specifically damaging newly replicated chromosome or chromosome regions.

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2. Precise chromosome movements prior to somatic metaphase in maize.

Light and electron microscope observations of early somatic prophase have shown that the chromosomes of maize are attached to the nuclear membrane. The numerous attachment points are apparently randomly distributed along the chromosomes but include the telomeres and centromeres of the chromosomes observed.

The somatic chromosomes were clearly visible during early prophase where they were organized in a polarized bouquet arrangement reminiscent of their previously held anaphase configuration. The chromosome arms were projected toward one end of the nucleus and the centromeres were found located at the other pole of the nucleus.

The centromeres of the prophase chromosomes were observed to move in a coordinated fashion from the "centromere pole" of the nucleus, along the nuclear membrane, to occupy an equatorial position by late prophase. The chromosomes then moved inward toward one another along the equatorial axis of the nucleus to form the new metaphase plate. This chromosome movement established the plane of the new metaphase plate at right angles and equatorial to the long axis of polarization of the prophase nucleus. Consequently, the plane of cell division was established along the axis of the polarization of the nucleus.

John D. Horn

3. The absence of nonhomologous associations of somatic chromosomes in maize.

All possible distance combinations of the ten pairs of somatic chromosomes of maize were accumulated for four cold arrested stocks

(T_{1-4}) and three arrested with 8-hydroxyquinoline or monobromonaphthalene (T_{5-7}). See Horn and Walden (MGCNL, 1970, 1971) for statistical and procedural considerations. An analysis of variance was performed on the data (Table 1) and means were compared by Tuckeys hsd procedure (Table 2).

Table 1

Comparison of treatment means among homologous and nonhomologous chromosomes using Tuckeys hsd procedure.*

Homologues T_{1-4}	Nonhomologues T_{1-4}	Nonhomologues T_{5-7}	Homologues T_{5-7}
39.1	42.9	43.1	43.6

*means underscored by a contiguous line are not significantly different $p \leq 0.05$

Table 2

Source of variation	df	SS	MS	F
Subgroups	3	160.5		
r (T_{1-4} vs T_{5-7})	1	38.5	38.5	0.57
c (Homologues vs Nonhomologues)	1	54.4	54.4	0.81
r x c	1	67.6	67.6	32.1**
Error	106	229.3	2.1	
Total	109	389.8		

**significant at $p \leq 0.05$

The data clearly showed that the use of chemical antimitotic agents in stocks T_{5-7} increased the separation of homologues at metaphase to the same degree of separation observed for nonhomologues in the same (T_{5-7}) or cold arrested stocks (T_{1-4}). Homologous chromosomes were shown to be significantly more associated in the cold arrested stocks T_{1-4} than

were the homologues of the chemical arrested stocks T_{5-7} or the non-homologues of either stocks T_{1-4} or T_{5-7}.

When the distances between all possible nonhomologous chromosomes taken pairwise were compared to the expected distribution of distance for randomly associating chromosomes, only four of a possible 315 distance distributions were significantly different ($p \leq 0.05$). There was no evidence for the nonrandom association of nonhomologues in any of the treatments examined in this study.

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4. Cycloheximide-affected metaphase morphology in maize.

In squash preparations of 3:1 alcohol-acetic acid fixed root-tips of maize, 8% of the metaphase figures were observed to be polar in configuration. Roots of intact, 4 day old seedlings were treated with a 15 minute pulse of 0.002% cycloheximide at 27°C followed by a 5 minute wash in 27°C running water. An immediate post-treatment increase in the frequency of polar metaphases was observed with a maximum of 61% of the metaphases being polar at 30 minutes after treatment. The increased number of polar metaphases arose as a result of a reduced number of cells leaving metaphase. The proportions of prophase and normal metaphase cells to the total number of cells observed remained at the control levels throughout.

The post-treatment polar metaphase configuration is unique and strongly resembles a polar view of normal anaphase. Electron microscope studies showed that the nuclear membrane was still intact in the cycloheximide treated polar metaphase cells.

A pattern of radiating arms was observed and this was characteristic and repeated from cell to cell. This pattern of chromosomes may be representative of the spatial organization of the chromosomes during the previous anaphase and consequently during interphase and prophase.

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