$$\frac{Gl_{17}\ a_2^{BlMex}\ Bt\ V_2}{gl_{17}\ a_2^{St}\ \ bt\ V_2}\quad y\ y \qquad X \qquad gl_{17}\ a_2^{St}\ bt\ Pr\ v_2\quad y\ ♂$$

The egg parents were detasselled and a block of tetraploid corn decreased chances of contaminating pollen grains on one side. Nine colored seeds were obtained (1 A_2 Bt Y, 5 A_2 Bt y, and 3 A_2 bt y) in a total population of 179,500. These plants will be tested next summer.

-- Ellen Dempsey

16. The occurrence of pg_{11} and pg_{12} in various lines.

The lines listed below were crossed with a pg_{11} pg_{12} y wx stock and the F_1's were selfed to test for the presence of one or the other of the duplicate factors. Five of the 8 lines are homozygous for one of the pg genes, four of them possessing pg_{11} on chromosome 6 and one having pg_{12} on chromosome 9. Apparently homozygosity for one member of the duplicate factor pair is common.

	Ratio in F_2	Homozygous for
Black Mexican	15:1	
a_2 bt pr tester	15:1	
M14	3:1	pg_{11}
Iowa B14	3:1	pg_{11}
Oh45	3:1	pg_{11}
a_1 sh_2 tester	15:1	
Oh43	3:1	pg_{11}
KYS	3:1	pg_{12}

-- Ellen Dempsey

17. A case of normal functioning of hyperploid pollen.

In previous work with plants carrying a normal 9 and a 9 with a piece of 3L transposed into the short arm between the Sh and Wx loci, the pollen grains with a normal 9 had a marked superiority in achieving fertilization over the grains with the transposed piece of 3L which were hyperploid for this segment when a normal chromosome 3 was present. The advantage of the euploid pollen varied in different crosses but there was always a marked difference in the percentage of functioning between the two types of pollen. This past summer a different result was obtained when plants heterozygous for N9 Dp 9 and the C Sh Wx loci were used as the male parent on a c sh wx gl_{15} tester. When sister Dp9 N9 Df3 N3 and Dp9 N9 N3 N3 plants (see 1959 News Letter for description of this aberration) were used as the female parent in test crosses the results were in close agreement with those found in extensive previous experiments -- namely, a marked reduction in crossing over and an approximate 2:1 ratio of Dp9:N9 ovules from the Dp9 N9 Df3 N3 class and a 1:1 ratio of Dp9:N9 ovules from the Dp9 N9 N3 N3 plants. It is clear that the Dp9 chromosome was present. Wholly unexpected results were found in the reciprocal crosses where Dp9 N3 pollen was just as effective in fertilization as N9 N3 grains. It should be noted that the present experiment involved a tester strain which had not been used before and it is possible that the genotype of the female parent plays a significant role in pollen competition. A somewhat similar situation was reported by Singleton (1940 P.N.A.S.) who found that sp pollen from Sp sp heterozygotes functioned with a much higher percentage on certain female tester lines than on others. This summer a duplicate planting will be made and pollen from individual plants will be applied to a number of tester strains in order to ascertain if the nature of the egg parent influenced pollen functioning. Another unexpected feature of the data is the relatively high frequency of crossing over in the C Sh region found among the male gametes in both the Dp9 N9 Df3 N3 and Dp9 N9 N3 N3 backcrosses. Again in former studies we found a striking reduction in crossing over throughout the short arm of 9 and this was true for the C Sh interval.

	(0) C Sh Wx	(2) C Sh wx	(1-2) C sh Wx	(1) C sh wx	(1) c Sh Wx	(1-2) c Sh wx	(2) c sh Wx	(0) c sh wx	% Recomb.
Dp9 C Sh Dp Wx Df3 N3 N 9 c sh N wx as female in B.C.	1299	9	0	4	5	0	9	654	C-Sh 0.45 Sh-Wx 0.91
Dp 9 C Sh Dp Wx Df3 N3 N 9 c sh N wx as male in B. C.	1005	15	0	6	27	0	18	512	C-Sh 2.1 Sh-Wx 2.1
Dp 9 C Sh Dp Wx N3 N3 N 9 c sh N wx as female in B. C.	1422	13	0	1	3	0	14	1541	C-Sh 0.13 Sh-Wx 0.90
Dp 9 C Sh Dp Wx N3 N3 N 9 c sh N wx as male in B. C.	541	9	0	8	9	0	11	539	C-Sh 1.5 Sh-Wx 1.8

-- M. M. Rhoades

18. Crossing over in homozygous Dp 9 plants.

Plants homozygous for the piece of 3L inserted into 9S between the Sh and Wx genes should have a marked increase in recombination values for the Sh-Wx region since the size of the chromatin segment lying between these loci would be increased by the length of the inserted 3L segment. However, when Dp 9 Dp 9 plants heterozygous for yg_2 C wx, and in some cases for C wx or sh wx, were backcrossed there was no increase observed in the C-wx or the sh-wx interval. Indeed the amount of recombination averaged about 17% for C-wx, a value which is significantly less than the standard frequency. So far as I can tell this is the first experiment of the kind conducted in maize and possibly in any organism. The only comparable case I am aware of is the work on the pale translocation in Drosophila where Hamlett (Biol. Bull. 1926) presumably studied crossing over in females homozygous for a small duplicated (inserted) piece and found that crossing over in flies homozygous for the duplication was reduced as much as in heterozygous individuals. Kossikov and Muller (J. Heredity 1935), however, have criticized the design of the experiment and believe it unlikely that Hamlett's flies were actually homozygous for the duplication.

One might reasonably assume that the longer the chromosome segment the greater would be the frequency of exchanges within the segment. This obviously is not true for the homozygous Dp. Apparently the insertion of foreign chromatin (piece of 3L) into 9S has modified in some way the mechanism of crossing over within 9S. The data could be interpreted as indicating that corn chromosomes have a certain autonomy in crossing over and that the system is disturbed by the insertion of chromatin from a non-homologous chromosome.

-- M. M. Rhoades