6. Further studies of the effect on crossing over of the gene ameiotic.

In a preliminary test of crossing over in chromosome 2 and in chromosome 9, no difference was found between microsporocytes from Am Am and Am am plants (MNL 43:61-63, 1969). However, in view of the variable effect of heterozygous asynaptic on crossing over in different chromosomes (see page 66, this Newsletter), a more exhaustive study of the ameiotic material was carried out. Comparisons of Am Am chromosome 3 heterozygotes with Am am heterozygotes, Table 1, show no differences in crossing over. This was true for the two genetic regions studied in both the MMC's and the PMC's. The chromosome 5 data (Table 2) are more difficult to interpret. When chromosome 5 heterozygotes of Am Am constitution were compared with Am am heterozygotes, crossing over for the $\underline{A}_2$-$\underline{Bt}_1$ and $\underline{Bt}_1$-Pr regions was found to be higher in MMC's of the Am am plants than in those of the Am Am. Within environments, the male gametes showed no difference between Am Am and Am am. However, crossover values from PMC's tested in both Indiana and Florida plantings were significantly higher than values from MMC's. A difference in crossing over in male versus female gametes has been well established for chromosome 5.

In the Florida backcrosses the frequencies of both the $\underline{a}_2$ and $\underline{bt}_1$ classes were significantly higher than the expected 50%. The male parents in the Florida tests differed slightly in genetic background from the Indiana male parents, and the chromosome 5 tester used as female parent in the Florida backcrosses was not the same as the stock used in Indiana backcrosses. Consequently, the off ratio could be attributed to a gametophyte factor affecting interaction with styles of different constitutions. Crossing over for the $\underline{A}_2$-$\underline{Bt}_1$ and $\underline{Bt}_1$-Pr regions in PMC's was statistically different in plants backcrossed in Indiana and Florida. Higher crossover values from Florida grown plants may be due to environmental differences.

Chromosome 9 heterozygotes of Am Am and Am am constitution showed no differences in crossing over for the Sh-Bz region in either the male or female gametes (Table 3). Recombination in the Bz-Wx region was slightly higher in Am am female parents than in the Am Am sibs. The

Table 1

Recombination in chromosome 3 heterozygotes.

	Genotype of Male Parent $\frac{Gl\ Lg\ A_1}{gl\ lg\ a_1}$		Genotype of Female Parent $\frac{Gl\ Lg\ A_1}{gl\ lg\ a_1}$	
	Am/Am	Am/am	Am/Am	Am/am
Total number of kernels	2617	3227	3100	3720
Gl Lg A	580	678	623	756
gl lg a	545	653	638	789
gl Lg A	356	472	449	563
Gl lg a	378	441	461	519
gl lg A	316	379	358	411
Gl Lg a	300	393	383	433
Gl lg A	68	101	90	118
gl Lg a	74	110	98	131
% Recombination				
Lg - A	29.0	30.5	30.0	29.4
Gl - Lg	33.5	34.8	35.4	35.8

Table 2

Recombination in chromosome 5 heterozygotes.

	Genotype of Male Parent $\frac{A_2\ Bt_1\ pr}{a_2\ bt_1\ Pr}$				Genotype of Female Parent $\frac{A_2\ Bt_1\ pr}{a_2\ bt_1\ Pr}$	
	Am/Am*	Am/am*	Am/Am**	Am/am**	Am/Am**	Am/am**
Total number of kernels	5308	4845	1924	1788	3836	6136
A Bt Pr	749	684	261	250	442	743
A Bt pr	1180	1019	586	543	1402	2033
A bt Pr	199	194	88	75	110	225
A bt pr	160	172	28	26	28	47
a Bt	389	355	101	97	128	281
a bt	2631	2403	860	797	1726	2807
% Recombination						
A - Bt	14.1	14.9	11.3	11.1	6.9	9.0+
Bt - Pr	34.3	35.3	30.0	30.9	24.4	25.8+

*Florida 1969

**Indiana 1968

+Significant at the 5% level

Table 3

Recombination in chromosome 9 heterozygotes.

	Genotype of Male Parent Yg Sh Bz Wx / yg sh bz wx		Genotype of Female Parent Yg Sh Bz Wx / yg sh bz wx	
	Am/Am	Am/am	Am/Am	Am/am
Total number of kernels	3745	4233	5305	4992
Yg Sh Bz Wx	1088	1211	1566	1453
yg sh bz wx	1052	1158	1559	1392
Yg Sh Bz wx	315	356	409	454
yg sh bz Wx	347	372	405	462
Yg Sh bz wx	45	40	32	34
yg sh Bz Wx	40	38	46	52
Yg sh bz wx	372	475	579	525
yg Sh Bz Wx	397	485	621	514
Yg sh Bz Wx	4	1	19	15
yg Sh bz wx	10	14	11	9
Yg sh bz Wx	29	45	22	43
yg Sh Bz wx	35	29	31	33
Yg Sh bz Wx	6	5	2	2
yg sh Bz wx	1	3	2	2
Yg sh Bz wx	0	0	0	2
yg Sh bz Wx	1	1	1	0
% Recombination				
Yg - Sh	22.7	24.8	24.2	22.9
Sh - Bz	2.9	2.4	2.1	2.3
Bz - Wx	19.6	19.2	16.4	20.0

four values for the Yg-Sh region fell into two statistically distinct classes, 22.7% and 22.9% versus 24.2% and 24.8%. While significant differences between Am Am and Am am plants occurred in both types of backcross, the Am am genotype gave the higher Yg-Sh recombination when male gametes were tested, and the Am Am was higher in tests of female gametes.

A difference in the effect of Am Am and Am am on crossing over in chromosomes 3, 5, and 9 was not critically established. With the chromosome 3 markers, Gl, Lg, and A_1, no difference in crossing over attributable to heterozygosity for am was apparent in male or female gametes. With the chromosome 5 markers, recombination in Am am megasporocytes was higher for both regions studied than in corresponding Am Am cells. Comparisons of Am Am and Am am microsporocytes, however, showed no difference in the A_2-Bt_1 or Bt_1-Pr recombination. The absence of an effect of the Am am genotype on crossing over in chromosome 5 was observed in two different environments and with different genetic backgrounds. The Yg-Sh region of chromosome 9 showed a decrease in crossing over in the megasporocytes in the presence of Am am, while a slight increase occurred in the microsporocytes.

Reid G. Palmer

7. Location of ameiotic on chromosome 5.

Preliminary linkage data suggested that the Am locus was in chromosome 5, but its placement in the linear map was unknown. In order to determine the precise location of am on chromosome 5, crosses were made between stocks segregating am and stocks containing the recessive markers a_2, bt_1, and pr. Since it was impossible to backcross to am am plants due to their almost complete sterility, linkage data were obtained from analyses of F_2 progenies. The amount of recombination between am-A_2, am-Bt_1 and am-Pr was then calculated by means of the tables of Immer (Genetics 15:81-98, 1930). The first linkage tests involved heterozygotes where am was in repulsion phase with chromosome 5 markers (Table 1). Since F_2 data in repulsion can yield a relatively imprecise estimate of linkage intensity, the 1969 tests were based on heterozygotes in coupling.