

5. Studies on preferential segregation involving In 3b and evidence of pseudo high negative interference.

It has been argued that preferential segregation caused by abnormal 10 takes place at the second meiotic division only when heteromorphic dyads (one chromatid knobbed and the other knobless) are present as a consequence of crossing over between the knob and the centromere. The data obtained previously have been consistent with this hypothesis. If a structural aberration reduced crossing over, a lesser degree of preferential segregation should occur since there would be fewer heteromorphic dyads. Studies where a piece of 3L was transposed to 9S and which resulted in marked reduction in crossing over in 9S, indicated that lower crossing over did indeed produce lower preferential segregation for loci in 9S. However, it was felt that further confirmation on this point was desirable. Therefore, plants heterozygous for K 10 and also heterozygous for In 3b were produced. The breakpoints of In 3b are in the long arm of 3 at positions .25 and .75. The loci gl_6 , lg_2 and A_1 were the marker genes in 3L, but only the Lg locus is included within the inverted segment. The following data were obtained when plants heterozygous for abnormal 10 and for a structurally normal chromosome 3 with a knob in 3L and In 3b were test crossed as the female parent.

K 10/k 10		In 3b gl Lg k A / N3 $G1$ lg K a				X	gl lg a	
(1)	(2)	(0)	(1-2)	(1-2)	(0)	(2)	(1)	
$G1$	$G1$	gl	gl	$G1$	$G1$	gl	gl	
Lg	lg	Lg	lg	Lg	lg	Lg	lg	
$\frac{A}{10}$	$\frac{A}{120}$	$\frac{A}{985}$	$\frac{A}{63}$	$\frac{a}{44}$	$\frac{a}{1005}$	$\frac{a}{95}$	$\frac{a}{21}$	$\Sigma = 2343$

$$G1-Lg = 5.4\%$$

$$Lg-A = 13.3\%$$

$$\% G1 = 50.3$$

$$\% lg = 51.6$$

$$\% a = 49.7$$

There is little indication of preferential segregation for the lg_2 and a_1 alleles carried in the knobbed chromosome. The proximal breakpoint of In 3b lies in that portion of the arm in which crossing over is normally low and few crossovers in the proximal uninverted segment occurred to form heteromorphic dyads. The observed results are in agreement with the hypothesis that heteromorphic dyads are essential for preferential segregation.

An interesting feature of the above data is the coincidence value for double crossovers in the $G1-Lg$ and $Lg-A$ intervals. In structurally normal plants heterozygous for the $G1$, Lg and A loci a coincidence value of approximately .8 has been found, but in the above data the coincidence is 5.7. This might be mistaken for a case of high negative interference were it not known that we were dealing with a heterozygous inversion. The high percentage of double crossover strands is due solely to the fact that all single exchanges within the loop give deficient crossover chromatids while the double crossover chromatids (from 2 and 3 strand doubles) give viable spores. It may be surmised that some of the reported examples of high negative interference have a basis in cryptic inversion heterozygosity.

Sister plants of the above but lacking abnormal 10 were test crossed and gave the following data:

k 10/k 10		In 3b	gl Lg	k A/ N3	G1 lg	K a	X	gl lg a
(1)	(2)	(0)	(1-2)	(1-2)	(0)	(2)	(1)	
G1	G1	gl	gl	G1	G1	gl	gl	
Lg	lg	Lg	lg	Lg	lg	Lg	lg	
$\frac{A}{3}$	$\frac{A}{46}$	$\frac{A}{463}$	$\frac{A}{3}$	$\frac{a}{7}$	$\frac{a}{493}$	$\frac{a}{45}$	$\frac{a}{1}$	$\Sigma = 1061$

$$G1-Lg = 1.3\%$$

$$Lg-A = 9.5\%$$

$$\% G1 = 51.7$$

$$\% lg = 51.2$$

$$\% a = 51.4$$

Here again one could conclude that there was high negative interference since the coincidence value is 7.8 but, as with the K 10 data, the high percentage of observed doubles is due to the elimination of all single crossover chromatids within the inversion.

M. M. Rhoades

INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE
Rabat, Morocco

1. Research for "Restorers" among Moroccan corn populations.

Corn populations collected from different parts of Morocco were crossed to the male-sterile single hybrid M 13 R^T MS x W 64 A, the tester being pollinated with a mixture of pollen from 10 plants per population. Eighty-four crossings were effected and their progenies examined for fertility of tassels. These were arranged in three groups: sterile, semi-sterile and fertile. The results of these observations are indicated in Table 1.

Table 1
Results of the Crosses

Population number	Localities	Progenies			
		Fertile	Partially sterile	Total plants	Percent sterile
1	Berrechid	28	9	102	63.7
3	Rabat	4	12	107	85.0
4	Salé	13	15	104	73.0
6	Basse-Moulouya	10	17	107	74.7
8	Rharb	0	1	50	98.0
9	Basse-Moulouya	24	27	108	52.7
10	Doukkala	33	23	110	49.0
12	Fès-Meknès	7	4	50	78.0
14	Taza	34	16	112	55.3
17	Ouezzane	20	7	106	74.5