5. Preliminary genetic evidence for "diploid lethals" in perennial teosinte.

Several lines of evidence indicate that the massive failures described several times by the writer (e.g. Genetics 50: 393-406) to recover perennialism or other teosinte traits in derived diploids most probably relate to genetic factors carried in teosinte chromosomes which are inviable in 1n gametophytes or as homozygous loci in 2n sporophytes. "Mangelsdorf tester" was used as a recurrent parent to derive diploid maize-teosinte derivatives. Selection in the post-triploid generations against Mangelsdorf marker genes was enforced to retain heterozygosity for the teosinte chromosome regions carrying the contrasting dominant alleles. Moreover, if the teosinte region were diploid-viable, it is to be expected that such selective reproduction would rapidly result in homozygosity of teosinte segments, as a piece-meal step toward "diploidizing" the perennial teosinte genome. It was found, however, that this more elegant genetic technique of selecting for "covering" teosinte segments during the post-triploid generations had two effects: 1) A bifurcation of ploidy levels in the population from a near-diploid level back to the tetraploid level, indicating that selection for teosinte genes resulted in selection for higher and higher chromosome numbers until tetraploidy (and perennialism) was reattained. This appears to be a demonstration that the necessary array of genes for perennialism is present in the first post-triploid generation, but is lost in later PTG's (Genetics 50: 393-406). 2) A high degree of sterility and inviability persisted among the diploid bifurcate of the population. The experiment has not been highly satisfactory because these causes of mortality have greatly reduced the population sizes that could be maintained during the PTG's. For example, a diploid population of only 18 persisted in the third PTG. Among these, two were incompetent to produce any inflorescence at all, while three were completely pollen and ear barren, and two were male sterile. This pattern was very different from that of other experiments where genetic markers were not selected. Among the 13 plants producing ears by sib pollination, all seed progenies segregated for all three seed markers introduced by the maize parent, wx, su, and Y, except for one ear having no wx, but this derived from a male-sterile plant. This experience is assumed to be positive evidence supporting the "diploid lethal" hypothesis. While it was possible to maintain teosinte chromatin in diploids "covering" all tested regions, it was not possible to

obtain viable plants homozygous for the three teosinte seed trait alleles. Further experiments have been started making use of maize recurrent parents having single, multiply-marked chromosome arms.

D. L. Shaver

6. A new meiotic mutant?

In observing the cytological properties of a population of pachytene synthetic plants, a plant was found in which cytokinesis after telophase II was greatly delayed by comparison with normal plants, in which cytokinesis begins at meiotic interphase. In the putative mutant, all microspores examined showed an apparent coenocytic condition after T II. Smears revealed no trace of the beginnings of cell wall formation in what appeared to be tetranucleate microspores, well after T II. Division, however, eventually occurred, and normal, fertile pollen was produced. Good seed sets were obtained both by selfing and outcrossing to another diploid. No large pollen grains were produced and only shriveled seeds resulted from outcrossing to a tetraploid.

D. L. Shaver

BUTLER UNIVERSITY
Indianapolis, Indiana

1. Light effect on d_1 locus.*

Differences in manifestations at the organ level under environmental manipulation for a genetically determined locus such as d_1 give us information about the factors that influence the locus. The experiments reported here investigate the influence of light on the aspects of cell growth in which the d_1 locus participates. Seeds segregating for d_1 were germinated in two control temperature rooms at 26° C, one room in continuous

*The cost of the computation at the Computation Center at Stanford University was partially financed by NSF grant GP 948 to the Center.