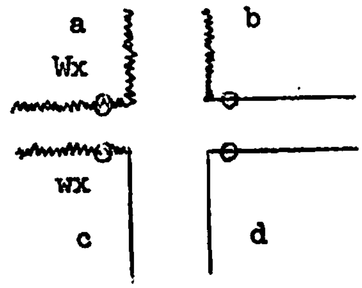
5. Differences in ♀ and ♂ transmission for heterozygotes involving the wx 9 translocation series.

The backcrosses described above were produced from crosses in which the F_1's were used as either ♀ or as ♂ parents, the deciding factor being the presence or absence of r in the F_1. Only the homozygous 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 susceptible 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 ♀ and ♂ gametes. The results listed below show two things (1) linkage of bz^m_2 to T 1-9(4995) 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 transmission of Wx carrying gametes through the female side.

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

Translocation	female Wx	female wx	Wx/wx	male Wx	male wx	Wx/wx
1-9c	5573	3270	1.70	1606	1498	1.07
1-9(4995)	1167	389	3.00	5448	2062	2.64
2-9b	1036	727	1.43	1711	1990	.86
3-9c	830	651	1.27	2142	1807	1.19
4-9g	1696	1233	1.38	2267	2327	.97
5-9c	1031	776	1.33	2678	2616	1.02
6-9b				1548	1467	1.08
7-9a	2565	2324	1.10	2083	2148	.97
8-9d	1664	1310	1.27	2364	2428	.97
9-10b				709	745	.95
Totals	15562	10680	1.46	22556	19088	1.18

It is interesting to consider the possible causes of the latter. The two most likely possibilities appear to be (a) that the duplication 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.



disjunction product	wx constitution
a b d	Wx
b d c	wx
d c a	Wx wx
c a b	Wx wx

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 $1/5 + 1/3 \times 1/5 = 4/15$ or 26.7%. In other words, 26.7% of the megasporocytes must undergo unequal distribution, an unexpcctedly high figure for non-disjunction in translocations in general.

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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