Culture	Interchange breaks		+ S.S.	+ F	wh.tip S.S.	wh.tip F
19247	2-10 (6061)	S.60( )-L.57	67	1	8	44
19248	"	"	43	0	2	9
19224,5	2-4L	L.59-S.40	38	23	22	13
19226,7	2-6b	S.69-L.49	43	47	32	34
19233	5-10(5290)	L.78-S.49	29	23	24	18
19245	1-3(5883)		21	13	19	14
19246	"		31	10	18	14

Only part of the plants were classified for sterility by pollen examination. Contrary to the statement in last year's report, the white-tipped plants were less vigorous than the normal sibs (on poor soil). Many of them had ears too small to be classifiable for sterility. This is reflected in the data for T2-10 (6061). The observed numbers give a recombination value of 6.3%, but the actual value is probably much lower than this. It is assumed that the breakpoints originally reported on chromosome 5 can be applied to chromosome 2. Since data for 2-6b with the break also in 2S and for T5-10 (5290) with the break in 10 in the short arm show independence, it is probable that this gene is in 10L.

The data for T1-3 (5883) are included as an illustration of the fact that occasionally (for no apparent reason) results based on only the dominant class for the character may be misleading. All but a few plants in these two cultures were classified on the basis of pollen sterility.

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4. Effects of colchicine on multiple interchange heterozygotes.

In M.N.L. 42:120 1968, it was reported that plants heterozygous for two rings of 10 produced sectors that extruded anthers and shed pollen when treated with colchicine as seedlings. The filled grains were much larger than normal. A few seeds were obtained by self pollination.

This seed was planted in the greenhouse and two plants transplanted to the field. The one plant that survived also had large pollen and was self-pollinated. The ear was well-filled but the kernels varied in size. Plants from both the large and small kernels

were all diploid. A few have been crossed with standard normal diploids. These will be grown this summer. The colchicine treatments will be repeated.

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1. Frequency of sector size for R alleles.

The expression of R alleles, reflecting their regulation, is complex; study of somatic pigment expression in the intensity and pattern of cell sectors in aleurone tissue may provide a basis for understanding the processes involved in regulation and in the paramutation phenomenon.

Studies were carried out on kernels carrying a single dose of R^{st}, R^{r}, $R^{r'}$ (R^{r} exposed once to stippled) and $R^{r''''}$ (R^{r} exposed multiple times to stippled) to analyze the size of sectors, their frequency, and the intensity of pigment in the cells.

Stippled (R^{st}) produces mostly uniform sectors and uniform pigmentation surrounded by extremely light colored cells presumably due to diffusion. Fig. 1 shows the relationship between size of sector and frequency. The most distinct feature observed was that peaks were prevalent for sectors having an even number of cells: 2, 4, 6, 8, 10 etc. The highest frequency was observed for 4-cell sectors.

In contrast to stippled, R^{r} (mottling), $R^{r'}$ and $R^{r''''}$ show a quite different pattern of sectors containing non-uniform and unevenly distributed cells of three color levels that are distinguishable under the microscope. There were significant differences in the frequencies of color levels among these R alleles. Following is the distribution of the three types of cells in percentage: