

none of them were intercalarily located. Furthermore the distal portion of the long arm of bivalent chromosome 3 was several times found to be asynaptic in about one-third of the total length of this arm. Whether this was caused by the presence of an inversion is uncertain, since there was no anaphasic bridge found among a limited number of sporocytes studied. A study of the F₁ hybrids of this teosinte and an inbred maize strain is in progress.

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2. Effect of x-rays on variegated leaf character.

In the summer of 1963, pollen of plants homozygous for a set of duplicate genes for variegated leaf, (vl₁ vl₁, vl₂ vl₂), was irradiated with x-rays. Three doses of x-rays 1000r, 2000r, and 3000r were applied. In about one hour after irradiation the pollen was crossed to the sib plants which were of the same genetic background. Pollen from each treatment was used on five different plants. In general, the seed sets were good for all the crosses. Seeds (kernels) from these crosses were planted in the summer of 1964. There were 527 fully grown plants obtained from treatment-1 (1000r); 555 plants, from treatment-2 (2000r); 362 plants, from treatment-3 (3000r). Frequent examinations of the vegetative characters, with special attention to the vl gene, were conducted during the whole growth period. No single plant was mutated back to the wild type. Leaves of all the plants appeared the same as those of the parental plants. Hence, it seems reasonable to conclude that x-rays are not effective in inducing reversion or inhibition of the vl gene in maize.

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3. Additional studies of haploid maize.

Last summer a haploid was found among the progeny of an inbred maize strain, Coe-stock-6, which was provided by Dr. E. H. Coe, Jr., of the University of Missouri. This plant was earlier in tasselling than the sibs, and its stalk was shorter. Since the chromosomes of the sib plants of this haploid were well spread at pachytene, it was anticipated that chromosomes of the haploid would also be well spread at the corresponding stage. Furthermore, much more information concerning the meiotic chromosome behavior, such as pairing between heterologous chromosomes indicative of duplication, in haploid maize is needed. Hence, microsporocyte divisions of this haploid were investigated.

At pachytene, the 10 chromosomes, like those of the other haploid maize previously reported by the author (M. G. Newsletter, 1963), were always entangled and formed

nonhomologous associations, predominantly fold backs. Pairing between heterologous chromosomes and chromosomes unpaired throughout their entire length were infrequent.

Table 1
Chromosome Associations At Diakinesis Of Haploid Maize

Class	Type of Association			Total	%
	Univalent	Bivalent	Trivalent		
1.	10	0	0	226	56
2.	8	1	0	133	33
3.	6	2	0	26	6
4.	5	1	1	8	2
5.	7	0	1	11	3
				404	

From diakinesis to metaphase I, chromosomes in over 50 percent of the sporocytes remained as univalents. As is shown by Table 1, among a total of 404 randomly selected cells, 56 percent, or 226 of them were found to have 10 well defined univalents; 33 percent, or 133 of them, eight univalents plus one bivalent; six percent, or 26 of them, six univalents plus two bivalents; two percent, or eight of them, five univalents plus one bivalent and one trivalent; three percent, or 11 of them, seven univalents plus one trivalent. Most of these bivalents and trivalents showed affinity by only end-to-end or rod-shaped pairings. No ring-shaped configurations were observed among the limited number of cells studied. Furthermore, these pairings were not limited to certain chromosomes.

From metaphase II to anaphase II, the phenomenon of multispindle was found in a few diads. The extra spindles appeared when only one or two strayed chromosomes were present in the cytoplasm of the diads. These spindle regions were clear in the better stained cells.

This plant was completely sterile when it was pollinated by the sib plant. No anthesis was observed.

Since bivalents varying from one to three in number were observed in less than 50% of the microsporocytes examined, it appears reasonable to conclude that duplicate factors in maize are intra-chromosomal. Coincidentally, among about 15 reported cases of duplicate factor inheritance in maize,

three of the four better known sets were proved to be intrachromosomal. Apparently those genetic findings support the present cytological observations.

As stated in the foregoing paragraph, the phenomenon of multispindle was seen from metaphase II and anaphase II, the extra spindles being organized where only one or two strayed chromosomes were present. It is conceivable that the centromeres of the chromosomes, instead of the centrosomes of the cytoplasm, are responsible for the organization of the spindle. Therefore, the mitotic spindle is of nuclear origin. The classic theory stating that the mitotic spindle is originated in the centrosomes should be rejected.

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4. Spontaneous reciprocal translocation in a maize tester plant.

An interchange between the long arm of chromosome 6 and the short arm of chromosome 9 was identified in a plant of the progeny of an inbred maize tester strain. The genotype of this strain was Y/y, sh bz/sh bz. By averaging five separate measurements, it was found that the length of the interchanged segment on the long arm of chromosome 6 occupied about 87 percent of the length of this arm, while that on the short arm of chromosome 9 included about 75 percent of this arm. This translocation was tentatively designated as T6-9a of our material. Since the exact locations of the previously reported translocations between the long arm of chromosome 6 and the short arm of chromosome 9 from other laboratories are not available, it is impossible to ascertain if this interchange has been published. However, it is certain that this did not come from an outcross.

At diakinesis it was observed that in a total of 309 randomly selected cells, 98 percent, or 303 of them formed chain-configurations involving chromosomes 6 and 9. A little more than one percent, or four of them formed ring-configurations, and only less than one percent, or two of them formed separate bivalents of these interchanged chromosomes. This unusually high frequency of the occurrence of chain-configurations might be caused by the frequent formation of non-homologous associations between the interchanged segment from the short arm of chromosome 9 and the long arm of the normal chromosome 6. This was actually observed at pachytene. These non-homologous associations could be a manifestation of duplication including the long arm of chromosome 6 and the short arm of chromosome 9.