

The plant from Source A was of the genotype Iy/iy , Y/Y and W22 has the genotype iy/iy , Y/Y .

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1. Studies on the effect of temperature treatment on intergenic and intragenic recombination.

Plants heterozygous for T6-9b or for $wx^{90}wx^c$ were grown in a growth chamber with controlled temperature, light period and humidity. Temperature was maintained at 70°F (+2°F) at floor level (close to 75°F at sporocyte level); relative humidity varied between 85% (with light on) and 95% (with lights off); diurnal light period was 14 hours with a mixture of cool white fluorescent and incandescent lights. Each plant was grown in fresh "Carl Pool" potting soil; starting at the three-leaf seedling stage, each was fertilized once a week by addition of one teaspoon (in solution) of "Rapid Gro." Reasonably vigorous growth was achieved under these conditions. At sporocyte stage bracketing spikelet samples were removed from some tassel branches and fixed for stage determinations; the remainder of each tassel was carefully returned to the stalk and was either immediately heat treated, as described elsewhere (P.N.A.S. 55:44-50, 1966), or maintained at constant temperature as a control. Tassel branches (both bracket-sampled and intact) were then removed and fixed at intervals following initial sampling by 5, 24, 48, 72, 96 and 120 hours from plants heterozygous for T6-9b. Pollen samples were collected and fixed from treated and control $wx^{90}wx^c$ plants and will be examined for effects of treatment on interallelic recombination. Quartet stages from heterozygous T6-9b samples have been scored for frequency of normal nucleolus quartets. This quantity may be related to crossover frequency if it is assumed that the frequency of adjacent II distribution (from the ring of four translocation configuration) is inversely related to crossover frequency in the interstitial segment of the limb carrying the chromosome 6 centromere and if 6⁹ univalents are distributed at random with respect to the normal chromosome 6. Results are shown in Table 1. The results are not suitable for standard statistical analyses because of interplant heterogeneity and because of the number of sampling times from various plants where data are missing (where samples did not contain any quartet stage cells). The greatest and most consistent departures from means of treated plants and from control values were found in the 72 hour samples of treated plants. Cells fixed at quartet stage 72 hours after initial sampling are estimated to have been at premeiotic interphase at the time of treatment although the possibility that some were at early synizesis cannot be excluded. Data so far available from studies of stage duration, based on samples of adjacent spikelets removed at the beginning of the experiment and at the various intervals following, and on relative frequencies of the various stages, are

Table 1
Frequency of Normal Quartets

Plant No.	pretreatment		5 hours		24 hours		48 hours		72 hours		96 hours		120 hours		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
treated plants	1	$\frac{1882}{2608} = 72.2$	$\frac{1088}{1517} = 71.7$	$\frac{949}{1339} = 70.9$	$\frac{1194}{1615} = 73.9$	$\frac{280}{373} = 75.1$	-----	-----							
	2	$\frac{1516}{2060} = 73.6$	-----	-----	-----	-----	$\frac{1947}{2522} = 77.2$	$\frac{2009}{2655} = 75.7$	$\frac{1769}{2419} = 73.1$						
	3	$\frac{1896}{2483} = 76.4$	$\frac{741}{960} = 77.5$	-----	$\frac{1769}{2323} = 76.2$	$\frac{1899}{2350} = 80.8$	$\frac{1630}{2042} = 79.8$	-----							
	4	$\frac{1623}{2181} = 74.4$	$\frac{1118}{1536} = 72.8$	$\frac{1174}{1611} = 72.9$	$\frac{846}{1165} = 72.6$	$\frac{1801}{2311} = 77.9$	$\frac{1748}{2287} = 76.4$	$\frac{1546}{2092} = 73.9$							
	5	$\frac{1586}{2160} = 73.4$	$\frac{1541}{2098} = 73.5$	$\frac{1508}{2162} = 69.8$	$\frac{1550}{2187} = 70.9$	$\frac{1847}{2444} = 75.6$	$\frac{1580}{2262} = 69.8$	-----							
	Total	$\frac{8503}{11492} = 74.0$	$\frac{4488}{6111} = 73.4$	$\frac{3631}{5112} = 71.0$	$\frac{5359}{7290} = 73.5$	$\frac{7774}{10000} = 77.7$	$\frac{6967}{9246} = 75.4$	$\frac{3315}{4511} = 73.5$							
controls	1	$\frac{1894}{2528} = 74.9$	$\frac{1554}{2127} = 73.1$	$\frac{1885}{2604} = 72.4$	$\frac{1679}{2283} = 73.5$	$\frac{3324}{4568} = 72.8$	$\frac{1797}{2502} = 71.8$	$\frac{520}{706} = 73.7$							
	2	$\frac{1817}{2499} = 72.7$	-----	$\frac{662}{924} = 71.6$	$\frac{3151}{4296} = 73.3$	$\frac{2599}{3621} = 71.8$	$\frac{1507}{2042} = 73.8$	$\frac{1545}{2116} = 73.0$							
	3	$\frac{1495}{2124} = 70.4$	-----	$\frac{1262}{1832} = 68.9$	$\frac{1396}{2005} = 69.6$	$\frac{1575}{2260} = 69.7$	$\frac{1401}{1989} = 70.4$	$\frac{814}{1166} = 69.8$							
	Total	$\frac{5206}{7151} = 72.8$	$\frac{1554}{2127} = 73.1$	$\frac{3809}{5360} = 71.1$	$\frac{6226}{8584} = 72.5$	$\frac{7498}{10449} = 71.8$	$\frac{4705}{6533} = 72.0$	$\frac{2879}{3988} = 72.2$							

inadequate but suggest that the total duration of meiosis was of the order of 68 hours (synizesis 50 hours, pachytene 6 hours, diplotene through telophase II 6 hours, and quartet stage 6 hours). All of the figures are rough estimates of means with unestimated variances. (On the average the longer stemmed spikelet of a pair is slightly more advanced than the short stemmed, but is often found at the same or a slightly earlier stage.) The durations of the pachytene (exclusive of synizesis) through quartet stages may be such that some cells scored at quartet stage were treated at least partly at pachytene while others were past pachytene. Some scored at quartet stage in 5 hour samples, are thought to have passed through metaphase during treatment, and these may show a tendency for treatment at this stage to depress the frequency of normal quartets (effect on disjunction); data are too sparse for significance in this respect. Further tests for this effect are planned. Because the quartet stage scoring method has poor resolution and probably inherent sources of error, studies have been initiated to search for effects of temperature treatment on crossing over within and coincidentally within and proximal to heterozygous inversion 5083 where a more direct method of scoring crossover frequency and much better resolution are available. Other inversions may also be used.

M. P. Maguire

2. Incorporation of tritiated thymidine by microsporocytes of maize.

Preliminary experiments on tritiated thymidine (H^3 -TdR) uptake in maize microsporocytes have indicated that a major period of incorporation precedes the synizesis stage. Following submergence of freshly cut ends of tassel branches in a culture medium containing H^3 -TdR, label was frequently found in nuclei at premeiotic interphase and less frequently at synizesis in sporocytes from the first two or three spikelets above the cut. Nuclear label was found after incubation periods of 5 hours, 22 hours and 72 hours at temperatures of 23°C and 27°C in medium containing tritiated thymidine in concentrations of 6 μ C/ml (6.7C/mM), 10 μ C/ml (6.7C/mM), 3 μ C/ml (1.9C/mM) or 10 μ C/ml (1.9C/mM). The culture medium contained 4% sucrose, 1% casein hydrolysate, 2% Vogel's solution (containing trace elements, minerals and buffers) and 1% vitamin mixture (containing thiamin, riboflavin, pyridoxamine, pantothenic acid, PABA, nicotinamide, folic acid and lipoic acid). After the incubation period the tips of branches were washed and then submerged in test tubes of medium supplemented with 20 μ g/ml unlabeled thymidine for two hours. The material was then fixed in alcohol:acetic 3:1 mixture; anthers were squashed in aceto-carmin and prepared for autoradiography as described by Schmid (in Human Chromosome Methodology. Academic Press, New York, 1965). Maximum exposure of film was 20 days. The approximate stage of treated microsporocytes at the beginning of the experiment was estimated by observation of microsporocytes from bracketing spikelets, collected at that time and presumed to be nearly the same stage. No significant chromosomal incorporation of tritiated thymidine was found during pachytene or the latter half of synizesis. It is uncertain whether some of the label found in cells at synizesis might have been incorporated during earlier phases of this stage or in the