Summary of 4n seed set in 4n x 4n pollinations, followed 3 1/2 hours later by pollination from a diploid source.

Pedigree (1)	No. pollinations	% 4n kernels (mean)	Duncan's multiple range test (2)			
A. F. x "W8" (+2n ♂)	74	46	a	b		
A. F. x "W26" (+2n ♂)	63	34	a		c	
A. F. x "Oh51A" (+2n ♂)	53	37		b	c	
"W8" x A. F. (+2n ♂)	72	59				d
"W26" x A. F. (+2n ♂)	22	53	a			d

(1) First named member was seed parent. A. F. = Argentine Flint.
(2) Means followed by same letter are not significantly different from each other (5% level).

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1. The use of hypoploids in identifying naturally occurring duplications.

We have commenced using various hypoploids in an arm by arm search for naturally occurring duplications in the maize genome. Assuming that such duplications are not uncommon, it is argued that during meiosis in the hypoploid individual, the chromosome arm, or part thereof, that is in haplo condition should synapse occasionally with segments of other chromosomes representing duplications of chromatin in the haplo arm. Crossing over in such "illegitimately" paired regions should yield gametes carrying reciprocal interchanges; the identification and analysis of translocations originating in this way might be expected to reveal the nature and extent of naturally occurring duplications.

D. E. Alexander presented preliminary reports (see M.G.C.N.L. 1954 and 1956) on a study which suggests that "crossing over had occurred between non-homologs during megasporogenesis of haploid maize plants." He suggests that cytological analysis of semisterile progeny of monoploid maize plants should lead to inferences concerning duplication in the genome. The use of hypoploids, as suggested here, should afford greater precision in searching for these duplications. Moreover, even though the hypoploid individual, as a result of gross deficiency, customarily exhibits abortion of 50% of its germinal elements, the deficient chromosome does not transmit through pollen or egg, and therefore is not expected to occur among the progeny of the hypoploid plant.

In our scheme, hypoploid individuals among the progeny of pollen parents carrying an A-B translocation are used as pollen (or egg) parents in crosses with vigorous single-crosses. The progeny of such crosses are grown on a large scale and at harvest time are searched for the occurrence of scatter-grain ears. These are routinely analyzed to confirm the presence of an aberration and to identify it cytologically.

Our results at this stage are preliminary but perhaps worthy of mention. Four reciprocal translocations were found among the progeny of TB-9b hypoploids (haplo condition for the short arm of chromosome 9). One of these appears to involve an interchange between 9S and another as yet unidentified arm. Two others involve 6L and 8L, and 5S and 8L. The fourth is not identified.

Among the progeny of TB-9a hypoploids (haplo condition for the long arm of chromosome 9), five individuals were found, on the basis of aborted pollen, to carry aberrations. One of these is unanalyzed but reciprocal translocations were found in the remaining four cases. One of the latter appears to involve 5S and 9L; another apparently involves chromosome 9 but in this case the other member of the interchange has not yet been identified. The two remaining interchanges appear to involve 2L and 6L, and 8L and 10L.

It should be emphasized that these identifications are tentative. If they are confirmed it would seem that there is a tendency for the chromosome arm that is in haplo condition in the hypoploid to be involved in interchanges; to the extent that there is such a preferential involvement we may expect that the method suggested here has application in identifying duplication segments. On the other hand, it seems clear that the haplo arm is not always involved in the interchange, but even in these cases there is a suggestion that certain arms may be involved more frequently than others. It may be that the haplo arm in the hypoploid plant leads to more complicated or secondary "illegitimate" associations, or that chromosomes are more prone to break in hypoploids and that in this respect some regions are more unstable than others.

We are extending these studies and have included other hypoploids in the analysis. Tentative estimates would place the frequency of interchanges among gametes of hypoploid plants at about five to twenty per ten thousand. It appears, however, that this frequency varies considerably depending on the particular hypoploid involved.

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