

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 ( $\underline{r}^E$ ), and the other a compound allele conditioning both self-colored and stippled aleurone ( $\underline{R}^E\underline{R}^{st}$ ). The self-colored aleurone component of the compound allele gave a phenotype characteristic of a paramutant  $\underline{R}^E$  allele. The stippled component gave a phenotype characteristic of  $\underline{R}^{st}$  (light), a phenotype that results from the loss of a modifier carried on the  $\underline{R}^{st}$  chromosome about 6 crossover units distal to the R locus.  $\underline{R}^E\underline{R}^{st}/\underline{r}^E\underline{r}^E$  endosperms resulting from pollinating  $\underline{r}^E\underline{r}^E$  ears with  $\underline{R}^E\underline{R}^{st}/\underline{R}^E\underline{R}^{st}$  pollen clearly show the  $\underline{R}^{st}$  (light) phenotype superimposed on the very light mottled phenotype characteristic of one dose of a paramutant  $\underline{R}^E$ . It would appear that in  $\underline{R}^E\underline{R}^{st}$  heterozygotes a genetic change is possible that incorporates the seed color component of both  $\underline{R}^E$  and  $\underline{R}^{st}$  together on the same chromosome, but excludes the plant color component of  $\underline{R}^E$  and a distal modifier carried on the  $\underline{R}^{st}$  chromosome. The frequency of such genetic changes in the above test was  $4/8378$   $\underline{R}^E$  gametes tested, a rate of  $4.8 \times 10^{-4}$ . 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 ( $\underline{R}^{st}\underline{R}^{nj}$ ) 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

associated change in the course of meiosis. A series of experiments are being undertaken to determine (1) the behaviour of the nucleolus in meiocytes subjected to treatment with various chemicals known to affect mitosis or suspected to affect meiosis and (2) any change in the course of meiosis correlated with any abnormal nucleolar behaviour.

Some preliminary observations in plants treated with different phenolic compounds and RNA (MNL 34) are presented below.

(a) Decrease in the size of the nucleolus:- In plants treated with 0.1M phenol an appreciable fraction of meiocytes appear to have relatively smaller primary nucleoli at diakinesis. However, the course of meiosis appears quite normal.

A similar observation in a limited number of meiocytes of asynaptic maize plants may be of some interest, if confirmed.

(b) Secondary nucleolus:- A small secondary nucleolus is found associated with the large primary nucleolus in a great number of meiocytes of plants treated with 0.1M phenol. Cells with this abnormality may or may not show abnormal division in the form of asynapsis or desynapsis of chromosome segments.

(c) Nucleolus-like bodies associated with chromosomes:- In plants treated with RNA, small nucleolus-like bodies are found associated with certain chromosomes. The maximum number of such bodies found in a cell so far is 4. These bodies are of the same size or smaller than the secondary nucleoli. This nucleolar condition does not appear to be associated with any abnormality of meiosis.

(d) Chromatin bodies not associated with chromosomes:- In plants treated with 0.1M phenol most of the meiocytes are found to contain several small granules stainable with aceto-carmin and lying scattered in the nuclear sap. These bodies are smaller than the secondary nucleoli or the nucleolus-like bodies associated with chromosomes. The maximum number of these bodies has been found to be 20, per cell. Meiocytes showing this condition also exhibit partial asynapsis or desynapsis of chromosomes.

(e) "Persistent" nucleoli:- This condition as reported by Sampayo (MNL 33) and Miller (MNL 34) has been observed in a few cells of plants treated with RNA. No abnormality in the course of meiosis is, however, evident.

Further work is in progress.

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