The latter explanation seems the more plausible because these mutations are occurring in strains which have been inbred from five to seven generations and which are presumed to be homozygous for certain teosinte chromosomes and in which crossing over would therefore have no genetic results. The transposition of blocks of genes from one chromosome to another would, of course, be quite a different process and would be expected to produce genetic results.

A similar situation exists with respect to a homozygous genotype of the extreme form of $\underline{de}^{t5}$. If this extreme condition is due to the block of genes from teosinte being present in its entirety, then once the genotype is homozygous for the block of genes crossing over between the homologous chromosomes should have no effect and the mutant might be expected to be, in this state, quite stable. On the contrary it reverts to normal and near-normal at a very substantial rate. These reversions could be accounted for by the transposition of the block of teosinte genes back to its original chromosome.

There is some question whether the unstable defective endosperm described here and similar types which have appeared repeatedly in our maize-teosinte derivatives should actually be called mutants. Perhaps "pseudomutants" would be a better term. The defective endosperm appears actually to be a case of imperfect development resulting from a block of teosinte genes which does not function well in this particular intracellular environment. Bianchi has found that this defective endosperm as well as others of the same general type disappear when outcrossed to certain stocks. In other words, what is being inherited here is not a lesion in the chromosome which produces the defective endosperm whenever it is in the homozygous condition but a certain intracellular environment characteristic of this particular inbred strain. In this particular intracellular environment this particular block of teosinte genes does not function well enough to produce a completely normal endosperm.

3. <u>An unstable mutant dwarf in a maize-teosinte derivative</u>.

A number of mutant dwarfs have occurred in various maize-teosinte derivatives involving the inbred A158 in which one or more chromosomes of maize have been replaced by their homologs from varieties of teosinte. Until recently we have not undertaken a special study of these dwarfs. However, in the summer of 1957 a progeny of a teosinte derivative proved to be segregating for a highly variable dwarf. This derivative involved chromosomes (or parts of chromosomes) 1, 7, and 9 of Durango teosinte and had been selfed for five generations when the mutant dwarf first appeared.

The instability of the mutant dwarf is illustrated by comparison of its frequency distribution with respect to height with that of normal plants in the same progeny. The dwarfs vary from 30-149 cms.

in height, the normal plants from 142-196 cms. The higher variability of the dwarfs as compared to the normal plants is a close counterpart of the variability of the unstable defective endosperm mutant described above as compared to normal seeds on the same ear.

The majority of the dwarfs do not produce ears but some ears were obtained from plants throughout the range of variation with respect to height. The cobs of the dwarfs were on the average more lignified than the ears of the normal plants and those of the short dwarfs were more lignified than those of the tall dwarfs. The extreme variant in ear type, an ear produced by a short dwarf, was flattened and almost distichous and had prominent, highly lignified glumes.

These characteristics suggest that the unstable dwarfs, like the unstable defective seeds are the product of a block of teosinte genes which has been transposed to a new position in which it has a deleterious effect upon development and which is variable as result of crossing over. The fact that the cobs of the dwarfs are more lignified on the average than the normal plants suggests that this possibly transposed block of genes is an addition to, rather than a substitution for, the previous complement of teosinte genes in the genom.

4. An unstable gametophyte mutant involving preferential segregation.

In one of the stocks mentioned above in which there had been 14 recognizable mutations in the population not exceeding 195 plants, a gametophyte factor affecting the Mendelian ratios has been studied and has proved to be unstable.

This mutant was first discovered in 1954 in an ear segregating for sugary endosperm which had only 15% of sugary seeds instead of the 25% theoretically expected. Among the progeny of this ear, one ear was obtained which segregated normally (22.2% sugary) and five were low sugary ranging from 9.2% to 18.9% sugary. The five low-sugary ears combined had an average of 14.2% sugary in a total of 963 seeds.

When the original stock was crossed with an unrelated sugary inbred the starchy seeds when selfed produced nine normal sugary ears (25.8% sugary in 1552 seeds of six of these ears) and two high sugary ears (37.4% sugary in 447 seeds). These results indicate that the original low sugary ears were the product of aberrant segregation resulting from a deleterious gametophyte factor linked with sugary. The normal sugary ears in the progeny of the original ear (1 in 6) and the high sugary ears in the crosses (2 in 11) are crossovers and represent 18% of the ears tested.

Heterozygous sugary plants producing low sugary selfed ears, when backcrossed on homozygous sugary, produce 26.1% of sugary seeds (total