It appears as though the phenotype of \( a^{m-1} p^{mo} \), both with and without 
Spm, is also brown but the low color level mosaic allele used makes 
color identification difficult.

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In spite of the considerable interest in abnormal 10 (K10) that has been 
generated by the studies of Rhodes, Dempsey, and others, the origin of 
this chromosome has not been established. Ting (Chromosoma 9:286, 1958) 
postulated that the extra segment of K10 arose by simple translocation 
between normal 10 and a B-chromosome. This hypothesis was tested by 
comparing meiosis in haploids with either K10 or normal 10 (k10) and 
carrying a single B-chromosome. The desired haploids were obtained from 
diploids of the constitution fl/gl, K10/k10. The glossy seedlings 
were selected as putative maternal haploids among the progeny of the 
glossy female parents crossed with normal males. The male parent used 
was "stock 6", a high haploid-inducer line discovered and supplied by 
Dr. E. H. Coe. Sixty-four glossy seedlings were found among a total of 
7,100 progeny obtained from this cross. Of these glossy exceptions, 58 
were verified as haploids by chromosome counts in root tip squashes pre-
pared by the Feulgen procedure. This is a haploid frequency of 0.82% 
which is considerably higher than the normal frequency of 0.1%. The 
chromosome 10 constitution was also determined in each haploid during 
the examination of dividing root tip cells where K10 can be recognized 
at metaphase by the acrocentric position of its centromere. Micro-
sporocytes at various stages of division were obtained in the greenhouse 
from two plants of each chromosome 10 constitution. First division cells 
were examined for the occurrence of bivalent configurations, that is, 
associations of two chromosomes joined by a chiasma. Since no metaphase 
plate is formed during first division in haploid pollen mother cells, it 
is difficult to distinguish anaphase I from metaphase I. Only those 
cells in which several univalents were seen passing to the poles were 
scored. At this stage the two chromosomes of a bivalent can be seen dis-
joining but connected by a bridge resembling a delayed chiasma. Normally, 
maize haploids possess ten chromosomes. However, all of the plants used 
in this study had eleven chromosomes including the normal complement of 
ten plus one B-chromosome also contributed by the maternal parent.

The frequency of bivalent configurations at metaphase I-anaphase I in 
k10 and K10 haploids was determined and the data are presented in Table 
1. One bivalent occurred in approximately 14% of the microsporocytes 
from both k10 and K10 plants. Two cells from each type of haploid were 
found to have two bivalents while one cell from a K10 haploid had three 
bivalents. A total of 51 bivalents, or an average of 0.15 per cell, was 
observed among the cells from K10-carrying haploids. This is not
Table 1

The frequency of bivalent configurations at anaphase I in microsporocytes from k10 and K10 maize haploids containing one B-chromosome

<table>
<thead>
<tr>
<th>Chromosome 10</th>
<th>Plant no.</th>
<th>11 uni.</th>
<th>9 uni. plus 1 biv.</th>
<th>7 uni. plus 2 biv.</th>
<th>5 uni. plus 3 biv.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>k10</td>
<td>167-3</td>
<td>120</td>
<td>18</td>
<td>1</td>
<td>0</td>
<td>140</td>
</tr>
<tr>
<td></td>
<td>168-7</td>
<td>169</td>
<td>31</td>
<td>1</td>
<td>2</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>289</td>
<td>14.37±1.90</td>
<td>0.59±0.41</td>
<td>0.29±0.29</td>
<td>341</td>
</tr>
<tr>
<td>K10</td>
<td>167-4</td>
<td>100</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>168-4</td>
<td>195</td>
<td>27</td>
<td>2</td>
<td>0</td>
<td>224</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>295</td>
<td>13.66±1.86</td>
<td>0.58±0.41</td>
<td>0</td>
<td>344</td>
</tr>
</tbody>
</table>
significantly different from the controls with a normal chromosome 10
where an average of 0.16 bivalents per cell was found.

Bivalent associations in haploids have usually been interpreted as result-
ing from crossing over between duplicate segments present in different
chromosomes. If the B and K10 chromosomes had homologous regions that
would pair with subsequent chiasma formation, bivalents would be expected
to occur more frequently in haploids with K10 than in those carrying the
normal chromosome 10. However, the similarity in bivalent frequencies
in the two types of haploids fails to lend support to the hypothesis that
the extra chromatin of the K10 chromosome came from a B type. Prophase
associations have been observed to occur between the two chromosomes at
meiosis in diploids (Ting MNL 33:37; Rhoades and Dempsey MNL 33:58).
However, these adhesions may represent non-specific attraction of the
heterochromatin present in both chromosomes.

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1. Transfer of ae wx to sweet corn by the translocation method.¹

Dr. R. G. Creech has found that the amylose extender gene (ae), in addi-
tion to changing amylose content of the endosperm, causes a substantial
increase in sugars and reduction in starch. He found also that ae com-
bined with wx (waxy gene) and du (dull gene) wx, causes a very high in-
crease in sugars and reduction in starch. Preliminary post harvest
studies by Dr. E. V. Wann indicate that starch accumulation in the
mutant gene types is much lower than that in normal su corn. These
findings were of sufficient promise to encourage the transfer of ae
and wx to standard su inbred lines.

The transfer of ae and wx requires that after the first backcross to
the recurrent su parent, each succeeding backcross must be selfed in
order to isolate the Ae ae Wx wx genotype for further backcrossing. At
the 5% probability level, at least 10 BC plants must be selfed to be
certain of detecting the double heterozygote. In order to save time,
paired selfs and backcrosses can be made simultaneously. The efficiency
of this system based on the number of ears saved from the numbers of ears
needed is 5%.

With the thought of increasing the efficiency of conversion, an ae wx
homozygous translocation line was developed at the University of Maryland
from an Ae wx translocation obtained from the Maize Genetics Coop.
Linkage data show that ae is separated from wx by 11.5 ± 0.5 units.

¹Scientific Article No. A1343, Contribution No. 3903 of the Mary-
land Agricultural Experiment Station.