Of the three 2-6 interchanges with the break in the nucleolus organizer, two have been tested. Both give normal 1:1 ratios, indicating that the deficiency which includes at least part of the organizer of chromosome 6 does not function.

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6. Notes on the 1-5 interchanges.

We now have all but 7 of the 40 stocks listed in the 1961 ARS 34-16 publication by Longley. Seven of the stocks have not been checked in intercrosses or linkage tests. Multiple-point linkage tests that include bm$_1$ as one of the markers served as a test to determine genetically whether the break was in the short or the long arm of chromosome 5. The genetic data and the results of intercrosses agree on the following changes in placement of the breaks in chromosome 5. Cytological observations alone are the basis for the changes in positions made for chromosome 1. Those with breaks found to be in a different arm from that listed:

6899 S.40 - L.10	not S-S
6197 S-S	not S-L
e S.01-S.12	not L-L
7219 S.20-L.42	not L-S
a L.64-L.49	not L-S
8041 L-S	not L-L

The information is not complete for 1-5 (6401).

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7. Chromosome pairing in intercrosses between stocks of interchange that involve the same two chromosomes.

Type 2a, interchange points in opposite arms in both chromosomes. In the intercrosses involving T1-5 interchanges, the frequencies of "pairs" at diakinesis ranged from 5 to 100%. When the interchange points in both chromosomes in both interchanges were at .4 or closer to the centromeres, the diakinesis configurations were all or mostly 10II. When one or more of the interchange points was at .5 or farther away from the centromeres, fewer of the configurations were pairs and more were chains, rings, or other types of associations of the 4 chromosomes. Complex configurations of 4 were observed which are probably the result of crossovers in both differential segments. Often these can be described only as a clump. Similar configurations in Pisum have been pictured by Lamm and Miravalle (1959, Hereditas). The frequencies

of pairs became progressively lower for intercrosses with breaks farther out on one or more of the arms.

At pachytene in intercrosses showing 15-30% of "pairs" at diakinesis, most of the cells had an association of 4 chromosomes with 2 +-shaped pairing configurations, one in each arm of the two chromosomes. When the breaks were at .4 or closer to the centromeres (100% "pairs" at diakinesis), "pairs" were also frequent at pachytene. In an occasional figure an association between the two in regions near the centromeres could be recognized. When certain of the interchange points were close to the ends, only one "cross" was observed in many of the figures. Although no intercross combination has been studied in which the 4 breaks were close to the ends, one can predict that in the resulting "pairs," homologous ends would not be paired.

The evidence from the intercrosses in which the interstitial segments are relatively short, with breaks at .4 or less, indicates that pairing is not initiated at the centromeres. If it were, the "pairs" observed in these intercrosses would then be associated homologously in the middles. This is not the case. However, when the interchanged segments are short, pairing may be initiated on either side of the break points. There may be several sites at which pairing may be initiated. In the type la intercrosses, the centromere is not one of these sites.

Hence, in maize the "intercross method" of locating break points proposed for barley by Kasha and Burnham, 1965 (Canad. J. Genetics and Cytol.) fails for the Type la intercrosses when one or more of the interchange points is at .5 or greater. Interchanges with breaks known to be at distal positions in the chromosomes are needed in barley to test the method.

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8. Crossing over in intercrosses involving T5-6c.

The T5-6c (5L 0.89-6S 0.0) stock homozygous for $\underline{bm}_1$ $\underline{pr}$, $\underline{ys}$, $\underline{v}_2$, $\underline{y}$ was crossed with five T5-6 stocks with breaks in 5S and 6L, i.e. the opposite arms, or Type la intercross. The F_1's were backcrossed to $\underline{bm}$ $\underline{pr}$ $\underline{ys}$ $\underline{y}$, in some cases $\underline{v}_2$, in others $\underline{V}_2\underline{v}_2$. Crossovers in both of the between-breaks segments in chromosome 5 and in 6 will result in two kinds of combinations, one with normal chromosomes 5 and 6 and one in which chromosomes 5 and 6 carry both interchanges. These will appear among the backcross progeny as fertile and semisterile plants, respectively. The latter is the type desired for the new marker method described below, but cannot be distinguished from the non-crossovers which are also semisterile. The frequencies of the fertiles from 5-6c crossed with five 5-6 (S-L) interchanges are shown in the following tabulation: