1. Linkage relations of some translocations in Cbromosomes 2 and 9.

In the course of studies on linkage relations of chromosome translocations in maize, data have been gathored on the genetic locations of translocations which on the basis of cytological observation were placed in the short arms of either Chromosome 2 or 9. Translocations involving Chromosome 2 were placed with relation to the genes lg_1, gl_2, B, sk_1, and v_4, while those in Chromosome 9 were placed with respect to the genes C, sh, and *wx*. Cytological positions have not yet been rechecked in those cases where genetical and cytological placement appear not to be in accord. With the Chromosom 9 translocations especially, accurate designation of the position of a translocation may be rendered difficult by the shortness of the chromosome and by the frequent occurrence of nonhomologous assosiation of the chromosomes. The cytological positions listed were determined by Dr. Longley and are based on calculations of three or more camera lucida drawings of what appeared to be the most characteristic configurations among those that could be analyzed.

In Table 1, data on several Chromosome 2 translocations are summarized. Translocations designated by small letters represent those given permanent symbols in previous publications or those assigned by Dr. Anderson in this issue of the News Letter. Others are designated by their temporary identifying numbors. For convenience in comparing cytological and genetic information, the translocations are listed in the order of their position from left to right in the chromosome on the basis of thair cytological placement. In some instances recombination values are also indicated for neighboring chromosome regions to indicate the degree of influence exerted by a translocation on linkage relations of adjoining genes. Recombination values in parentheses are based on a different total number of plants, the number being indicated in the second column to the right. Some of the translocations which appear from these data to be considerably to the right of sk may possibly be in the long arm of tho chromosome proximal to v_4.

In Table 2, the information on several Chromosome 9 translocations is summarized in a similar manner. In addition, the probable location of the translocation with respect to the short or long arm of the chromosome is indicated in several instances. In some cases this location will be evident from the linkage relations. In others, when the translocation is to the right of wx, it was still possible in certain instances to determine whether it is in the short region between wx and the centromere or whether it is in the long arm.

Adjacent-1 disjunction of the chromosomes from a heterozygous translocation at microsporogenesis gives rise to unbalanced gametic types which are duplicated for part of a chromosome arm and deficient for another. Pollen grains containing such duplicate-deficient complements often form readily-visible amounts of starch if the deficiency is not too detrimental. Pollen grains deficient for most of either the short or the long arm of Chromosome 9 form little starch, however. In some heterozygous translocations which involve Chromosome 9 and are closely linked to *wx*, partly-filled pollen grains are produced which carry an entire normal Chromosome 9 together with a duplication of

most of either the short or the long arm. If such a translocation is heterozygous for *wx*, with the *wx* allele carried on the normal Chromosom 9, something of the position of the translocation may be inferred. If the break is between wx and the centromere most of the short arm will be duplicated in the partly-filled pollen. Such pollen will contain both a *Wx* and a *wx* allele and will stain blue with dilute iodine solution. If the break is just to the right of the centromere, nearly all of the partly-filled pollen will carry the wx allele only, and be duplicated for most of 9L. Such pollen will stain red with iodine solution. Such pollen tests were applied in assigning the translocations to one arm or the other as indicated in Table 2. In the case of several of the translocations, the fact that the break points are not just to the left of wx was confirmed by showing that *C* and *wx* remain linked in the homozygous translocation.

As a result of crossing over between the *wx* locus and the point of translocation, partly-filled pollen of opposite staining reaction may result, the frequency of which may, in fact, be used as a measure of the *wx* - T distance.

In several of the translocations studied, duplicate-deficient eggs function and, when fertilized, give rise to plants having certain chromosome regions in triplicate. When test-crossed, genes carried in these regions give what appear to be trisomic ratios. Such plants have been useful in establishing or confirming the break points in several of the above translocations.

Table 1.
Translocations Involving Chromosome 2

Chromosome	Cytological Position in Chromosome 2	Linkage Relations				Number of Plants in Linkage Test	
						Values not in Parentheses	Values in Parentheses
2-3 e(a)*	S.64 (S.9)	T 0.4	lg 3.5	gl		283	
2-5 g	S.79	lg 6.9	gl 2.1	T 4.2	B	146	
2-3 5304-3	S.67	lg 7.3	gl 2.3	T (4.6)	B	217	109
2-3 c	S.40	gl 12.1	B 2.0	T 4.0	sk	199	
2-8 5483-4	S.36	B 11.9	sk 27.4	T (9.4)	v_4	201	117
2-3 6862-6	S.34	B 2.9	sk 8.7	T		69	
2-9 a	S.31	B 1.2	sk 1.2	T		81	
2-5 4741-4	S.30	B 4.2	sk 3.7	T		215	
1-2 5255-8	S.25	B 13.1	sk 9.3	T (3.7)	v_4	183	27
2-8 c	S.17	B 6.9	sk 13.9	T (2.0)	v_4	202	50
2-7 6372-2	S.13	B 7.5	sk 8.0	T 14.0	v_4	200	
2-5 e	S.12	B 13.1	sk 15.1	T (0)	v_4	199	45
1-2 4937-8	S.11	B 18.9	sk 14.7	T (6.4)	v_4	190	124

*This translocation stock, which was thought to be 2-3e, is probably 2-3a, whose cytological position as reported by Burnham is indicated in parentheses.

Table 2.
Translocations Involving Chromosome 9

Translocation	Cytological Position in Chromosome 9	Linkage Relations			Number of Plants in Linkage Tests: Values not in Parentheses	Number of Plants in Linkage Tests: Values in Parentheses	Probable Chromosome Arm
4-9 6222-1	S.82	C 3.3	T 0.3	sh 6.3 wx	368		S
3-9 5775-1	S.59	C 6.6	sh 11.0	wx 1.4 T	290		S
8-9 5300-3	S.41	C 3.4	sh 10.1	wx (0) T	209	283	S
8-9 7074-6	S.36	T 0.6	C (0.6)	sh(14.2)wx	179	499	S
1-9 4398-4	S.32	C 6.6	sh 15.3	wx(2.1) T	287	377	S
2-9 6656-4	S.32	C 1.1	sh 11.0	wx(1.4) T	91	209	
5-9 a	S.21	C 1.4	sh 9.1	wx 0.5 T	429		S
3-9 c	S.20	C 12.4		wx 1.2 T	161		L
6-9 4505-4	S.16	C 27.1		wx 2.9 T	210		L
8-9 6673-6	S.15	C 15.6		wx(2.9) T	160	347	L
5-9 5614-3	S.15	C 27.9		wx 2.1 T	240		L
1-9 4995-5	S.14	C 6.0	sh 16.1	wx(4.6) T	317	456	
4-9 5657-2	S.14	C 12.4		wx(1.8) T	242	443	
7-9 4363-1	S.11	C 11.6		T 2.3 wx	129		S
5-9 4817-7	S.08	C 23.2		wx 3.4 T	267		L

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