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1. Genetic modifiers affecting the rate of chromosome loss induced by B chromosomes.

In discussing the results of experiments on the loss of knobbed A chromosomes or knobbed arms induced by B chromosomes (MNL 1969), we stated that the bulk of our data came from the original line in which loss was first observed and that a number of problems remained to be resolved. Among these are: (1) what is the effect of the genetic background on the rate of loss, (2) are B chromosomes from unrelated strains as effective in inducing loss as the B's of the high loss strain, and (3) is the rate of loss knob specific? In the 1969 News Letter preliminary data were presented on the frequency of loss of the  $A_1$  allele in the male gametes of  $F_1$  plants derived from a cross of a Black Mexican plant with nine B's onto the silks of an individual with one B from the high loss line. The low loss rate in  $F_1$  plants with 5-7 B's could be attributed either to modifying genes for low loss rate contributed by the Black Mexican parent or to the ineffectiveness of the Black Mexican B chromosomes in inducing loss of the knobbed chromosome 3. Experiments conducted in the summer of 1969 permit some clarification of the above problems. Data comparable to those given in the 1969 News Letter were obtained from  $F_1$  plants from the cross of a Black Mexican strain with B's by a high loss plant with no B's; in contrast to the earlier test, these  $F_1$  individuals received B chromosomes only from the Black Mexican parent. The data produced when the  $F_1$ 's were used as pollen parents on an  $a_1$  tester are as follows:

Plant	No. of B's	% $A_1$ loss	Population
30119-5	5	3.1	767
" -1	4-5	2.7	336
" -4	5	1.3	479
" -8	5-7	2.4	1595
" -11	6	1.3	1079

These results are similar to those reported in 1969 and unequivocally demonstrate that B's from Black Mexican can induce loss. However, they permit no discrimination between the hypotheses of inefficient

B's and modifiers for a low loss rate. Convincing evidence for genetic modifiers came from tests of individuals derived from the backcross of O B high loss ♀ X  $\frac{\text{O B high loss}}{\text{Black Mex. with B's}}$  ♂. The progeny would on the average have  $3/4$  of their genes from the high loss line and all B's would be from Black Mexican. When two individuals from this cross, each homozygous for the large knob in 3L and with 6 B chromosomes, were used as the pollen parent in crosses with  $\underline{a}_1$  testers the following results were obtained:

Plant	Constitution	<u>A</u> kernels	<u>a</u> kernels	$\Sigma$	% <u>a</u>
30123B-10	6 B's K3L/K3L	2201	224	2425	9.2
" -12	6 B's K3L/K3L	2067	76	2143	3.5

The 9.2% rate of A loss approaches that previously found for 6 B plants in the high loss line. It can be concluded that the ensemble of B's from the Black Mexican strain induces chromatin loss as readily as do the B's of the high loss line although differences may exist between members of the two pools. The difference in loss rate between plants 10 and 12 cannot be attributed to sampling errors and must reflect differences in genetic modifiers present in the two sister plants.

We believe that we have at least a tentative answer to the first two questions raised in the opening paragraph of this report. The remaining question is that of knob specificity. We know that in knobbed/knobless heterozygotes, it is the knobbed chromosome that is preferentially eliminated but we have no information as yet on the loss rate of different sized knobs or if knobs of the same size from different strains will have an identical response to B chromosomes. However, we have demonstrated that the loss of the terminal knob on 9S can be induced by B chromosomes. When plant 30115-5, with three B chromosomes and two chromosomes 9 each with the C allele and a large knob on the tip of 9S, was used as the pollen parent in crosses with a c tester there were 68 kernels with the recessive c phenotype in a total of 1080 (6.3%). This is a loss rate slightly higher than the 4.9% reported in the 1969 News Letter for the loss of the A allele from a knobbed chromosome 3 in a plant with three B chromosomes. Clearly, the large knob on 3L is not unique in its response to elimination by B chromosomes.

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