main stalk. Unfortunately, no adequate genetic data on loss rate were obtained from these 9 plants because adverse weather conditions inhibited pollen shedding. The cytological data showing no intra-plant variation in number of B's lend no support to a genetic difference in main stalk and tiller as the cause of low and high rates of loss. It is conceivable, though unlikely in our opinion, that in plants 23 and 24 a reduction in numbers of B's did occur during tiller differentiation. If so, it must be a sporadic and unpredictable happening.

The hypotheses of preferential fertilization and of differing genetic constitution of tiller and main stalk are not consonant with the experimental data. At the present we are in the unsatisfactory position of ascribing differences in rate of loss found when two female testers were employed in the high-loss crosses to unknown and undefined environmental conditions.

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