

distortion of pairing in this region resulting in little or no crossing over. Anderson, Kramer and Longley (1955, Genetics 40:531-538) found that heterozygous translocations involving the long arm of chromosome 6 frequently produced a marked suppression of crossing over in the \underline{Y}_1 - \underline{Pl} region.

The actual reason for the negative results may have been a combination of two or more of the above explanations. However, there is evidence that the second alternative might have been one of the factors involved. In this experiment a total of 2,051,571 \underline{Y}_1 bearing gametes was tested (694,330 from the male rows, 901,494 male gametes that fertilized the F_1 plants and 455,747 \underline{Y}_1 female gametes produced by the F_1 plants) and no back mutations to \underline{Y}_1 were observed. If the mutation causing \underline{Y}_1 was due to a simple base substitution back mutations might be expected, yet none was observed in a reasonably large sample. However, no back mutations would be expected if the mutation was the result of a deletion.

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1. Unstable derivatives of the B^9 chromosome.

The B^9 chromosome of the translocation, B-9b, can be separated from the reciprocal 9^B chromosome and maintained as a supernumerary in a stock with two chromosomes 9. When crosses of the type $\underline{c} \underline{sh} \underline{wx} \times 9^c \underline{sh} \underline{wx} \ 9^c \underline{sh} \underline{wx} \ B^{9C} \underline{Sh}$ are made, about 10% of the progeny are phenotypically $\underline{C} \underline{Sh}$ and result from functioning of $9^c \underline{sh} \underline{wx} \ B^{9C} \underline{Sh}$ pollen. (Cross-over $9^c \underline{Sh} \underline{wx}$ chromosomes also give rise to $\underline{C} \underline{Sh}$ kernels, but can be distinguished in the next generation by testcross data--Robertson, 1967). A relatively large percentage of the $\underline{C} \underline{Sh}$ progeny of $9 \ 9 \ B^9$ plants exhibit $\underline{C-c}$ mosaicism (1-2%) and such kernels have been investigated. One might expect the great majority of mosaics to have arisen from a single break in the B^9 , followed by a breakage-fusion-bridge cycle. However, a number of the mosaic kernels investigated showed a heritable mosaicism, and, in this respect, resembled ring chromosomes. Given below are the results of

test-crosses of 31 plants derived from mosaic kernels.

Segregate solid-colored kernels	Segregate kernels with C-c mosaicism	All kernels colorless
12 ears	7 ears	12 ears

Seven independent cases of heritable mosaicism were found, among 31 individuals tested. One B^9 derivative, discovered before the seven cases above, has been tested for C-c mosaicism and Yg-yg mosaicism and found to exhibit both.

A number of explanations can be given for the unstable B^9 derivatives. They could simply be ring chromosomes. On the other hand, a mutation of the timing mechanism, which normally restricts nondisjunction of the B^9 to the second pollen mitosis, could account for their behavior. The fact that nondisjunction of the B^9 requires the presence of 9^B (Carlson), which is absent in these crosses, makes this idea less likely. A third explanation for the derivative B^9 's is loss of the minute short arm of the chromosomes (Randolph) and formation of an unstable telocentric. A cytological analysis should help decide between the alternatives.

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2. Regulation of nondisjunction of the B chromosome.

The B chromosome of maize undergoes nondisjunction at the second pollen mitosis, and rarely at other divisions (Roman, 1947). It has been shown, with TB-4a, that nondisjunction of the B^4 chromosome requires the presence of 4^B , even though the 4^B chromosome itself divides properly at the second pollen mitosis (Roman, 1949). The analogous situation was found with TB-10a (Longley, 1956) and TB-9b (Carlson, 1968). One can infer, therefore, that a gene(s) in the distal heterochromatin of the intact B (present on 4^B , 10^B , and 9^B) causes a "stickiness" or incomplete replication in the proximal part of the B, resulting in nondisjunction. The restriction of nondisjunction to the second pollen mitosis might result from repression of this gene(s) during all divisions except the second pollen mitosis. However, Battaglia proposed (1964) a different explanation for the localization of B chromosome nondisjunction to the second pollen mitosis. According to Battaglia, the B chromosomes of