chromatid interference, the expected frequency of recombination in the proximal region is 0.46. Since a total frequency of exchange in the inverted region of 0.36 was found, with no interference between the two regions, the expected frequency of cells at anaphase I with fragment only is 0.17. The frequency found, 0.07, suggests a substantial interference to simultaneous double exchanges within and proximal to the inversion. Double crossovers within the inversion, however, apparently occurred with a frequency near that expected in normal sequence material of the same estimated length (0.01). Crossing over within the inversion and/or the reversal of pairing which accompanies it seems somehow to be frequently inhibitory to proximal crossing over although the proximal region seems usually to be synapsed regularly at pachytene for most of its length. It is suggested that pairing initiation in the inverted region (which is distal) is likely often to occur earlier than in the proximal region and that in these cases the synapsis of the proximal region may result from extension of synapsis from the other arm. As proposed in the preceding report, crossover sites may usually be established at synaptic initiation, with nearby second crossovers sometimes following the spreading of synapsis to adjoining regions. Pairing of the proximal region, following homologous pairing in the inverted region, may take place in a manner less favorable for crossing over.

M. Maguire

4. Experimentally produced meiotic abnormalities.

Induced meiotic abnormalities so far observed in this laboratory have included synaptic failure, failure of chiasmate association to persist until metaphase, irregular chromosome contraction at diplotene, presence of multiple nucleolar-like bodies at diakinesis, end-to-end association of diakinesis bivalents, cytokinetic failure at first and second meiotic division, tripolar spindles, distorted spindles, decondensation of chromosomes at metaphase and anaphase, and reorientation and abnormal separation of metaphase I bivalents such that sister centromeres may separate equationally at anaphase I. These abnormalities were apparently first induced while pieces of 3 x 5 index cards were positioned next to the meiotic tassel during heat treatment (for mechanical support).

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