

The data indicate that ears borne below an optimum position may be reduced in size probably because of competition with longer shanks and more numerous husks.

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9. Clustered spikes, an extreme feature of teosinte, present in maize-Tripsacum hybrid.

Since the clustering of spikes is unique to teosinte among the American Maydeae, this character seems at first to oppose the theory that teosinte is derived from a maize-Tripsacum hybrid. But the presence of clustered spikes in an F_1 hybrid between multiple-tester maize and Tripsacum dactyloides, which is currently under study, demonstrates that this feature is merely a hybrid product of combining two other characters from maize and Tripsacum. When the many-noded shank (peduncle) of maize, which has a lateral bud at each node, is combined with the small two-ranked spike of Tripsacum there is a development of the lateral buds into clusters of spikes.

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10. Cytological studies of F_1 hybrids between maize and teosinte.

A. Chalco teosinte - maize hybrids. Two F_1 plants of the cross of an inbred maize strain of Wilbur's Flint x Chalco teosinte and its reciprocal were cytologically investigated. A practically terminal inversion was found at pachytene in the short arm of chromosome 8 in both of these plants. This inversion, like In 8 in other varieties of teosinte, formed loop-shaped, ring-shaped and asynaptic configurations. The length of this In 8 and the percentage of the short arm which it occupies are shown in Table I.

Table I Length of In 8 in Chalco teosinte

Cell No.	Length in microns		Percent of Short arm
	Short arm	Inversion	
1	16.0	13.6	85.0
2	14.0	9.2	65.7
3	12.8	9.6	75.0
4	14.2	10.7	75.3
5	13.4	9.6	71.6
Average	14.0	10.5	74.5

The chromosomes in these F_1 plants were well spread and easily identifiable. There was one knob on the long arm of chromosome 1, and one on each arm of chromosome 2. The long arm of chromosome 3 had a medium-sized knob. A small subterminal knob was present on the short arm of chromosome 4, and a relatively large knob occurred on the long arm. A large knob occurred on the short arm of chromosome 5. Two knobs were found on the long arm of chromosome 6, and a small terminal knob or a large chromomere on the short arm of the same chromosome. A large knob was also present on the

long arm of both chromosomes 7 and 8. The short arm of chromosome 9 had a large terminal knob. Chromosome 10 in these hybrids was knobless. Since the inbred strain of Wilbur's Flint was previously found to have only large chromomeres and no chromosome inversions, the knobs and In 8 in the hybrids were definitely contributed by the Chalco teosinte parent.

In a total of 626 randomly chosen sporocytes, 9.4 per cent had two univalents at diakinesis, the remainder having all of their 20 chromosomes associated into ten different bivalents. Sporocytes having more than two univalents were not observed. The low percentage of sporocytes having univalent chromosomes at diakinesis indicates that the chromosomes of Chalco teosinte and of the inbred strain of Wilbur's Flint have a high degree of homology.

B. Florida teosinte - maize hybrids. Four F_1 plants of the cross of Wilbur's Flint x Florida teosinte and one F_1 plant of the reciprocal cross were cytologically examined. At pachytene the chromosomes in all of the plants appeared sticky and highly heterochromatic. A heterochromatic segment attached to the end of an unknown chromosome seemed larger than that attached to the distal end of the abnormal chromosome 10, previously described (Chromosoma, 1958). It was very difficult to identify the chromosomes and their irregularities. However, a practically terminal inversion in the short arm of chromosome 9 was definitely identified. On the basis of three separate measurements, it was concluded that the average length of this inversion was 19.1 μ which was about equivalent to 81.9 per cent of the length of the short arm. There were probably two other paracentric inversions, but due to their stickiness the chromosomes involved were not definitely known, although they seemed to occur on chromosomes 3, 4, or 5.

At diakinesis of 448 randomly chosen sporocytes studied, 297 or 66 per cent had all of the ten chromosomes paired as bivalents; 115 or 26 per cent had two univalents; 34 or seven per cent had four univalents and two cells or less than one per cent, had six univalents.

At anaphases I and II, bridges and fragments in various combinations were frequently found. The results are shown in Table II on the following page.

Lagging chromosomes were also frequently present at anaphase I. Most of these laggards were individual chromosomes showing no association even when two occurred in the same cell. The number of laggards varied from one to five. The frequency of each number is shown in Table III.

Table III. Laggards found at anaphase I of F_1 plants of maize and Florida teosinte

	Number of Laggards					
	0	1	2	3	4	5
Frequency	360	55	49	4	7	2
Per cent of total	75.3	11.5	10.3	0.8	1.4	0.4

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