the exceptional kernels would have the Yg allele contributed by the sister sperm cell and give rise to green seedlings. Loss of the C allele from the chromosome 9 with the small knob would also result in a colorless kernel when the deficient sperm fertilized the polar nuclei but the embryo would produce a yellow green seedling. In short, a green seedling from a colorless kernel denotes loss of the K^L chromosome while a yellow green plant from a colorless kernel is the consequence of loss of the K^S chromosome. In a preliminary experiment we obtained 37 green and four yellow green seedlings from colorless kernels. Not unexpectedly, the chromosome with the larger knob is most frequently lost.

M. M. Rhoades
Ellen Dempsey

2. Possible causes of variations in the frequency of chromatin loss induced by B chromosomes.

In the 1970 growing season, unusually high rates of endosperm loss of A_1 (around 20%) occurred when a number of high loss plants with 6 or more B's were used as male parents in crosses with several a tester stocks. The high loss plants were derived by self and sib pollinations within a stock which in preceding generations had given uniformly lower rates (about 12%) in crosses with six different female parents. The higher frequencies were attributed to an undefined environmental effect since the segregation of modifying genes or the differential performance on different females appeared unlikely. Moreover, in 1970 two high loss individuals gave both high and low rates of loss when used as the male parent on two a stocks. In both instances, the cross with the late maturing $d_1 lg_2 a_1$ stock gave a lower rate than did the cross with the earlier a_1 B Pl stock. Population totals are given in parentheses.

♂ parent	# B's	Endosperm loss of A with ♀ parent:	
		d_1 lg_2 a_1	a_1 B Pl
30785-24	7	12.7 (529)	21.7 (1634)
30785-23	8	8.9 (615)	19.5 (2110)

The different rates of endosperm loss observed in the two crosses could be ascribed to the ability of the female parent to affect the

pattern of fertilization. Thus, the lower endosperm loss of both pollen parents in the d lg a crosses might be due to the preferential fertilization of the egg by deficient sperm while in the a B Pl crosses the reverse would occur. If this indeed is the correct explanation, the low endosperm loss observed in the d lg a crosses should be combined with a high rate of loss in the embryo and the high endosperm loss of the a B Pl crosses should be associated with low embryo loss. That this is not true was shown for plant 24. In field grown plants from the a B Pl crosses, 19.3% of the progeny came from colorless kernels (loss of A in the endosperm) while the frequency of embryo loss was 9.4% (detected as anthocyaninless plants with 50% pollen or ovule abortion). Comparable values for the d lg a crosses were 8.3% endosperm and 3.6% embryo loss (detected by colorless plant phenotype, by pollen and ovule abortion, and by progeny testing). There was no compensating increase in embryo loss if endosperm loss was low and vice versa. The total loss rate in endosperm and embryo differed when the same individual plant was crossed onto two tester stocks.

It is possible that the 20% rate of endosperm loss reflects an environmental difference; the lower rate of loss found in crosses onto the d lg a stock might also be assigned to an environmental effect were it not for the fact that, in both plants 23 and 24, the pollen tested for loss in the a B Pl crosses came from the main stalk and that used in the d lg a crosses was produced by a tiller. It is true that the second microspore division in the tiller occurred at a later time and presumably under different growing conditions than it did in the main tassel. This would argue for an environmental effect such as variation in temperature. However, a difference in genetic constitution of main stalk and tiller might be responsible. Elimination of several B chromosomes from the tiller at the time it originated from the main stalk would give a tassel with a lower loss potential. Whether or not the main stalk differs from its tillers in numbers of B's has not been studied in maize, but this somewhat fanciful hypothesis is made more credible by the variation in the number of B's during tiller differentiation in Dactylis (Puteyevsky and Zohary, 1970). Mitotic instability in number of B's has also been

found in several species (see Battaglia, 1964 for references). The influence of environmental factors on chromatin elimination induced by B's remains to be demonstrated, as does the likelihood of somatic variation in numbers of B's between main stalk and tiller. Experiments have been set up to resolve these questions.

M. M. Rhoades
Ellen Dempsey

3. Effects of various segments of the B chromosome on recombination and nondisjunction.

A) Analysis of the B chromosome segments responsible for enhanced crossing over.

Hanson studied recombination in chromosomes 9 and 3 and reported slightly higher values in plants with B chromosomes. These effects were not discernible until about four B's were present in the plant, at which time most of the enhancement was in double crossover classes. Since then Nel has found that B's appreciably augment exchanges in the centromere regions of chromosomes 5 and 9. The most spectacular promotion of recombination by B chromosomes, however, was discovered by Rhoades. A segment of 3L was transposed to the short arm of chromosome 9 and intercalated between C and Wx. Crossing over between the chromosome 9 markers was little affected when the transposition was homozygous, even though the physical distance was extended. This situation was drastically altered when a single B was present. Recombination was increased as much as 110% by the addition of a B chromosome, and a dosage effect was evident. The transposition line was utilized in crosses with selected A-B translocations in an attempt to determine which portion(s) of the B chromosome was involved in the enhancement of recombination.

Translocation stocks TB-4a, TB-3a, TB-6a, and TB-8a were made homozygous for the transposition and heterozygous for the markers C and Wx. Chromosomal constitutions of the resulting families were determined by pachytene analysis, root tip chromosome counts, and/or pollen abortion. The results of testcrosses are given in Table 1, and B chromosome breakpoints are shown in the accompanying drawing.