Any or all of the above cytological phenomena would alter the constitution, chromosomal as well as genetic, of the resultant microspores. Considering those listed from (a) to (d), three microspore types, i.e., with none, one or two $\underline{Su}^d$ chromosomes could be expected. Assuming a similar meiotic behavior in megasporogenesis, the functional egg could belong to one of the three nuclear phenotypes. It appears fusion between male and female gametes, each carrying more than one of the $\underline{Su}^d$ chromosomes, is eliminated as is to be inferred from the absence, so far as is known, of plants with 3 or 4 extra chromosomes in the derived progeny.

The transmission frequencies for the $\underline{Su}^d$ allele in the different test crosses made during 1966 and 1967 are listed in Table 1. While in some the observed data agree with the expected, in certain others they are not in agreement. The variable rates from identical crosses probably are related to the meiotic phenomena (a) to (d) and the consequences of those listed under (e) and (f) are not yet understood.

Table 1

Transmission frequencies of the $\underline{Su}^d$ allele in the different test crosses of addition disomic corn-Tripsacum hybrid derivatives

Year	Plant No. and cross	Observed $\underline{Su}^d$ kernels (Per cent)
1966	66-1026 : Selfed . . .	100
	66-1026-2 X $\underline{su}$ $\underline{gl}_3$ . . .	100
	66-1026-4 X $\underline{su}$ $\underline{gl}_3$ . . .	100
	$\underline{su}$ $\underline{gl}_3$ X 1026-5 . . .	99
	$\underline{su}$ $\underline{gl}_3$ X 1027 . . .	96
1967	$\underline{su}$ $\underline{bm}_3$ X 248 . . .	97
	$\underline{su}$ $\underline{bm}_3$ X 251 . . .	75
	Plant row numbers 1026, 1027 for 1966 and 248, 251 for 1967 have the same source as 67-258 & 259.	

B. G. S. Rao
W. C. Galinat

10. Emergence of "Pseudo-substitution" stocks of corn carrying the $\underline{Su}^d$ allele derived from Tripsacum.

Among the selfed progeny of the 20+1 addition monosomics of corn marked by the phenotypic expression of the dominant $\underline{Su}^d$ allele of Tripsacum, certain $\underline{Su}^d$ plants with $\underline{2n}$=20 chromosomes were isolated by cytological studies

(stock 67-262). Both at diakinesis and metaphase I there appeared to be 10 bivalents uniformly in all the nuclei examined. Disjunction was normal and segregation equal at anaphase I and II. Fertility adjudged from kernel set on the ear was near full. It was therefore expected that these plants would represent "substitution" stocks in which the $\underline{Su}^d$ locus from Tripsacum had been successfully transferred to one of the corn chromosomes followed by an elimination from the genome of the Tripsacum chromosome, now deficient for the $\underline{Su}^d$ locus. To verify this as well as to locate the newly introduced Tripsacum chromosome segment in the corn genome, studies were extended to analyses of the pachytene nuclei. The preliminary observations are recorded below.

Ir about 10 pollen mother cells in which the pachytene chromosomes could be analyzed with acceptable clarity of detail, a small extra fragment of chromosome material is found to be present. Like the other chromosomes, the fragment appears to be of a double nature and is always found in association with the centromere of any one of the corn chromosomes in the different analysable cells. In none of them was it possible to identify this fragment pair independent of the other corn chromosomes or as a discrete entity. By virtue of its constant association with the centromere of any one of the corn chromosomes, it is suspected to represent (a) a telocentric fragment pair (similar to a B chromosome or its C, D, etc., derivative) or (b) an iso-chromosome with inside pairing, derived in either case from the extra $\underline{Su}^d$ chromosome present in the parents. Its occurrence as a lateral "appendage" to the centromeres of any one of the corn chromosomes might be interpreted as due to the association of the centromeres of nonhomologous chromosomes, a phenomenon of not an infrequent occurrence. Due to its extremely small size (about 5 to 8 microns at pachytene), the extra chromosome fragment is not apparent at diakinesis and metaphase I. In a solitary metaphase I plate, one of the bivalents was noticed to have a small spherical knob-like extension at one of its polar ends (centromere) which is believed to represent the condensed fragment pair still in association with the centromere of the concerned bivalent. It would appear that this moves to one pole in its entirety without the anaphase I separation, and its fate during the subsequent course of meiosis is not yet ascertained.

The irregular meiotic behavior of this fragment pair of chromosomes is considered to be related to the inconsistent and unexpected (19% in the parent stocks of 1966) transmission frequencies observed for the $\underline{Su}^d$ allele in the different progenies derived on selfing the parent stock (Table 1).

From its present form and meiotic behavior, the fragment chromosome pair may not be expected to be stable. Little is known of the causes underlying the metamorphosis of a normal Tripsacum chromosome to the state of a small fragment, without apparently affecting the expression of the $\underline{Su}^d$ allele.

Table 1

Transmission frequencies of the *Su*^{d} allele in selfed pseudo-substitution stocks of corn-Tripsacum hybrid derivatives (Stock 67-262)

Plant No.	Total kernels	Observed *Su*^{d} kernels	Percentage of *Su*^{d}
67-262-1	120	29	24.2
-2	170	10	5.9
-3	264	33	12.5
-4	287	52	18.1
67-263-1	308	51	16.5
-2	317	72	23.5
-3	310	39	12.6
-4	298	21	7.1
-5	304	64	21.0
-6	319	59	18.5
-7	372	29	7.8

Both the stocks 67-262 and 67-263 were derived from selfing of 66-368-8

B. G. S. Rao
W. C. Galinat

UNIVERSITY OF MELBOURNE
Parkville, Victoria, Australia

1. Effect of temperature on the rate of crossing-over in maize.

Preliminary experiments have been carried out in the Phytotron at the Plant Industry Division, C.S.I.R.O., Canberra, to estimate the effect, if any, on the rate of crossing-over in stable stocks of *C Sh* maize. Homozygous recessive *c sh/c sh* plants kept at 27°C were used as female parents, while heterozygotes in coupling phase were used as pollen parents after being grown to anthesis in glasshouses set at 24°C, 27°C, 30°C, 33°C and 36°C. The daylight length was 16 hours and the humidity was kept constant for all glasshouses.

At anthesis the plants were transferred to the 27°C glasshouses and crosses made. Subsequently, the ears were harvested and calculations of recombination values from 17 ears in each treatment were made. The results were as follows: