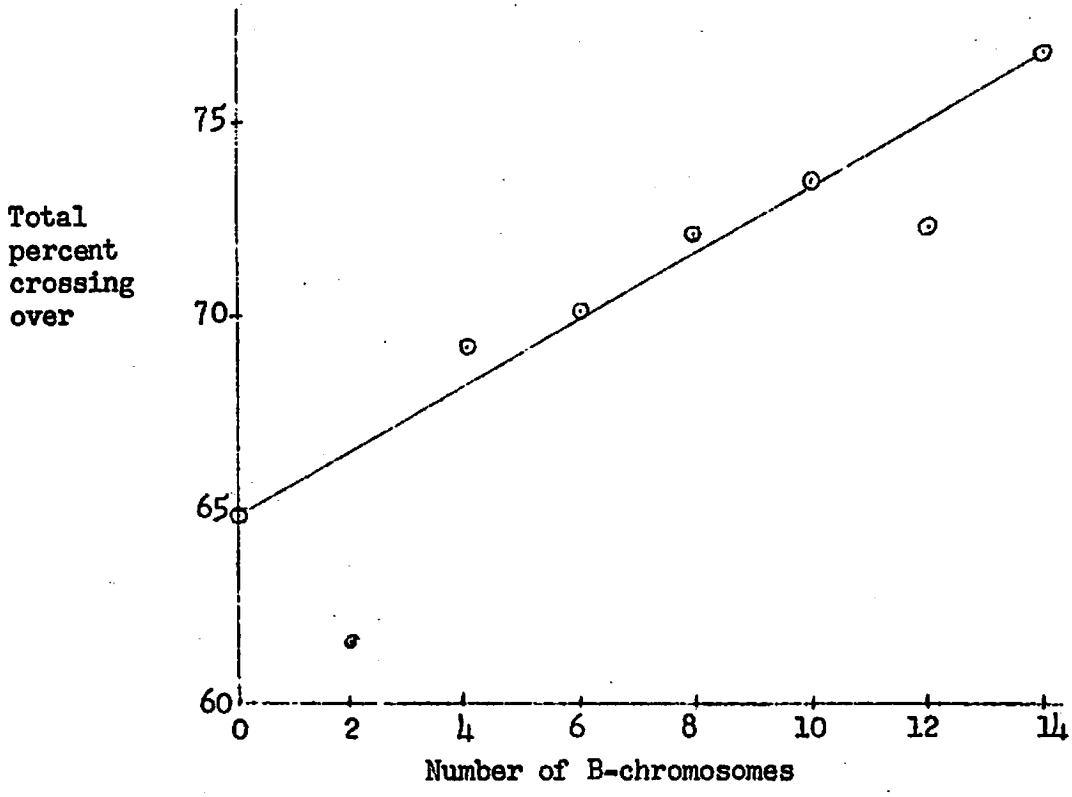

George P. Hanson

2. Further studies with heterozygous inversions in chromosome 3.

The paracentric inversion In 3b has breakpoints at positions .25 and .75 in the long arm of chromosome 3. Backcross data from In 3b heterozygotes presented in the 1956 News Letter gave the following recombination values:

Gl_6-Lg_2	0.57%
Gl_6-A_1	9.7%
Lg_2-A_1	9.6%
A_1-Et	17.7%

It is apparent that the A locus is distal to point .75 in the long arm, but the close linkage of Gl with Lg could arise if both loci were included in the inversion or if Gl were in the proximal uninverted segment. In order to delimit more precisely the cytological location of Gl, plants homozygous for In 3b and heterozygous for the Gl and A loci were testcrossed as shown below:

$$\frac{gl\ In\ A}{Gl\ In\ a} \times gl\ a$$

gl A	Gl a	gl a	Gl A	
193	165	127	180	$\Sigma = 665$

The 46.2% of recombination between Gl and A indicates that Gl is in the proximal uninverted segment. A much lower recombination value

would be expected if the Gl locus were included in the inversion because it would then be placed relatively closer to the A locus. The A locus is distal to point .75 and proximal to .95 in the long arm.

Paracentric inversion In 3c has breakpoints very near the centromere and the tip of the long arm--i.e., the inverted segment includes nearly all of the long arm. The frequencies of PMC's with two bridges and two fragments (arising from 4-strand doubles) in the In 3a, In 3b, and In 3c heterozygotes are as follows:

In 3a = 1.2%
In 3b = 1.0%
In 3c = 8.5%

The much higher percentage of 4-strand doubles in In 3c heterozygotes indicates that double crossovers arising from 2- and 3-strand doubles should be relatively frequent. The following data from a small test-cross show that this is so. The Gl, Lg and A loci appear to be included within the inverted section. Linkage data from homozygous inversion plants which are heterozygous for the Gl Lg A loci will be decisive in determining if these loci all are in the inverted segment.

In A Lg Gl / N gl lg a X gl lg a Σ = 526

(0)	(0)	(1-2)	(1-2)	(1-3)	(1-3)	(1-4)	(1-4)	(2-3)	(2-3)	(2-4)	(2-4)	(3-4)	(3-4)
In	N	In	N	N	In	N	In	In	N	In	N	In	N
Gl	gl	Gl	gl	gl	Gl	Gl	gl	Gl	gl	gl	Gl	gl	Gl
Lg	lg	Lg	lg	Lg	lg	Lg	lg	lg	Lg	lg	Lg	Lg	lg
A	a	a	A	A	a	A	a	A	a	A	a	A	a
268	200	3	11	1	3	1	4	14	11	8	0	2	0

M. M. Rhoades

3. Linkage studies with chromosome 3.

Two backcrosses were made of F_1's segregating for lg_2 na_1 a_1. F_1 plants of family 24575 had knobless chromosomes 3 while F_1 plants of family 23529 were heterozygous for a large knob at 3L .6. The two families are not closely related; one of the parents of 24575 was inbred KYS which is not present in the 23529 material. The backcross data are presented below. The order of the genes is lg-na-a. Previous studies with heterozygous knobs have shown that crossing over is reduced in regions near the knob. The finding of a higher Lg-Na value and a lower Na-A value in K3/k3 plants might be taken to indicate that the knob is distal to na. However, comparisons of the two sets of data are not valid because of the different genetic backgrounds.