11. <u>Further analysis of Rg-14</u>.*

* This report represents work done jointly by the late L. J. Stadler and myself.

Previous results have provided evidence on absence of (p) element in R^g-14. Another test of determining the existence of (p) may be possible by a comparative analysis of unequal crossing-over in plants homozygous for non-crossover and crossover R^g mutants.

If R^g crossovers lack the (p) element, the homozygote (-S/-S) should yield only r^g non-crossover mutants. The occurrence of unequal crossing-over should be inhibited if this phenomenon requires synapsis of (p) and (S) components. In the case of the R^g non-crossover (pS/pS), however, r^g crossovers should occur, since (p) is presumably present. Also r^g crossovers of one class are expected from the heterozygote (-S/pS). These relations are illustrated in the following diagrams:

	Crossover/Crossover	Non-crossover/Non-crossover	Non-crossover/Crossover
A.	- S - S absence of unequal co.	p S p S → r^g crossover	p S - S → r^g cross-over
B.	- S - S absence of unequal co.	p S p S → r^g crossover	class absent

At the present time data are available from an R^g crossover. The seed-color mutants analyzed were produced from plants homozygous for R^g-14 and heterozygous for g and K. Two different compounds were employed in the experiment: (1) g R^g-14 K/g R^g-14 k and (2) G R^g-14 K/g R^g-14 k. In the case of the compound G R^g-14 K/G R^g-14 k, the expected types of unequal crossovers are G r^g K and g r^g k. The unequal crossovers expected from the compound G R^g-14 K/g R^g-14 k are g r^g K and G r^g k. In addition, these same classes of unequal crossovers are expected in 15% of the seed color mutants regardless of any relation of mutation to unequal crossing over, since the standard crossover frequency for the R-K interval is 1% and for the R-G interval, 14%.

The compound g R^g-14 K/G R^g-14 k produced 8 seed-color mutants, of which 5 were g r^g K non-crossovers and 3 were G r^g k non-crossovers. The total population included a test of 37,037 female gametes.

Out of 21,862 gametes tested in the compound G R^g-14 K/g R^g-14 k, 5 colorless seeds were found, and of these 2 were of the G r^g K non-crossover type and 3 of the g r^g k non-crossover type.

The occurrence of 13 non-crossovers among the 13 seed-color mutants examined is significant evidence that unequal crossing-over is not involved in the mutations, for if unequal crossing-over had been as frequent in homozygous R^g-14 as in heterozygous R^g-14, approximately 6.5 unequal crossovers would be expected in addition to 2 due to coincident crossing-over between g and K. The number of unequal crossovers expected is based on the relative proportion of unequal crossovers and noncrossovers observed in R^g-14 and R^g co-1 heterozygotes. These results showed that approximately 50% of the mutants identified were unequal crossovers.

Thus the absence of r^g crossovers from homozygous R^g-14 supports the view that this allele is deficient for element (p).