is more frequent in the microsporocytes than in the megasporocytes although it is less than normal in both cases. When the genes tested are in repulsion phase, one class of crossovers may be confused with tertiary trisomes (6, 9, and 6^9), which occur with a low frequency in both backcross populations. In these cases the crossover frequency was obtained by doubling the value found for the reciprocal crossover class. When the genes are in coupling phase the tertiaries are included with the non crossovers and have a negligible effect on the crossover frequency. Some reduction in the frequency of crossing over in 9S is expected because all tested plants were heterozygous for a large terminal knob and for wd. Since not all the progenies were tested for yg, the population totals for Yg-Sh and Sh-Wx values differ. The data are given below:

Constitution	Heterozygous parent	Yg-Sh Σ	Yg-Sh %	Sh-Wx Σ	Sh-Wx %	%Wx	Total recombination
$\frac{T\ Wx\ Sh\ wd\ k}{N\ wx\ sh\ Wd\ K^L}$	♀	561	1.1	1963	0.97	33.0	2.07
"	♂	1617	9.2	6525	13.8	51.5	23.0
$\frac{T\ Wx\ sh\ Wd\ K^L}{N\ wx\ Sh\ wd\ k}$	♀	530	0.2	1026	1.2	35.3	1.4

The position of the knob on the translocated or on the normal chromosome has little effect on the transmission of the translocated chromosomes (Wx marks the break point) or on the frequency of crossing over in 9S. The structural heterozygosity from both the translocation and the presence of the large knob on one of the homologues results in defective pairing of 9S in pachynema and it is not surprising to find a great reduction in crossing over in this arm.

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3. Crossing over in plants homozygous for T6-9b.

In plants homozygous for T6-9b, crossing over was tested in the Yg-C and C-Wx regions. Duplicate plantings were made from the same ear; family 23234 was grown in the greenhouse and 24124 in the field. PMC were obtained from plants in family 24124 and all had knobless chromosomes 9. Probably most of the plants in family 23234 had the same constitution, but the possibility exists that a few may have been $K^L9/k9$. The crossover values from ♂ and ♀ backcrosses are shown in the table with the standard values (Emerson, Beadle, and Fraser) and some of Rhoades' for comparison.

Backcrosses of $\frac{wx\ c\ Yg}{Wx\ C\ wd}$

		Yg-C	C-Wx	Σ	Total recomb.	% doubles	coin.
23234 ♀ B.C.	T/T	11.8	33.2	578	45	1.4	.36
24124 ♀ B.C.	T/T	9.6	37.4	1024	47	0.39	.11
23234 ♂ B.C.	T/T	8.7	43.6	585	52.3	0.9	.22
Standard	N/N	20	26		46		
Rhoades	N/N	20.6 (Yg-Sh)	17.2 (Sh-Wx)		37.8	0.9	.26

The overall recombination from wx to yg is not greatly different but the distribution of crossovers is altered in the 6^9 chromosome. Recombination is reduced in the Yg-C region and increased in the C-Wx region. Since these plants (for the most part) were not heterozygous for the large terminal knob on 9S, there is no apparent reason for the reduction in crossing over in the distal segment.

The position of the distal .6 of 9S with respect to the centromere may be altered by the translocation and might influence recombination in this region. The breakage points of T6-9b according to Longley are 6L.10 and 9S.37. In terms of relative distance from the centromere (based on Longley's pachytene measurements of normal chromosomes) the break in 6L would be 3.68 units from the centromere and the break in 9S, 5.71 units. Thus, in the 6^9 chromosome, the distal part of 9S (including the Wx locus) should be closer to the centromere. An average of three pachytene figures from my stocks gave somewhat different breakpoints: 6L.17 and 9S.46. However, shifting of the point of partner exchange often occurs in heterozygotes and in one figure (which was discarded) both breaks appeared to be adjacent to the centromeres. A comparison of the length of the longer arm of the 6^9 chromosome with the normal 9S should reveal whether the translocated piece is closer to the centromere or more distant. Measurements were made of the arm ratio of the homozygous 6^9 chromosome in 13 pachytene cells. A ratio of 1.6:1 was found:

. The ratio of 9S/6S in a normal strain is 1.3:1. This would indicate that the distal part of 9S is further from the centromere in the translocated chromosome.

A centromere effect, such as that reported by Beadle (1932) in Drosophila, would be expected to cause the greatest change in regions nearest the centromere with a gradual lessening in the effect, rather than a reversal of the effect in the distal region as was found here. Patterson (MNL 32) reported increased C-wx values in homozygous

T4-9$_{5657-2}$ (4L.33-9S.25) and in homozygous T6-9e (6L.17-9L.22). In the second case the break is in 9L so a centromere effect is ruled out. No explanation can be advanced at present for the change in recombination frequencies in the homozygous T6-9b.

Ellen Dempsey

4. Test for pseudoallelism at the A_2 locus.

A total of nine possible mutants (A_2) were obtained among 179,500 seeds from crosses of Gl_{17} $a_2^{Bl\ Mex}$ Bt V_2 / gl_{17} a_2^{St} bt V_2 yy ♀ X gl_{17} a_2^{St} bt Pr v_2 Y ♂ (see MNL 34, page 65). The phenotypes of these nine individuals and the results from selfing are shown below:

	Plant phenotype						⊗ Ear
1	Gl	A	Bt	Pr	Y		seg bt and sh, no v; red cob
2	Gl	A	Bt	Pr	y	(on same ear)	not seg bt or v
1	Gl	A	Bt	Pr	y		seg bt, no v; red cob
*1	Gl	A	Bt	Pr	y		seg bt, seg v; white cob
1	?	A	Bt	Pr	y		(no germination)
1	gl	A	bt	Pr	y		(hoed out)
*1	gl	A	bt	Pr	y		seg v
1	?	A	bt	Pr	y		(no germination)

The two cases which appear not to be contaminants are non-recombinants for the adjacent markers, one being Gl Bt, the other gl bt. They probably represent mutations of a→A. The reverse mutation rate of the two a alleles used in the experiment has not been tested. This experiment failed to demonstrate intra-cistron recombination.

Ellen Dempsey

5. Evidence for the chiasma theory of metaphase pairing.

On the chiasma theory of metaphase pairing post-diplotene association is due to the presence of chiasmata which arise from prior crossover events. This theory is believed to be generally valid although in some forms, notably Drosophila, other mechanisms are responsible for association of the two homologues until anaphase separation. There is, however, considerable evidence in maize which indicates the essential correctness of this theory. Data of two kinds are available.