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1. Mutable alleles from x-rayed stocks.

From previous experiments (Mottinger, MNL 39:98 and 43:148) no evidence was obtained for the induction of intragenic mutations at the bronze locus when x-rays were applied at post-meiotic stages. From the experiments of Russell and Russell on mice (Rad. Res. (Suppl. 1): 296-305, 1959 and Jour. Cell. and Comp. Physiol. 56 (Suppl. 1) 169-188, 1960) mutations which appeared to be intragenic were obtained when x-rays were applied to gonial cells at pre-meiotic stages. It therefore was deemed advisable to conduct similar experiments in maize.

To ensure that sporocytes to be treated were at a pre-meiotic stage, stalks were opened and visual observations were made.

Among the F_1 progeny of crosses between sh bz wx ear parents and Sh Bz Wx stocks x-rayed at a pre-meiotic stage, two kernels of Sh bz Wx phenotype (designated bz-x3 and bz-x4) were obtained in a population of ca. 130,000. A third kernel of Sh bz Wx phenotype with a cluster of Bz spots (bz-x5) was also observed.

Among testcross progeny from each of the mutations, kernels mosaic for the Bz and bz phenotypes were observed. The revertant sectors, however, were generally quite small, in most instances involving only a few aleurone cells each. Thus, in all probability, the original bz-x3 and bz-x4 kernels possessed revertant tissue but it went undetected.

In progeny from testcrosses of the original bz-x3 kernel, most reversions occurred late in development of the endosperm; however, a few kernels exhibited early reversions. In subsequent testcrosses of kernels with revertant tissue, progeny exhibited many more instances of early reversions, some including entire kernels.

In the case of bz-x4, the reversion frequency in the original testcross was much lower than that of bz-x3. In the second testcrosses, this frequency remained about the same.

Kernels of bz-x5/bz constitution showed the lowest number of reversions in all testcrosses and the frequency did not increase in subsequent generations. Both early and late events were observed but the former were quite rare.

These data would seem to indicate that gene control systems affecting the bronze locus have either been induced by x-rays or existed previously in the stocks. Control experiments with the same original stocks will be conducted to determine which of the two alternatives is correct.

A second question to be answered is whether these systems involve one or two elements. In all three cases, the reversion events show tight linkage with the Sh allele; therefore, if the systems involve two elements, the second resides on chromosome nine. The exact location of this element cannot be ascertained until progeny tests are made of all individuals. If a kernel does not exhibit any reversions, it may contain the mutable allele and the reversion-inducing element, but the time of activation may be so late that no reversions have occurred before the endosperm has matured. Reversions may or may not be observed in subsequent testcrosses.

At the present time, tests are being conducted to determine (1) whether these mutable alleles respond to Ac or Spm, (2) whether these stocks can affect mutable alleles which do respond to Ac or Spm, (3) whether reversion patterns remain stable or unstable and (4) if an increased dosage of the mutable alleles has any observable effect.

Although no apparent intragenic changes at the bronze locus arose in these experiments, a number of mutations at the Sh_1 locus have yet to be tested.

John P. Mottinger

2. Reversion of sh-bz-x2.

In a greenhouse planting of sh-bz-x2 A/sh-bz-x2 a individuals (for background data on sh-bz-x2 see MNL 39:98 and 43:148) an open-pollinated ear was observed which segregated for ShBz and sh bz kernels. The phenotypic counts were 180 A Sh Bz, 63 A sh bz, 70 a Sh and 21 a sh. Since only sh-bz-x2 homozygotes were present, contamination could be ruled out as a source of the dominant phenotypes. And, since the plant bearing this unusual ear was bz in phenotype, heterofertilization in the kernel from