2. A case of "spreading effect" involving the $A_1$ locus.

Among the mutants arising from $a_1{}^{p}{}_{m}$, one ($a^{P}{}_{L14}$) exhibited simultaneous alterations at the $A_1$ locus as well as at an adjacent locus. The allele arose as a single, light pale, self-colored, exceptional kernel in the cross $a_1{}^{p}{}_{m}$ $Sh_2/a_1{}^{p}{}_{m}$ $Sh_2$ x $a_1$ $sh_2/a_1$ $sh_2$. When the kernel was grown and the plant self-pollinated, the resulting ear demonstrated that the new pale type was inherited in the typical Mendelian fashion, and that the new type could not have been the result of a foreign pollen grain. The kernels from this ear fell into an approximate 3($a_1{}^{P}{}_{L14}$ $Sh_2$) to 1($a_1$ $sh_2$) ratio. A fraction of the pale kernels were germless while only two germless kernels were found in the $a_1$ $sh_2$ class. In addition when the germed kernels were grown, some of the seedlings were both devoid of chlorophyll and markedly deformed. This aberrant seedling type was with one exception, confined to the $a_1{}^{P}{}_{L14}$ $Sh_2$ class. Furthermore, approximately 40 mature plants have been grown from the $a_1{}^{P}{}_{L14}$ $Sh_2$ kernel class from self-pollinated heterozygotes and in every case these plants have proved to be heterozygous. Table 1 gives the results of a classification of kernel and seedling types in the progenies of two self pollinated plants heterozygous for $a_1{}^{P}{}_{L14}$ $Sh_2$ and $a_1$ $sh_2$.

Table 1. Kernel and seedling frequencies among the progenies of selfed heterozygotes.

| | Kernel Classification | | | Seedling Classification | | |
|---|---|---|---|---|---|---|
| Kernel Phenotype | Number Classified | Germless Kernels | Germed Kernels | Number Classified | Deformed Albino Seedlings | Normal Seedlings |
| $a^{P}{}_{L14}$ $Sh_2$ | 308 | 65 | 243 | 216 | 27 | 189 |
| $a$ $sh_2$ | 117 | 2 | 115 | 72 | 1 | 71 |

It is clear that a gene or closely linked genes control these abnormal kernel and seedling types, for when they are considered together the aberrant types make up one-fourth of the progeny. Furthermore, the single exceptional seedling found in the $a_1$ $sh_2$ class and possibly the two germless $a_1$ $sh_2$ kernels indicate that crossing-over may occur between $A_1$ and the gene controlling these deformed seedlings.

Several explanations are possible for the results described above. Two simultaneous independent point mutations involving these two genes is highly improbable. A deficiency of the chromosomal region including the two linked genes is possible. However, the detection of crossing-over between the two genes rules out this hypothesis. The results may be explained by a spreading effect, such as that found by McClintock, which is caused by the inhibition of closely linked genes. The available evidence supports the last hypothesis.

The new gene controlling albinism has proved to be not allelic with W of Stadler and Roman, for plants of the constitution $a_1{}^{P}{}_{L14}$ $Sh_2/a$ - $x_1$ are normal.