The mutants with self-colored aleurone and green plant color recovered from R^rR^{st} heterozygotes could have arisen either from mutations of R^{st} to R^{sc}, or from mutations of R^r to R^g. It was anticipated, however, that the mutants could be classified as to their source by their phenotypic expression. Many R^{sc} mutants from R^{st} have been isolated and they invariably have given full self-colored kernels when present in only one dose in the endosperm ($R^{sc}rr$). On the other hand, R^g mutants from R^r give a mottled phenotype when present in a single dose in the endosperm. In addition, R^{sc} mutants are not susceptible to the paramutagenic action of R^{st}, while R^g mutants from R^r have been shown to be paramutable; therefore, the pigmenting capacity of the R^g mutants recovered from R^rR^{st} heterozygotes will be further reduced since they will be paramutants.

From the mating R^rR^{st} X r^gr^g 10,175 self-colored kernels were planted, and 74 seedlings were classified as green and transplanted to pots. Selfs were obtained from 63 of these plants and 49 proved to be non-mutant, i.e. R^{st}. Ten verified mutants segregated 3:1 on the selfed ears for fully self-colored and colorless kernels and were therefore considered to be R^{sc} mutations from R^{st}. The rate of mutation of R^{st} to R^{sc}, after adjustment of the total number of kernels planted for the death of 11 presumed mutants (63/74) and for percent germination (96.7), was 11.9 x 10^{-4}. This mutation rate falls about mid-way between the rate obtained from $R^{st}r^g$ heterozygotes (7.3 X 10^{-4}) and the one previously reported for R^{st} homozygotes (17.0 X 10^{-4}). The mutation rates of R^{st} to R^{sc}, as measured in various R locus combinations, are summarized below.

R locus Combinations	Frequency of R^{st} to R^{sc} Mutations	Rate X 10^{-4}
$R^{st}R^{st}$	34/19,920	17.0
$R^{st}r^r$	1/ 2,055	4.9
$R^{st}r^g$	14/19,239	7.3
R^r R^{st}	10/ 8,378	11.9

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6. A stippled - self-colored (R^gR^{st}) compound allele.

Four mutants with no plant color (green) were recovered from the above matings that did not segregate the phenotypes expected from either R^{sc} mutants from R^{st} or R^g mutants from R^r. The selfed ears carrying these four exceptional mutants segregated the expected 1/4 colorless kernels, but the colored class of kernels was made up of both self-colored and stippled kernels. Progeny tests of the self-colored and

stippled kernels from the four exceptional ears indicate that the self-colored, stippled, and colorless aleurone phenotypes resulted from the segregation of two R locus alleles only--one conditioning colorless aleurone (r^g), and the other a compound allele conditioning both self-colored and stippled aleurone (R^gR^{st}). The self-colored aleurone component of the compound allele gave a phenotype characteristic of a paramutant R^g allele. The stippled component gave a phenotype characteristic of R^{st} (light), a pheontype that results from the loss of a modifier carried on the R^{st} chromosome about 6 crossover units distal to the R locus. R^gR^{st}/r^rr^r endosperms resulting from pollinating r^rr^r ears with R^gR^{st}/R^gR^{st} pollen clearly show the R^{st} (light) phenotype superimposed on the very light mottled phenotype characteristic of one dose of a paramutant R^g. It would appear that in R^rR^{st} heterozygotes a genetic change is possible that incorporates the seed color component of both R^r and R^{st} together on the same chromosome, but excludes the plant color component of R^r and a distal modifier carried on the R^{st} chromosome. The frequency of such genetic changes in the above test was 4/8378 R^r gametes tested, a rate of 4.8×10^{-4}. The possibility of compound alleles occurring at the R locus has been suggested by Stadler (Science 120:811-819), and Brink has reported a stippled-Navajo ($R^{st}R^{nj}$) compound allele (Maize News Letter 34:122).

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1. A study of abnormal nucleolar behaviour in meiocytes of maize induced by various agents and its relation to the course of meiosis.

The nucleolus is an organelle intimately associated with the synthesis of RNA and proteins. Hence, any change in the appearance or behaviour of the nucleolus might well be a reflection of the change in the metabolism of these compounds or their organization within this organelle. It is believed that the RNA/DNA ratio is an important factor controlling the mitotic or meiotic pattern of cell division and the normal progress of meiosis. (Sinha, MNL 34; Science, 1959; Ph.D. thesis, Indiana U., 1960). This leads us to the further belief that the nucleolus may be involved in the control of the pattern of cell division and the regulation of meiosis.

One of the ways to test this belief is to note simultaneously different types of nucleolar abnormalities in meiocytes and any