2. A study of transmission of a B^4 derived from a TB-4a stock.

As Roman first showed (1947), TB-A translocations in maize are a useful tool in studying the specificity of different chromosome segments. Bianchi, Bellini and Ottaviano (1961) studied the influence of the TB-4a translocation on the endosperm development. They found that kernels were heavier when the endosperm was hyperploid for the segment B^4. It was suggested that the hyperploid endosperm condition could be fixed by transferring the B^4 into a normal line where it would undergo normal disjunction. Accordingly, four inbred lines and their hybrids were pollinated with the TB-4a stock. Because of B^4 non-disjunction the resulting progeny ears carried three different classes of kernels, in regard to B^4:

(1) hyperploid embryo and hypoploid endosperm
(2) hypoploid embryo and hyperploid endosperm
(3) both embryo and endosperm normal

Kernels of class 1 have then been selected using as criteria of selection both different weight and scutellum color markers. The hyperploid plants obtained were selfed, after collecting part of the tassel from each of them, during the stages of meiosis. The results of the study of the pachytene are summarized as follows:

Probably vital genotypes	Expected ratio		Observed frequencies	Expected frequencies	Observed ratio
$4,4,B^4$	1	1	5	5.3	1
$4,4,B^4,B^4$	1	2	0	10.6	0
$4,4,B^4,B^4,B^4$	1				
$4,4^B,B^4$	1	5	29	26.5	5.8
$4,4^B,B^4,B^4$	2				
$4,4^B,B^4,B^4,B^4$	2				
$4^B,4^B,B^4,B^4$	1	2	16	10.6	3.2
$4^B,4^B,B^4,B^4,B^4$	1				
4,4	0		3	0	0.6
Total		10	53	53	

From the table it appears that genotypes $(4,4,B^4,B^4)$ and $(4,4,B^4,B^4,B4)$ were not found, while normal genotypes (4,4), which were not expected were found. The finding suggests that the B^4 may be lost before or during both male and

female gametogenesis. Cytological observations of microsporocytes in plants with (4,4,B^4) genotype, show homologous pairing at pachytene, in the region of the short arm of chromosome 4, between the chromosome 4 and the B^4, in the typical way of trivalents, and also non-homologous pairing in the same region. The B^4 may undergo partial or complete autosyndesis. During diakinesis the B^4 is often observed close to a bivalent, presumably the chromosome 4. At metaphase I the univalent B^4 is outside the equatorial plate in about 30% of the cells, while at metaphase II the B^4 shows the same behavior in about 20% of the cells. During anaphase I the univalent B^4 undergoes division in about 30% of the cells, but often at late anaphase or at beginning telophase. Both telophase I and II show micronuclei. These micronuclei at telophase I are presumably the result of lagging of the univalent B^4. Those observed at telophase II are thought to derive from the B^4 that divided at the previous division.

The (4,4,B^4) plants, once selfed, yielded kernels of the following constitution (observations were made on the plants obtained from them):

Genotypes	Expected ratio	Observed frequencies	Expected frequencies	Observed ratio
4,4	1	67	22	1
4,4,B^4	2	21	44	0.3
4,4,B^4,B^4	1	0	22	0
Total		88	88	

These data indicate that: (1)The (4,4,B^4,B^4) class, expected in ¼ of the progeny, was not found. (2) The (4,4) class largely exceeded the expected ½.

These observations suggest that: (1) Meiosis is an obstacle for the transmission of the B^4 in the normal genotypes examined. (2) Presumably the few pollen grains carrying the B^4 that escaped the meiotic barrier are then selected against, when in competition with normal pollen grains.

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3. The "smoky" derivative of R^{st}.

In the 1965 News Letter it was reported that following introduction of Mp into an R^{st} stock, several ears were observed carrying kernels with abnormal spotting patterns among the