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1. Alteration of recombination frequencies in A- by B-chromosomes.

Closely related lines of Black Mexican sweet corn with and without B-chromosomes were crossed to chromosome-2, -3, and -9 testers. Root-tips were obtained from the F_1 seedlings and the number of B-chromosomes possessed by each plant ascertained. The F_1 plants were then backcrossed to their respective testers and the recombination frequencies between the gene markers determined.

Table I presents the data obtained using a $\underline{yg_2}$ - $\underline{c}$ - $\underline{sh_1}$ - $\underline{wx}$ chromosome-9 tester.

Table I. Frequencies of crossover classes from backcross of

$$\frac{Yg_2\ (1)\ C\ (2)\ Sh_1\ (3)\ Wx}{yg_2\quad c\quad sh_1\quad wx}\ ♀\ \times\ yg_2\ c\ sh_1\ wx\ ♂$$

No. of B-chromosomes	Crossover region							Total Progeny
	(1)	(2)	(3)	(1,2)	(1,3)	(2,3)	(1,2,3)	
0	18.6	2.9	16.9	0.26	0.40	0.058	<.0001	8565
1-4	18.3	3.2	17.8	0.24	0.60	0.096	.0002	4156
6-9	15.1**	3.7	20.7**	0.56	1.87**	0.655**	<.0009	1069
1-9	17.7	3.3	18.4*	0.31	0.86**	0.211*	.0002	5225

* Significantly different from 0 B-chromosome class at 5% level
** Significantly different from 0 B-chromosome class at 1% level.

The data indicate that the addition of B-chromosomes results in an increased recombination frequency between $\underline{c}$ and $\underline{sh_1}$ as well as between the $\underline{sh_1}$ and $\underline{wx}$ loci. The higher the number of B-chromosomes present in the F_1 plant the greater the increase in these regions. Turning now to a consideration of the $\underline{yg_2}$ - $\underline{c}$ region a completely opposite effect due to the B-chromosomes is encountered. In this region the larger the number of B-chromosomes the lower the frequency of single crossovers.

A comparison of the 6-9 B-chromosome vs the non-B-chromosome classes shows that the frequency of double crossovers is increased in all regions studied and table II gives the coefficient of coincidence values for these regions.

Table II. Coefficient of coincidence values (data from Table I)

No. of B-chromosomes	Crossover region		
	(1,2)	(1,3)	(2,3)
0	0.48	0.13	0.12
1-4	0.41	0.18	0.17
6-9	1.00**	0.60**	0.85**
1-9	0.53	0.26**	0.35**

** Significantly different from 0 B-chromosome class at 1% level.

It may be noted that B-chromosomes decrease chromosomal interference in all three regions and the effect is greater with the higher number of B's.

To state the results differently, the decrease in interference was found to be greatest near the centromere as was the increase in single crossovers. However, the latter effect was reversed near the end of the short arm of chromosome 9 (the presence or absence of a knob in this region has not yet been ascertained).

Supernumerary chromosomes have been known for some time to exist in many plants and animals; however, cytogeneticists have in most cases been unable to ascribe a particular function to them. The data presented above suggest one such function. This idea is supported by studies by Barker (*Heredity* 14:211-214, 1960) in the grasshopper *Myrmeleotettix maculatus*. He found that populations which possessed supernumerary chromosomes had a higher chiasma frequency than populations which lacked them.

The corresponding data with other chromosome testers is being analyzed. Also studies are being carried out utilizing larger numbers of B-chromosomes.

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2. Crossing over and segregation in plants heterozygous for T6-9b.

It was reported previously that plants heterozygous for T6-9b (breaks:6L.10-9S.37) give an excess of the normal chromosomes when used as female parents in the backcross. Normal and translocated chromosomes are recovered with about equal frequencies from the heterozygous male. The progeny of the two backcrosses (♂ and ♀) also differ in that crossing over in the short arm of chromosome 9