over between K10 and the centromere. It is not known whether treatment at pachytene reduces crossover frequency; further studies are in progress.

It is hoped that this report will draw attention to the apparent potential value of ethanol treatment techniques for the study of meiotic chromosome structure and behavior.

Stocks which have so far been subjected to ethanol treatment include KYS and Coop stocks heterozygous and homozygous for K10 and elongate (el). Similar effects were observed in all stocks with the following astonishing exception: frequent bivalent interlocking at diakinesis was found in a 24-hour sample from one el plant. This is described below.

Marjorie Maguire

Induced bivalent interlocking — In a sporocyte sample from a phenotypically el plant collected and fixed 24 hours after initiation of ethanol treatment (described above), clear bivalent interlocking at diakinesis was frequent. Diakinesis material collected from this plant before treatment appeared completely normal. From the affected sample 15 cells each showed two pairs of bivalents interlocking, four cells showed three pairs interlocking and four cells each had a chain of three interlocked bivalents; only nine cells were seen which had no evidence of interlocking at diakinesis. Many cells (119) contained chromosomes too clumped for analysis, and many of these may have been interlocked. Only five metaphase I cells were available in squash preparations from this sample; of these, one cell showed two sets of apparently interlocked bivalents, and one cell showed one pair of such bivalents.

It is unlikely that cells at diakinesis 24 hours after treatment initiation were less advanced than pachytene (complete synapsis) at the time of treatment initiation. Thus, bivalents probably already completely synapsed at treatment seem to have been induced somehow to interlock by diakinesis in many cells.

It is not known whether the el trait expression is in any way related to the bivalent interlocking seen. No such interlocking has been seen in diakinesis slides from another el plant similarly treated or from any other treated plants. Further studies are underway.

Marjorie Maguire

Possible clustering within anthers of sporocytes with crossovers in specific regions — A common impression among cytogeneticists who have examined large numbers of sporocytes in smear preparations is that cells with cytologically recognizable products of crossing over in specific regions tend to be found close together in pairs or larger clusters. This is unexpected since anther contents

are usually vigorously stirred in slide preparation, and there is no a priori expectation of similar crossover events in cells initially located close together. It seems very unlikely, however, that stirring during slide preparation actually produces order from randomness. Thus, true clustering of crossover cells in smear preparations is considered to be evidence of geographic clustering of such cells within the anther prior to slide preparation.

Data were collected on the distribution of anaphase I cells with the various observable crossover classes in smear preparations from plants heterozygous for paracentric inversion 5083. These classes include single crossovers within the inversion (single bridge and fragment), three-strand double crossovers within the inversion and proximal to it (fragment only) and 4-strand double crossovers within the inversion (double bridge and two fragments). The slides were systematically scanned and records were kept of the number of cells of each crossover class and of the number of cells of the no-observable-crossover class in each scan. A total of 1685 cells in 139 scans were scored. Results were subjected to analysis of variance. Variation between scans within anthers was found to be (1) significantly greater than random expectation for the proportion of cells with single crossovers within the inversion ($P < 0.01$), (2) borderline for the proportion of cells with three-strand double crossovers within and proximal to the inversion ($P \simeq 0.05$), and (3) well within random expectation for the proportion of cells with four-strand double crossovers within the inversion. For anthers with at least one event of the crossover class, variation between scans from the same anther was significantly greater than random expectation for the proportion of cells with three-strand double crossovers within and proximal to the inversion ($P < 0.01$), but not for the proportion of cells with four-strand double crossovers within the inversion (where error mean square was calculated to be greater than the mean square between scans within anthers).

Results thus support the interpretation that there is within-anther clustering of cells with crossing over within the inversion, at least of events of single crossing over within the inversion and of events of three-strand double crossing over within and proximal to the inversion.

The distribution of crossover classes with respect to each other within scans was also studied. Tests for within-scan correlations of frequencies for all combinations of crossover classes were negative. All estimates of r were close to zero. The three detectable classes of crossover events appear to be independently distributed with respect to each other within anthers. This is surprising since correlation of subsample frequencies for single and double crossovers would

be expected, with two obvious types of exceptions. One of these exceptions is the special case where effects on crossover frequencies in the two regions are approximately inversely related. In this case clustering of cells with double crossovers would not be expected, and variability in the frequency of doubles should be relatively small (both circumstances apparently contrary to present findings). The other type of exception results from the case where a large part of the variability in crossover frequency is due to factors which affect crossover interference with special constraints. The results are consistent with the suppositions (1) that classes of cells are somehow generated such that some are predisposed to crossing over within the inversion but not in the proximal region while others are predisposed to coincident crossing over in both regions and still others possibly to double crossovers within the inversion, and (2) that there is some tendency for cells of the same class to occur in groups of unknown size within the anther. Such a system accounts for clustering of cells of each crossover class in the absence of correlated distribution of cells of the various crossover classes. An economical alternative explanation (short of gross sampling error) has not yet been conceived by me.

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An interchromosomal effect in maize — The effect of structural chromosome rearrangements on recombination in heterologous chromosomes has been well documented in a variety of organisms (see Lucchesi and Suzuki, Annual Review of Genetics, 1968, 2:53-87). Although this phenomenon, termed the interchromosomal effect, has been reported in maize (Bellini and Bianchi, 1963, Z. Vererbungslehre 94:126-132; Ting, 1963, Genetics 48:913-914), its properties and characteristics in corn remain to be explored.

We report preliminary data obtained with two paracentric inversions ($In2e^S$ and In3c), which were supplied by Dr. Greg Doyle. Recombination was studied in the short arm of chromosome 9, delineated by the markers c-sh-wx. Heterozygous inversion stocks were crossed to c sh wx. The resulting structural heterozygotes and their normal sibs were then backcrossed to the same tester.

In order to determine whether or not backcross differences were randomized, Chi-squares for heterogeneity were calculated. Among the normal sibs from either inversion, good homogeneous fit in both the c-sh and sh-wx regions was found. For the c-sh region, in the inversion heterozygotes homogeneity was also found.