

reciprocal mating gave 225 colored:80 colorless (73.8% A). These data, limited though they are, suggest that pairing was not at random in the structurally heterozygous triploid but tended to occur preferentially between the two In 3b chromosomes. If these two chromosomes always formed a bivalent and disjoined normally, only colored kernels would be found in backcrosses. If pairing between the three chromosomes were at random, then the ratio of colored: colorless kernels should be that found in the control matings with structurally identical chromosomes. The observed data fall between these two extremes and are indicative of some degree of preferential pairing. These data are of interest in connection with the problem of pairing in allopolyploids with partially homologous chromosomes.

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3. Further studies on the Li pericentric inversion in chromosome 9.

Li reported (M. N. L. 1950) that the break points in In 9a were at 0.7 in 9S and 0.9 in 9L. The sh locus was distal to the break point in 9S while wx was included in the inverted segment. Crossovers within the inversion loop give rise to two kinds of deficient-duplicate chromosomes. One is a Dp 9S Df 9L chromatid which has in duplicate the distal .3 of 9S and is deficient for the terminal .1 of 9L. The complementary duplicate-deficient strand is Df 9S Dp 9L. This chromatid is deficient for the distal .3 of 9S and has the distal .1 of 9L in duplicate. Li found that 2.4 percent of the functioning megaspores had the Df 9S Dp 9L chromosome. No statement was made about the functioning of the Dp 9S Df 9L megaspores. The following data afford additional information on the cytogenetics of this inversion:

<u>Sh Bz In Wx</u>		X		sh bz wx pollen					
sh	bz	N	wx						
Sh	sh	Sh	sh	Sh	sh	sh	Sh		
Bz	bz	bz	Bz	bz	Bz	bz	Bz		
<u>Wx</u>	<u>wx</u>	<u>Wx</u>	<u>wx</u>	<u>wx</u>	<u>wx</u>	<u>Wx</u>	<u>wx</u>	Total	
1104	1099	0	2	10	11	142	720	3088	
1834 Sh:1254 sh				1837 Bz:1251 bz				1257 Wx:1831 wx	

The greater number of Sh and Bz kernels compared to those homozygous for the sh and bz alleles is due to the large Sh Bz wx class which comes in large part from Dp 9S Df 9L gametes produced by crossing over within the inversion. It is evident that the Bz locus is distal to the break point in 9S. However the Sh Bz wx can also come from single exchanges between bz and the In and from 2- and 2-strand doubles within the inversion where one exchange is between wx and the break point in 9L. These should be relatively infrequent. The complementary class,

sh bz Wx, occurred much less frequently (142 vs 720) than the Sh Bz wx class. This is indicative that the Df 9S Dp 9L megaspores do not function as frequently as do the Dp 9S Df 9L spores.

Data from the reciprocal cross are as follows:

<u>Sh</u>	<u>sh</u>	<u>Sh</u>	<u>sh</u>	<u>Sh</u>	<u>sh</u>	<u>sh</u>	<u>Sh</u>	
<u>Bz</u>	<u>bz</u>	<u>bz</u>	<u>Bz</u>	<u>bz</u>	<u>Bz</u>	<u>bz</u>	<u>Bz</u>	
<u>Wx</u>	<u>wx</u>	<u>Wx</u>	<u>wx</u>	<u>wx</u>	<u>Wx</u>	<u>Wx</u>	<u>wx</u>	Total
754	540	0	0	13	9	31	40	1387

Here the Sh Bz wx and sh bz Wx classes are approximately equal in size since neither type of duplicate-deficient microspore develops into functioning pollen and both classes stem from singles between bz and the In or 2- and 3-strand doubles within the In where one exchange is between wx and the break point in 9L. In the female backcross the Sh Bz wx class constituted 23.3 percent of the progeny but only 2.9 percent in the male backcross. The difference may be ascribed to functioning Dp 9S Df 9L megaspores. Likewise in the female backcross the sh bz Wx class was 4.6 percent of the total while in the male backcross the percentage was 2.2. Here also the difference is due to functioning Df 9S Dp 9L megaspores which according to Li's data amount to 2.4% of the functioning ovules.

When plants heterozygous for this inversion were pollinated by bm pollen, some of the F₁ plants were phenotypically bm. These arose from functioning Dp 9S Df 9L megaspores which are deficient for the tip of 9L. The F₁ bm plants are hemizygous for the bm locus and show the bm phenotype. The bm locus can be placed in the distal end of 9L.

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4. Further studies on preferential segregation.

Plants of abnormal 10/normal 10 and K 3L/k 3L constitution were used as the female parent in crosses with a gl₆-lg₂-a₁ tester which had knobless chromosomes 3. (The symbol K 3L represents a chromosome 3 possessing the knob at position 0.6 in the long arm while k 3L denotes a knobless chromosome 3.) Both the K 3L and k 3L chromosomes of the female parent were carrying the G₁, L_g and A alleles. The A locus is distal to the knob while G₁ is proximal. The location of L_g with respect to the knob is uncertain as yet. Four types of F₁ plants are expected although not with equal frequencies inasmuch as both the abnormal 10 and K 3L chromosomes undergo preferential segregation. In a total of 50 F₁ plants which were studied cytologically for the presence or absence of the abnormal 10 and K 3L chromosomes, and from which backcross progenies were obtained, there were 25 plants