If the Tripsacum chromosomes segregate at random at meiosis and if there is no selective gametic or zygotic elimination then there should be 50 percent of dominants for those loci for which Tripsacum carries one dominant allele and 75 percent dominants for loci for which Tripsacum carries two alleles. The data fit neither of these theoretical expectations, probably because the high degree of gametic elimination is selective against extra Tripsacum chromosomes. It may be significant, however, that six of the seven frequencies are similar to each other (average 32.2 percent dominants) while the seventh, J_1, has almost exactly twice this frequency. This may suggest that Tripsacum carries only one allele for the maize markers, bm_2, lg_1, a, su, gl_1, and wx, but carries two for j_1. The final answer will depend upon the cytological identification of the Tripsacum chromosomes carrying the dominant alleles in 2n+1 plants. If the presence of a particular dominant allele is always associated with a particular Tripsacum chromosome, it may be assumed that Tripsacum carries only one dominant locus for the character in question.

One Tripsacum chromosome has so far been identified both genetically and cytologically: the chromosome carrying the allele of wx. This is the satellite chromosome of Tripsacum which among the 18 Tripsacum chromosomes is the sixteenth longest in length. In one plant with better than average pachytene spreading this chromosome frequently associated with chromosome 9 of maize in a peculair configuration. This chromosome has a median centromere and two terminal knobs. Its two arms fold back on each other, their terminal knobs fusing. This large fused knob may then fuse with the terminal knob of chromosome 9 of maize. In this plant the satellite chromosome of Tripsacum never becomes attached to the nucleolus although it did so at times in the F_1 hybrid producing configurations in which two satellite chromosomes were attached to the nucleolus.

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8. Effects of Tripsacum floridanum chromosomes on the meiosis of maize.

During the summer of 1961-62 a large population (about 650 plants) was grown of the progeny of the triploid hybrid of corn and Tripsacum floridanum (produced by Dr. Galinat by backcrossing the F_1 corn-Tripsacum hybrid twice by corn, MNL 35, 36). Young tassel material was collected for the following types of cytological study: (1) frequencies of the numbers of extra Tripsacum chromosomes transmitted by the triploid hybrid; (2) identification of the Tripsacum chromosome carrying the dominant allele for gl_3 when this is covered; (3) affinities of maize and Tripsacum chromosomes within themselves when they are present as parts of the haploid complement and in different combinations;

(4) effects of Tripsacum chromosomes on the synapsis and other aspects of the meiosis of maize when present singly and in various combinations. The following report concerns the fourth aspect mentioned above.

In some of the segregates a very interesting behavior was observed in the maize chromosomes themselves apparently under the influence of the Tripsacum chromosomes. This was in the form of interruption and breakdown of the normal course of the meiotic process at various stages of the division cycle and total degeneration of the microspores. The most common abnormality was pachytene pairing failure. The extent of this was highly variable ranging from small segments of the pachytene bivalents showing nonpairing but with good diakinesis and metaphase pairing (apparently chiasma formation unaffected) to a high degree of asynapsis including entire chromosomes leading to highly reduced bivalent formation at diakinesis and metaphase. As an example, in the following table are given the frequencies of chromosome associations at metaphase I in six segregates.

Plant No.	No. of Extra Tripsacum Chromosomes	Mean Association per Cell Trivalent	Bivalent	Univalent	No. of Cells Analysed
575-3	2	0.32	5.28	10.48	25
575-8	2	-	10.00	2.00	20
575-11	3	0.20	9.90	2.60	21
575-15	3	0.15	6.00	10.55	20
573-5	12	0.13	11.13	9.33	15
575-10	10	-	2.75	24.50	16

A second class of aberrations include disturbances in the spindle. In these the anaphase is disorganized and the chromosomes are scattered all over the cell. They undergo divisions and fragmentations resulting in cells with large numbers of chromosomes which eventually degenerate. A variation on this is the clumping of the bivalents on the metaphase plate unaccompanied by division or fragmentation and final degeneration of the chromosomes.

A third type of aberration was exhibited by the plant 575-14 carrying six extra Tripsacum chromosomes. In this plant there is good pairing (average 11.83 bivalents and 2.33 univalents at metaphase I). But widespread degeneration takes place at almost all stages of meiosis prior to metaphase. The cells rarely get beyond metaphase I. In the table below are presented the frequencies of normal and degenerating cells in two anthers from the same spikelet.

	Pachytene	Diplotene	Diakinesis	Metaphase I
No. of cells normal	1	7	7	35
No. of cells degenerating	21	14	8	27
			(Total = 120)	

The wall of the microsporocyte very early starts going through a morphogenetic development similar to that of the pollen grains. Thus frequently one comes across cells looking like pollen grains but containing degenerating meiotic figures from pachytene to metaphase.

A fourth type of aberration observed was translocation. So far two plants were observed which were heterozygous for a reciprocal translocation each in the maize chromosomes.

These effects resemble abnormalities of meiosis due to genetic causes (eg. asynapsis) and due to the action of chemical and physical agencies. It appears that the Tripsacum chromosomes act in disrupting the balance of genetic and physico-chemical factors at several points which together make meiosis and the subsequent events in the microspore an integrated system.

Further studies are in progress along these lines for a fuller understanding of these phenomena.

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9. Northern flint-like characters derived from Tripsacum.

Certain plants in our maize populations segregating T. dactyloides and T. floridanum chromosomes had acquired from Tripsacum several characteristics which resemble those of the northern flints including the early flowering habit, tillering habit, flag leaf development, and long internodes above the ear position. The genes for earliness from Tripsacum may be hidden by the perennial character in this grass. But once the perennial plants are well established, these genes may serve to speed early flowering in the spring. The identification of northern flint-like characters with Tripsacum germplasm agrees with other evidence that the northern flints are tripsacoid.

W. C. Galinat

10. Teosinte introgression and fasciation.

Origin of fasciation. Fasciation, a sort of incipient branching which flattens the ear while it increases the number of kernel rows, has an ancient history in maize, perhaps as a mechanism to concentrate the grain under short protective husks. Although obvious fasciation is rare in modern maize, it does occur in extreme form in certain relic races, which are now restricted to high elevations, such as Palomero Toluqueño in Mexico and Confite Puneño in Peru as well as in a race which is maintained as a novelty type in the United States, Strawberry popcorn. Experimental evidence now indicates that genetic factors for