

The cards were found to contain sizing composed of corn starch which had been treated with ethylene oxide. Similar heat treatment in the absence of foreign material or with filter paper only produces few or no abnormal cells, but such treatment in the presence of filter paper soaked with solutions of a number of substances has been found to produce some or most of the above abnormalities. These substances include NaOH, NH_4OH , ethylene glycol, glyoxal and ethanol. (Abnormalities have not been found after treatment in the presence of grocery store corn starch.) Observations suggest that treatments with some of these substances may provide useful techniques for studies of chromosome structure, synapsis and crossing over.

M. Maguire

5. Retardation of bivalent separation.

Some mid and late anaphase I cells of a maize-Tripsacum chromosome 2 substitution stock have been found to be "exceptional," in that they show some evidence of retarded bivalent separation. Abnormalities observed include: (1) retention of attenuated, but unbroken, terminal connections between half-bivalents, (2) half-bivalents under tension, joined by incompletely terminalized chiasmata, (3) pairs of half-bivalents, each with at least one chromatid under tension, although complete connections are not visible, and (4) "lagging" bivalents under little or no tension. Examples of (1) and (3) are illustrated in Figure 1.

To test whether the observed anaphase behavior is related to genetic and structural heterozygosity, frequencies of such "exceptional" cells were recorded for plants of different chromosomal constitutions. Table 1 compares these frequencies for (A) disomic plants with normal maize complements, (B) disomic plants of the same stock, carrying a normal maize chromosome 2 and a maize-Tripsacum interchange chromosome, (B') trisomic plants carrying a normal maize chromosome 2 and reciprocal maize-Tripsacum interchange chromosomes 2, and (C) plants of the KYS stock. No two samples could be shown to be significantly different (5% confidence level) by a t test.

One disomic plant, which had a normal maize complement (A), exhibited chromosome behavior which approached the "sticky" phenotype in about 15% of the anaphase I cells analyzed. There was considerable tension

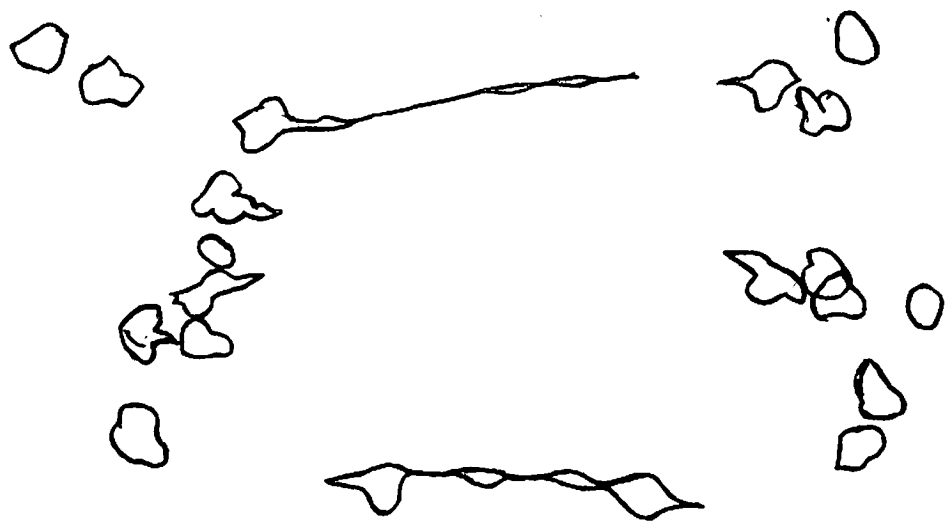


Figure 1. "Exceptional" mid-anaphase I. Retraced from a camera lucida drawing. Magnification 1905 X.

Table 1
Frequencies of "exceptional" cells at anaphase I

| Stock* | No. plants | No. cells | Overall mean | Variance |
|----------------------------------|------------|-----------|--------------|----------|
| Mid and late anaphase I combined | | | | |
| A | 7 | 200 | .23 | .02 |
| B | 4 | 76 | .32 | .06 |
| B' | 4 | 182 | .097 | .0008 |
| Mid-anaphase I only | | | | |
| A | 4 | 71 | .40 | .03 |
| B | 7 | 128 | .53 | .05 |
| C | 3 | 57 | .39 | .01 |

*Described in text.

on most chromatids in each affected cell, although few complete connections between chromatids could be resolved.

The significance of these phenomena is not clear. Darlington (Recent Advances in Cytology, 1937) suggested that terminalization of chiasmata may be arrested when a region where there is a change of homology is encountered. The data presented here provide neither support for, nor disproof of, this hypothesis.

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1. The effects of light on pigmentation in developing maize seeds.

A. Increased aleurone pigmentation induced by light in developing seeds.

Plants of six strains of W22 differing only with respect to factors conditioning pigment formation in the aleurone were pollinated and cobs sampled at various time intervals after pollination (normally every two