7. Unstable genes.

Five mutable alleles of pr have been found which are not Ac controlled. Each of these mutable genes was crossed to an Ac tester that was I Ds/I Ds in constitution. No evidence of Ac activity was obtained.

One other mutable gene which occurred at the R locus also failed to show any Ac activity when crossed to an Ac tester. This unstable gene effects both the aleurone and plant color components. Four different phenotypes were observed in the aleurone. The seeds that were fully colored and spotted-dilute gave rise to fully colored plants, but the seeds that were spotted produced variegated color in the tassels. The plant color from colorless seeds appeared somewhat diluted, but only four plants were observed from this class.

8. Pre-meiotic mutation at the R locus.

Several somatic sectors involving pre-meiotic mutations of R to r have occurred spontaneously in female gametes. The cultures in which the sectors originated were marked to the left and right of the R locus to determine whether crossing over was involved.

One relatively large sector including 24 colorless seeds was produced by the cross g R^r K/G R^r k x g r^g k/g r^g k. Since the colorless seeds were found in positions clustered on the ear. the mutation must have occurred in a somatic cell. The table (p. 89) shows the positions of the mutants on the ear and also the g and knob-10 classification.

It will be noted that 15 of the 19 mutants analyzed are of g r^r K type that could occur by mutation of the g R^r K allele. If pre-meiotic mutation resulted in the production of g r^r K/G R^r k cells, the two G r^r K mutants (positions I-3 and A-4) could be ascribed to coincident crossing over between g and r at meiosis. This interpretation is plausible since 14% of the mutants analyzed should show crossing over in the g - r segment.

In addition to these 17 mutants with knob-10, two were found without the knob. They included one g r^r k mutant (position C-20) and one G r^r k mutant (position A-1). On the assumption that the original mutation occurred in the g R^r K allele, the compound g r^r K/G R^r k could yield a g r^r k mutant by crossing over between r and K in the following meiosis. However, only 1% crossing over is known to occur between r and K. Another possible interpretation is that unequal crossing over occurred at meiosis independent of the sector. The other seed color mutant without the knob (G r^r k) could be attributed to a double crossover in the g-r segment and the r-K segment, assuming the somatic mutation involved the g R^r K chromosome. Both of these considerations, however, require a high percentage of crossing over in a relatively short segment.

Ear Diagram of Sector

(g R^r K/G R^r k x g r^g k/g r^g k)

Seed Number ↓ / Row Number →	H	I	J	A	B	C . . . . G
1				G r^r k		
2		zero germ.				
3	g r^r K	G r^r K			zero germ.	
4	g r^r K			G r^r K	g r^r K	
5				g r^r K		
6				↓[1] g CD	g r^r K	
7				↓[1] g CD	g r^r K	
8						
9					g r^r K	
10					g r^r K	g r^r K
11						
12						
13					g r^r K	
14						
15						
16					g r^r K	
17					g r^r K	g r^r K
18						g r^r K
19						↓[2] g CD
20					g r^r K	g r^r k

↓[1] Died before maturity. Both mutants were colored plant and golden.

↓[2] Sterile plant.

A second sector involving loss of aleurone color occurred in the compound $\underline{g}$ $\underline{R}^{g}$ co-7 $\underline{k}/\underline{G}$ $\underline{R}^{r}$ $\underline{K}$. In this case the sector included only three colorless seeds. The location of these mutants is given in the following diagram:

Row Number ⟶

Seed Number ↓	A	B
1		
.		
.		
.		
.		
4	g r^{g} k	
5		g r^{g} k
6		g r^{g} K

These results indicate that the pre-meiotic mutation involved the $\underline{g}$ $\underline{R}^{g}$ $\underline{k}$ allele since two of the three cases were $\underline{g}$ $\underline{r}^{g}$ $\underline{k}$. If the pre-meiotic mutation produced $\underline{g}$ $\underline{r}^{g}$ $\underline{k}/\underline{G}$ $\underline{R}^{r}$ $\underline{K}$ cells, the $\underline{g}$ $\underline{r}^{g}$ $\underline{K}$ mutant (position B-6) could be attributed to a coincident crossover between $\underline{r}$ and $\underline{K}$. As mentioned previously, coincident crossovers are expected in only 1%.

In addition to these large sectors, three others were found which involved only two seeds. In the first case two adjacent mutants were identified in the compound $\underline{g}$ $\underline{R}^{g}$ co-6 $\underline{k}/\underline{G}$ $\underline{R}^{r}$ $\underline{K}$. The two mutants were of the $\underline{g}$ $\underline{r}^{g}$ $\underline{k}$ type which occurred by mutation of the $\underline{R}^{g}$ $\underline{k}$ parental allele.

A second case with two adjacent mutants was identified in the compound $\underline{g}$ $\underline{R}^{g}$-14 $\underline{K}/\underline{G}$ $\underline{R}^{r}$ $\underline{k}$. Both mutants were of type $\underline{G}$ $\underline{r}^{r}$ $\underline{K}$ which could represent somatic mutation of the $\underline{G}$ $\underline{R}^{r}$ $\underline{k}$ allele with coincident crossing over between $\underline{r}$ and $\underline{K}$. An alternative explanation is that both mutants represent independent events of unequal crossing over.

The third case with two adjacent mutants occurred in the compound $\underline{g}$ $\underline{R}^{g}$ co-8 $\underline{k}/\underline{g}$ $\underline{R}^{r}$ $\underline{K}$. One of the mutants was of type $\underline{g}$ $\underline{r}^{g}$ $\underline{k}$ and the other was $\underline{g}$ $\underline{r}^{r}$ $\underline{k}$. Presumably these mutants represent meiotic events. The $\underline{r}^{g}$ $\underline{k}$ case could be attributed to mutation of the $\underline{R}^{g}$ $\underline{k}$ allele and the $\underline{r}^{r}$ $\underline{k}$ case to unequal crossing over.

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