1. The difference in Wx frequency between male and female gametes from Wx\text{Coe}/Wx90.

In 1963 a conventional genetic analysis of the heterozygote Bz +90 V/bz C+ v, ae ae showed an interesting difference in Wx frequency in the male and female gametes. When the heterozygotes were used as males onto the bz Wx\text{Coe} v, ae tester, 76 apparent Wx, ae recombinants were found in 133,358 kernels. This is a frequency of $57 \times 10^{-5}$. The weighted average of Wx frequency in the pollen of the heterozygotes was $75 \times 10^{-5}$. When heterozygous plants of the same genotype were used as female parents, 19 apparent Wx, ae recombinants were found in 94,158 kernels or a frequency of $20 \times 10^{-5}$. The probability that the observed distribution would be found if Wx gametes were equally likely for both male and female populations is 0.0001 (from expansion of the binomial distribution and summation).

The verification of the presumed recombinants was hindered by poor germination. Test pollinations (by bz Wx\text{Coe} v, ae) were obtained on only 36 plants. Of these 31 came from Wx, ae recombinants, 2 from Wx Ae contaminants, and 3 from Wx ae gametes. These latter could arise by heterofertilization events or misclassification.

The same type of test was repeated in 1965. Plants of the constitution Bz +90 V/bz C+ v, ae ae were used as male and female parents in crosses with the tester stock bz Wx\text{Coe} v, ae. When the heterozygotes were used as males, 18 presumed Wx ae were found in 35,497 kernels. This is a frequency of $51 \times 10^{-5}$. The weighted average of Wx in the pollen of the plants used as male parents is $72 \times 10^{-5}$. When the heterozygotes were used as female parents, 17 presumed Wx ae were found in 85,679 kernels or a frequency of $20 \times 10^{-5}$.

The agreement between the results of 1963 and 1965 indicates that the difference in Wx frequency between male and female gametes for Wx\text{Coe}/Wx90 heterozygotes is real and reproducible.

In tests with Bz Wx V/bz Wx V plants that are as closely related as possible to the Bz Wx90 V/bz Wx\text{Coe} v heterozygote, no differences were found for the bz Wx interval ($\sigma^2 20.0\%$ and $\phi 19.1\%$) or the Wx V interval ($\sigma^2 5.6\%$ and $\phi 5.4\%)$.

Oliver Nelson

2. Reconstitution of the $R^s$ allele.

Near-colorless aleurone mutants from $R^s R^s$ are associated with crossing over between outside markers and possess all
part of the paramutagenic action characteristic of the
parental allele. These facts suggest that the stippled
phenotype may depend on two or more components that are
separable by crossing over. Tests have been made for
reconstitution in various heterozygous combinations of
mutants derived from $R_{st}^+$, and an apparently successful test
involved the following alleles:

$R_{sc}^{cl113}$: Self color mutant from $R_{1st}$; nonparamutagenic.

$R_{sc}^{cl132}$: Self color mutant from $R_{1st}$; as paramutagenic
as $R_{st}$.

$R_{E}^{G(I)^2}$: Near-colorless aleurone, green plant mutant
isolated from $R_{RSt}$; unstable seed color giving
mutations to self color; stable plant
color. Mutants of this type are not associ-
ated with recombination when isolated from
$R_{FRSt}$ plants, also occur in $R_{st}^+R_{st}$ plants,
and are as paramutagenic as $R_{st}$.

$R_{E}^{G(I)^3}$: Near-colorless aleurone, green plant mutant
isolated from $R_{FRSt}$; stable seed color; unstable
plant color giving mutations to red plant.
Mutants of this type are associated with re-
combination when isolated from $R_{RSt}$ plants, and
are as paramutagenic as $R_{st}$.

The two near-colorless mutants were made heterozygous with
each of the two self color mutants, and plants of the four
heterozygous combinations were pollinated with $R_{E}^+$, wx pol-
len. Stippled kernels were selected from these ears and
grown out for verification. The results are shown in Table
1. Tests to definitely exclude the possibility of the
stippled kernels having resulted from pollen contamination
are not yet complete, but evidence to date makes this very
unlikely.

One of the three $R_{st}^+$ mutants isolated from $R_{sc}^{cl113}/R_{E}^{G(I)^3}$
was atypical in phenotype, the colored spots being smaller than
those characteristic of the standard $R_{st}^+$ allele. The two
$R_{sc}$ alleles were not tested for back mutations to $R_{st}^+$ in
homozygous plants, but McWhirter (MGNL 35:142) tested 98 $R_{sc}$
mutants for back mutations to $R_{st}^+$ and none were recovered
in over one million gametes.

Positive verification of the reconstitution of $R_{st}^+$ in cer-
tain of the heterozygous combinations would indicate that:
(1) the stippled phenotype is dependent on two or more
genetic components, (2) the components of $R_{st}^+$ can be
separated and reassembled by crossing over, (3) the com-
ponent(s) of $R_{st}^+$ carried by the near-colorless crossover
mutant was complementary to the one(s) carried by the $R_{sc}$
mutants, (4) the component(s) of $R_{st}^+$ carried by the
near-colorless noncrossover mutant, if any, was not complementary to the one(s) carried by the $R^{sc}$ mutants, (5) mutations of $Rst$ to $R^{sc}$ and to near-colorless alleles not associated with crossing over involve alterations of a common $Rst$ component, (6) paramutagenic and nonparamutagenic $R^{sc}$ mutants carry the same unaltered components of $Rst$, and (7) secondary changes may occur in the separation and reassembling of $Rst$ components as evidenced by the altered phenotype of one of the reconstituted $Rst$ alleles.

Table 1

<table>
<thead>
<tr>
<th>Combination of alleles</th>
<th>Total No. of kernels scored</th>
<th>No. of stippled kernels selected as $Rst$ mutant verified</th>
<th>Non-</th>
<th>Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R^{sc113} / R^{E}(I)^3$</td>
<td>24,459</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>$R^{sc113} / R^{E}(I)^3$</td>
<td>14,877</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>$R^{sc113} / R^{E}(I)^2$</td>
<td>28,033</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$R^{sc113} / R^{E}(I)^2$</td>
<td>19,952</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$R^{E}(I)^3 / R^{E}(I)^3$</td>
<td>22,260</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$R^{E}(I)^2 / R^{E}(I)^2$</td>
<td>32,155</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

R. B. Ashman

3. Seed color mutations from $R^{sc}$ heterozygotes.

Three general classes of mutations to or toward colorless aleurone in $R^{sc} / Rst$ plants have been identified: near-colorless aleurone, green plant; near-colorless aleurone, red plant; and colorless aleurone, red plant. The near-colorless, green mutants do not form a homogeneous group, varying in seed and plant color stability and in their association with recombination between outside markers. Tests have shown that near-colorless mutants possess either all or part of the paramutagenic action of $Rst$, and that colorless mutants are nonparamutagenic. The apparent association between the near-colorless phenotype and paramutagenic action was examined further in the following test.