5. Differences in \( \delta \) and \( \varphi \) transmission for heterozygotes involving
the \( wx \varphi \) translocation series.

The backcrosses described above were produced from crosses in
which the \( F_1 \)'s were used as either \( \varphi \) or as \( \delta \) parents, the deciding
factor being the presence or absence of \( \varphi \) in the \( F_1 \). Only the homo-
zygous \( bz^m \) seeds were classified for \( M \) and \( Wx \) hence \( Wx \) vs \( wx \) counts
represent only half of the seed produced and the results may be sus-
ceptible to a certain amount of error on this account. However, with
this reservation, it is possible to measure transmission of each
\( wx \) marked translocation through \( \varphi \) and \( \delta \) gametes. The results listed
below show two things (1) linkage of \( bz^m \) to \( T \) 1-9(h995) on the long
arm of chromosome number 1 as shown by reduced transmission of \( bz \) \( wx \)
gametes in both female and male. (2) An overall increase in trans-
mision of \( Wx \) carrying gametes through the female side.

Frequency of starchy vs waxy seeds from a cross of \( Twx/N \ Wx \times N \ wx \)
showing differences when heterozygote is used as female or as male.

<table>
<thead>
<tr>
<th>Translocation</th>
<th>( Wx )</th>
<th>( wx )</th>
<th>( Wx/wx )</th>
<th>( Wx )</th>
<th>( wx )</th>
<th>( Wx/wx )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9c</td>
<td>5573</td>
<td>3270</td>
<td>1.70</td>
<td>1606</td>
<td>1198</td>
<td>1.07</td>
</tr>
<tr>
<td>1-9(h995)</td>
<td>1167</td>
<td>389</td>
<td>3.00</td>
<td>5448</td>
<td>2062</td>
<td>2.64</td>
</tr>
<tr>
<td>2-9b</td>
<td>1036</td>
<td>727</td>
<td>1.43</td>
<td>1711</td>
<td>1990</td>
<td>.086</td>
</tr>
<tr>
<td>3-9c</td>
<td>850</td>
<td>651</td>
<td>1.27</td>
<td>2112</td>
<td>1807</td>
<td>1.19</td>
</tr>
<tr>
<td>4-9g</td>
<td>1696</td>
<td>1233</td>
<td>1.38</td>
<td>2267</td>
<td>2327</td>
<td>.97</td>
</tr>
<tr>
<td>5-9c</td>
<td>1031</td>
<td>776</td>
<td>1.33</td>
<td>2678</td>
<td>2616</td>
<td>1.02</td>
</tr>
<tr>
<td>6-9b</td>
<td>1518</td>
<td>1647</td>
<td>1.08</td>
<td>2083</td>
<td>2148</td>
<td>.97</td>
</tr>
<tr>
<td>7-9a</td>
<td>2565</td>
<td>2324</td>
<td>1.10</td>
<td>2364</td>
<td>2128</td>
<td>.97</td>
</tr>
<tr>
<td>8-9d</td>
<td>1664</td>
<td>1310</td>
<td>1.27</td>
<td>709</td>
<td>745</td>
<td>.95</td>
</tr>
<tr>
<td>Totals</td>
<td>15562</td>
<td>10680</td>
<td>1.46</td>
<td>22556</td>
<td>19088</td>
<td>1.18</td>
</tr>
</tbody>
</table>

It is interesting to consider the possible causes of the latter.
The two most likely possibilities appear to be (a) that the duplica-
tion deficiency products of adjacent disjunction may be differentially
viable in the female (inviable in the male) such that the normal \( Wx \)
carrying chromosome is essential before a deficiency for another
chromosome can survive. This seems rather unlikely since the effect
is expressed for all 8 of the translocations listed. (b) that non-
disjunction occurs such that a 3:1 distribution of the members of the
translocation configuration is obtained and that the gametes with
extra chromosomes are transmitted through the female but not the male
and further that the gametes getting only one chromatid are completely
inviable in both. Such behavior would cause an increase in \( Wx \) gametes
as indicated below.
Thus whenever 3:1 distribution occurs 3/4 of the gametes produced carry Wx and this added to the usual equal distribution of gametes from alternate disjunction would increase the frequency of Wx individuals when the heterozygote was the female but not when the male.

If one considers the difference between male and female transmission in this experiment (24% or roughly 1/5) and if one attributes this to 3:1 distribution one can see that the frequency of such distribution must be high (since only 3/4 of the non-disjunction events give Wx carrying gametes). This can be calculated as 1/5 + 1/3 x 1/5 = 4/15 or 26.7%. In other words, 26.7% of the megasporocytes must undergo unequal distribution, an unexpectedly high figure for non-disjunction in translocations in general.

M. G. Nuffer

UNIVERSITY OF MISSOURI

and

UNITED STATES DEPARTMENT OF AGRICULTURE
Columbia, Missouri

1. The gene action sequence in anthocyanin synthesis.

Previous investigations by various workers have led to the following hypothetical gene action sequence (News Letter 31:138):

(C,R); In; A_1; Bz; A_2---------anthocyanin