Table 1
Segregation of Chromosomes in the Progeny of the Triploid Hybrid [(maize x T. floridanum) x maize]

Chromosome Number	Number of Extra Tripsacum Chromosomes	Observed Frequency	Frequency Expected on Random Segregation of Chromosomes
10	0	1	0.00
20	0	29	0.00
21	1	46	0.00
22	2	21	0.15
23	3	13	0.45
24	4	18	1.80
25	5	7	4.95
26	6	7	10.65
27	7	2	18.15
28	8	1	25.05
29	9	2	27.75
30	10	1	25.05
31	11	0	18.15
32	12	1	10.65
33	13	0	4.95
34	14	0	1.80
35	15	0	0.45
36	16	1	0.15
37	17	0	0.00
38	18	0	0.00
Total		150	

low chromosome classes (0-5). It appears that gametic or zygotic combinations involving high numbers of Tripsacum chromosomes are systematically eliminated.

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12. Transmission frequencies and phenotypic effects of two Tripsacum floridanum chromosomes in addition monosomics of maize.

In the summer of 1962 several maize plants which are addition monosomics for T. floridanum chromosomes were isolated from the progeny of the triploid hybrid [(maize x T. floridanum) x maize]. Synaptic relations, transmission frequencies and phenotypic effects of two of these, identified at pachytene as Tripsacum chromosomes 5 (length, 39.96 microns; arm ratio, 4.1:1.0) and 11 (length, 22.04 microns; arm ratio, 4.0:1.0) are studied and reported here. Neither of these chromosomes showed any synaptic relations with any of the maize chromosomes at pachytene or other stages of meiosis. At pachytene, however, their terminal knobs were usually seen to be sticking with the knobs on the maize chromosomes. This sometimes persisted to diakinesis where configurations consisting of associations of three chromosomes were found.

In backcross progenies the two addition monosomics showed transmission frequencies of 32.0% (chromosome 5) and 29.2% (chromosome 11).

In order to study the phenotypic effects of these chromosomes on maize, measurements were made on tem morphological characters (plant height, number of tillers, number of leaves, leaf length, leaf width, leaf length/leaf width, number of days to silking, number of ear shoots, number of days to anthesis, and length of the central spike) in the backcross progenies of the addition monosomics and means for 20- and 21-chromosome plants compared. In the case of chromosome 5, the 21-chromosome plants were significantly shorter, had shorter and narrower leaves and their leaf length/leaf width ratio was higher compared to the 20-chromosome plants. In the case of chromosome 11, the 21-chromosome plants were also significantly shorter, had narrower leaves, and exhibited a higher leaf length/leaf width ratio compared to the 20-chromosome plants. They were also later in silking. It seems quite likely that all the observed effects are the consequence of aneuploidy rather than due to specific genes residing on the extra chromosomes.

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13. Chromosome synapsis in an interspecific Tripsacum hybrid.

A hybrid between T. floridanum Simm., and T. dactyloides L., was produced by one of us (W.C.G.) and its cytology with reference to pachytene synapsis has been studied in order to understand the chromosomal relationships of the two species. At pachytene the chromosomes of the two species showed good synapsis for most of their lengths. However, the hybrid was found to be heterozygous for the following differences: (1) a duplication of 3.5 microns on the short arm of chromosome 7, about 3 microns removed from the proximal end; (2) a duplication of about three microns on the nucleolar arm of the nucleolus organizing chromosome immediately following the nucleolus organizer; (3) a terminal knob on chromosome 12. Besides the above, several other differences were found in the synaptic relationships. They are: (1) an intercalary unpaired region in the short arm of chromosome 1 about three microns in extent and about 3.6 microns removed from the distal end; (2) variable (total to none) failure in the long arm of chromosome 15; (3) fusion of the terminal ends of the two arms of chromosome 7 and the nucleolus organizer chromosome giving "ring shaped" bivalents at pachytene.

Diakinesis pairing was normal and 18 bivalents were always formed. Metaphase was extremely clumped and there was some bivalent lagging at anaphase.

From the above description it can easily be seen that there are no major differences between the karyotypes of the two species. Except for the two small duplications the chromosomes of the two species are more or less identical in their morphology. The present data support other unpublished evidence that the two species are closely related.

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