13. Behavior of-altered knob-10 chromosomes.

As reported in the 1955 Maize News Letter a number of altered knob-10 rod chromosomes originated from a ring-10 heterozygote. A preliminary study has been made on three of these chromosomes to determine their effect on preferential segregation.

The following symbols are used to denote the different types of knobs: K, normal knob; k,, knobless 10; K_s, approximately one-half of the original knob located at the end of 10-long; K_{is}, about one-half of K-10 placed interstitially on 10-long; and K_o, chromosome lacking the knob but possessing the dissimilar chromomere pattern characteristic of normal knob-10 chromosome.

The data given in the following table came from plants heterozygous for the changed knobs.

Culture	Total Population	Number Colored Seeds	Number Colorless Seeds	% R
R^r K/r^g k (control)	15,030	9,546	5,484	63
R^r K_s/r^g k	40,114	19,853	20,261	49
R^r K_o/r^g k	10,278	5,432	4,846	53
R^r K_{is}/r^g k	16,632	7,993	8,639	48

These data show that normal segregation is restored in the presence of either K_s-10, K_{is}-10, or K_o-10. This would suggest that the factor responsible for preferential segregation is located in either the distal half of K-10, or in the euchromatic segment distal to normal X-10. Preliminary cytological studies indicate, however, that neo-centric activity which is characteristic of normal K-10 is present in the K_s-chromosome. This is surprising since K_s shows no preferential segregation of R. The objection may be raised that the K_s-chromosome possesses a deficiency which is reducing the normal female transmission of R, however, both pollen and ovule examinations have shown no evidence of abortion. The K_o-chromosome also exhibits no abortion in pollen or ovules. This has not been checked in stocks carrying K_{is}.

In addition, each of these knobs have been tested in compound with a normal knob-10. If both knobs are equally effective, a 1:1 ratio is expected. However, if the knobs have lost their ability to segregate preferentially, a normal knob ratio is expected. In this case, the normal knob showed a 68 K:32 k ratio.

Culture	Total Population	Number Colored Seeds	Number Colorless Seeds	% R
R^r K/r^g K (control)	20,976	6,944	14,032	68
R^r K_s/r^g K	15,278	7,388	7,890	48
R^r K_o/r^g K	17,409	7,090	10,319	59

R^r K_{is}/r^g K	20,327	9,063	11,264	56

These results are inconsistent with the data from table 1. The K_s chromosome, which exhibited no preferential segregation in the heterozygote, clearly shows full knob effect in compound with a normal knob-10. Also, the K_o-chromosome, which showed no preferential segregation in the heterozygote, exhibits some degree of preferential segregation in the homozygote. This chromosome has not been examined for neo-centromeres. The K_{is} chromosome also shows some preferential segregation in the presence of normal K-10, but abortion is not excluded.

At the present time an explanation of these results is not apparent, but it seems possible that the phenomenon of preferential segregation could be due to a combination of several factors.

This study includes other altered knob-10 chromosomes such as: one with approximately one-half of the knob on the end of 10-short; one with a normal K-10 but without the dissimilar chromomere pattern; and one with normal K-10 on 10-long and a modified K-1C on 10-short.