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.

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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.

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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.

light and the other in continuous dark for 8 days. The stock carrying $d_1$ was backcrossed for several generations to University of Minnesota station inbred A25 and then selfed. Seed was supplied through the courtesy of E. C. Abbe. Control temperature rooms at Stanford University were loaned by P. R. Ehrlich. Thomas Cornwall assisted in the experiments. Plants in the dark room were exposed to light 8 days after planting when growth of the first leaf was complete or nearly complete. Measurements of maximum length and width of the first leaf blade were made at maturity so that all measurements would be at comparable time of growth. The mean, standard deviation, standard error, and number for each population are in Table 1. Since difference between dwarf and normal sibs is an indication of locus effect, a method for comparison of proportionate values for quantitative differences of comparable morphological units, "mean comparative intensity difference" ($\bar{X}$CID) is also listed in Table 1.

Dark-grown dwarfs had significantly longer and wider first leaves than light-grown dwarfs, while the first leaves of dark-grown normals were slightly longer and wider than light-grown normals (Table 1). Since dark-grown dwarfs had shorter and wider first leaves than those of either the light-grown or dark-grown normals, they do not phenocopy the normals. While these results are of interest, they tell us nothing about the effect of light on the participation of the locus in normal growth. We can pinpoint this information to the locus, however, if we compare dwarf-normal organ differences in light and dark using the $\bar{X}$CID as an index. If we assume that the dwarf mutation alters instructions by the locus, the degree of change as manifested in organ growth is an indication of the degree of participation by the locus in normal cell growth. The $\bar{X}$CID is therefore a guide to the normal effect of the locus through the intensity of the dwarf-normal growth difference. On the basis of these assumptions, the higher the $\bar{X}$CID, the greater is the effect of the locus in normal growth. Using this analysis, we find that dark-grown dwarf and normal sibs differ considerably less than do light-grown dwarf and normal plants in length of the first leaf blade (Table 1, $\bar{X}$CID).

This analysis of difference suggests a possible role of light on the participation of the locus in normal cell growth. Previous studies of Phinney and his group (1956, 1958, 1961, and 1963) and my recent experiments currently being written for publication indicate that the $d_1$ locus contributes to control of rate of synthesis leading to a gibberellin-like substance, which influences cell growth. A time regulation mechanism for the locus

is suggested by these studies. Analysis of the present experiments indicates that this time regulation is influenced by light. The greater dwarf-normal difference in leaf blade length in light growth as compared to the dark-grown difference suggests that the locus contributes to cell growth to a greater extent in the presence of light. It is possible, then, that light influences the rate of synthesis controlled by the locus. This hypothesis could be tested by comparing dwarf-normal $\bar{X}$CID of organs grown at various light intensities.

Table 1
Statistical Analysis of $d_1$ and Normal First Leaf Differences in Light and Dark Growth.

| Leaf 1 | Dark-grown N | Dark-grown $\bar{X}$ | Dark-grown SD | Dark-grown SE | Light-grown N | Light-grown $\bar{X}$ | Light-grown SD | Light-grown SE |
|---|---|---|---|---|---|---|---|---|
| Normal Length | 56 | 58.8 | ± 5.7 | .7 | 11 | 56.0 | ± 3.9 | 1.1 |
| Normal Width | | 11.7 | ± 0.7 | .09 | | 10.7 | ± 0.6 | 0.1 |
| Dwarf Length | 23 | 40.2 | ± 4.7 | .9 | 16 | 28.4 | ± 4.0 | 1.0 |
| Dwarf Width | | 15.5 | ± 1.2 | .2 | | 13.9 | ± 1.1 | 2.2 |
| *$\bar{X}$CID N:D Length | | .31 | | | | .49 | | |
| Width | | .24 | | | | .23 | | |

*$\bar{X}\text{CID} = \frac{\bar{X}_1 - \bar{X}_2}{\bar{X}_1}$, $\bar{X}_1$ and $\bar{X}_2$ are means of two populations with $\bar{X}_1$ the larger mean.

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