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1. **Is the effect of the B-chromosomes on recombination primarily an additive one?**

That the B-chromosomes can influence recombination in the A-genome chromosomes of maize is well documented. This attribute of the B-chromosome has been convincingly demonstrated by Hanson, Rhoades, and Nel. Nel has further shown that the abnormal chromosome 10 does have some sort of influence on the B-effect. Both Hanson and Rhoades observed a shift in the distribution of crossing over from the distal to the proximal region (chromosome 9) in their studies with the B-chromosomes.

In our study, where the maximum number of B's employed was five, we observed effects similar to those observed by the previously mentioned individuals. In addition, we have evidence indicative of active participation of the knobs of chromosome 9 in the B-effect. It is clear from our data that the types of knobs present do make a difference. In K^s/K^s homomorphs the decrease in recombination in the distal region ($yg - sh$) and the concomitant increase in the proximal region ($bz - wx$) are not as striking as the increases observed in both regions in K^*/K^s heteromorphs. The "total" recombination value obtained in each of the various homomorph classes is the same, approximately 42% for the $yg - wx$ region. On the other hand, the "total" can be said to be increased in B-containing heteromorphs relative to the B-less heteromorphs. Nonetheless, the suppressive effect of the K^* knob on total recombination is still visible.

Both in the proximal and the distal regions, regardless of knob composition, there is a "zig-zag" or "odd-even" effect on recombination. In the distal region an odd number of B's appears to reduce the frequency of recombination while an even number appears to reestablish the original value (0-B class value) in the homomorphs. Quite the opposite effect seems to be the case in K^*-knob containing classes. In the proximal region it appears as if an odd number of B's results in an increase in recombination regardless of knob composition. The manifestation of the "odd-even" effect is more pronounced in K^*-bearing plants than in K^s

Recombination values obtained from testcrosses of plants with different
combinations of knobs and number of B-chromosomes

		$\frac{+\ +\ +\ +}{yg\ sh\ bz\ wx}\frac{o}{+}$	yg – sh	sh – bz	bz – wx	Total	Total progeny
1	0 B	K^s/K^s	23.86%	2.47%	15.72%	42.05%	7934
2		K^*/K^s	8.35	1.61	19.10	29.05	6038
3	1 B	K^s/K^s	22.08*	2.32	17.27*	41.66	5658
4		K^*/K^s	10.92**	1.69	21.39**	34.00**	9539
5	2 B	K^s/K^s	24.17	2.12	16.23	42.52	7444
6		K^*/K^s	8.12	1.43	21.05*	30.60	5121
7	3 B	K^s/K^s	21.77*	1.84	17.44*	41.06	2494
8		K^*/K^s	10.41**	2.05	23.34**	35.80**	4430
9	4 B	K^s/K^s	23.47	1.86*	16.07	41.40	5587
10		K^*/K^s	8.97	1.48	21.94**	32.39**	4202
11	5 B	K^s/K^s	23.69	1.85	18.33*	43.87	971
12		K^*/K^s	12.63**	1.86	22.77**	37.27**	966

* and ** denote deviations, significant at the 5% and 1% levels respectively, from the " 0 B "
class of the same knob constitution.

homomorphs. The "zig-zag" type of effect on recombination by the super-
numeraries has been observed in rye by Jones and Rees, and in Listera
ovata by Vosa and Barlow. Our work on the B:Knob interaction is in need
of further experimentation. It would be interesting to know whether the
"zig-zag" effect observed in chromosome 9 is displayed in the other
A-genome chromosomes.

It becomes increasingly clear that the effect of the B-chromosomes
on recombination is not simply an additive one. It is also quite clear
that the effect of the B-chromosomes on recombination is modifiable not
only by the abnormal chromosome 10 but also by the knobs of chromosome 9.

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2. Probable weak fusion of chromatids broken during a breakage-fusion-
   bridge cycle.

McClintock (Genetics 26:234) first described the chromatid type
of breakage-fusion-bridge cycle in which a dicentric chromatid introduced
into the initial triploid nucleus of the maize endosperm will persist
throughout both the gametophyte and endosperm divisions. Variegation
patterns of endosperm markers in mature kernels provide evidence of the
cycle.

In the present study plants heterozygous for a ring chromosome 10
carrying the dominant R color factor allele and the dominant allele for
non-striate plant (Sr_2) were crossed to chromosome 10 testers marked by
the recessive alleles (figure 1). Three classes of progeny resulted.
The largest class of kernels (84.4%) was colorless and yielded green,
non-striate plants which were shown cytologically to contain normal
chromosomes 10. These individuals arise from one of the noncrossover
classes. The second class of kernels comprised 10.4% of the progeny.
The kernels were variegated for R. The variegation of the endosperm
tissue indicated that either the ring was present or a crossover between
the ring and the rod had produced a dicentric chromosome that was under-
going the chromatid type breakage-fusion-bridge cycle. Of the 10 kernels
in this class which germinated, 4 produced plants variegated for striate.
These plants, designated class II-A in figure 1, represent the other non-
crossover class. The presence of the ring was confirmed cytologically.