gametes was tested. The frequency of germinal changes to R^{st} (light) in homozygous R^{st} stocks was found to be only 0.3/1000, based on a population of 18,586 R^{st} gametes.

The difference between the frequency of changes to R^{st} (light) in R^{st} heterozygotes with R^{r} and r^{r} and in R^{st} homozygotes suggested that such changes are either 1) associated with heterozygosity, per se, at the R locus, or 2) a product of crossing over between R^{st} and a linked modifier carried on the R^{r} and r^{r} chromosomes.

A test was made using a proximal marker, golden (g), and a distal marker, a terminal heterochromatic knob (K), to test for the association of crossing over with changes of R^{st} to R^{st} (light). The following cross was made: $g\ R^{g}\ K/G\ R^{st}\ k$ x $g\ r\ k$. R^{st} (light) kernels were selected and planted; the resulting plants were scored for golden, and the ears were pollinated with rr. K was scored by making counts of the number of R^{st} (light) and r kernels on each ear to determine whether preferential segregation for R^{st} (light) had occurred. The results from this test showed that changes to R^{st} (light) were always associated with crossing over between R and K.

It is hypothesized that there is a locus about 5.7 crossover units distal to R, the alleles of which modify the expression of R^{st}. The modifier conditioning normal stippled expression was designated M^{st}, and the one conditioning R^{st} (light) expression was designated m^{st}.

The R^{r} and r^{r} chromosomes in the first test carried m^{st}, and the crosses made may now be diagrammed as follows: $R^{r}\ m^{st}/R^{st}\ M^{st}$ x $r^{g}\ m^{st}$. Crossing over produced an $R^{st}\ m^{st}$ chromosome which conditions R^{st} (light). The complementary crossover class would be $R^{r}\ M^{st}$ in the $R^{r}R^{st}$ heterozygotes, and $r^{r}\ M^{st}$ in the $R^{st}r^{r}$ heterozygotes. Both of these complementary crossover classes have been identified, and they occur with the same frequency as R^{st} (light).

The changes of R^{st} to R^{st} (light) in R^{st} homozygotes cannot be ascribed to recombination between R^{st} and a linked modifier. The few mutants obtained from these matings have been interpreted as mutations of M^{st} to m^{st} or transpositions of M^{st} (see below).

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4. Transposability of M^{st}, a modifier of stippled aleurone.

Numerous self-colored kernels were selected after the following cross: $R^{st}r^{g}$ x $r^{g}r^{g}$. These kernels were grown out to verify the presumed mutations of R^{st} to self-color. The ears produced by the resulting plants were pollinated with $r^{r}r^{r}$. As observed in an earlier test, less than half of the phenotypically self-colored kernels gave self-colored (R^{sc}) offspring. Fifty plants, in fact, grown from 64 self-colored kernels did not give germinally transmissible R^{sc} mutants, but segregated stippled and colorless kernels. Among these plants two were found which segregated 1/4 R^{st}, 1/4 R^{st} (light), and 1/2 r, instead of the expected 1/2 R^{st}, and 1/2 r kernels.

It has been shown that R^{st} differs from R^{st} (light) only in a modifier located about 5.7 crossover units distal to R (see above). An explanation which satisfactorily accounts for the ratio observed on the ears from the two exceptional plants would assume that the linked modifier (M^{st}) which conditions the R^{st} phenotype is a transposable unit. On this basis it could be assumed that the R^{st} (light) phenotype results from the absence of M^{st}, and that in the two exceptional ears M^{st} has shifted from its standard position, 5.7 crossover units distal to R, to a new position which assorts independently of R. Verification of the transposition hypothesis requires progeny tests of the three classes of kernels on the ears from the two exceptional plants.

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5. Mutability of R^{st}.

Tests were made of the mutability of R^{st} and R^{st} (light) in homozygous and in several heterozygous combinations.

R^{st} and R^{st} (light) in homozygotes were observed to mutate to self-color (R^{sc}) at the respective rates of 17.0 and 19.9/10^4 gametes tested. A total of 19,920 R^{st} and 24,599 R^{st} (light) gametes were scored. When R^{st} and R^{st} (light) were heterozygous with r^r, they were observed to mutate to R^{sc} at the respective rates of 4.9 and 4.3/10^4 gametes tested. A total of 2,055 R^{st} and 4,623 R^{st} (light) gametes were scored from heterozygotes with r^r. The basis for the difference in rate of mutation of R^{st} and R^{st} (light) to R^{sc} in homozygotes and heterozygotes with r^r is not yet known. Several somatic mutations of R^{st} to R^{sc} have been found, which indicates that mutations to R^{sc} are probably not regularly associated with crossing over.

In R^{st} (light) homozygotes, one mutation to colorless or near-colorless aleurone was found in 26,805 gametes tested. No mutations to colorless or near-colorless aleurone were found in R^{st} homozygotes; 20,825 R^{st} gametes were scored. Mutations to colorless or near-colorless aleurone with either red or green plant color were observed in both R^rR^{st} and R^rR^{st} (light) heterozygotes. It was assumed that mutants with green plant color came from stippled, and mutants with red plant color from R^r. Based on this assumption, R^{st} and R^{st} (light) were observed to mutate to colorless or near-colorless aleurone in heterozygotes with R^r at the respective rates of 5.4 and 4.2/10^4 gametes tested. A total of 10,942 R^{st} and 4,720 R^{st} (light) gametes were scored. These data show that the frequency of mutations of R^{st} and R^{st} (light) to colorless or near-colorless is much greater when stippled is heterozygous with R^r than when it is homozygous. The basis for this effect of homozygosity