

6. In the case of trisomes, if the odd chromosome has an earlier time of synaptic activation than the standard chromosomes, then the frequency of sporocytes with an odd chromosome and one of the standard chromosomes activated will be greater than the frequency of sporocytes with the two standard chromosomes activated. Consequently, more synaptic associations between an odd chromosome and a standard chromosome will be formed than would be expected on a random basis.

If the time of synaptic activation of the odd chromosome is later than that of the standard chromosome, then there will be more standard-standard associations than at random.

In tetraploids, precocity or retardation of synaptic activation would produce only homogenetic associations. The phenomenon of "negative preferential pairing" is peculiar to trisomes.

7. The control of the time of synaptic activation is very mutable. Irradiation and chemical mutagens can shift the time (backward or forward) of synaptic activation.

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7. Telocentric 6L trisomes and their possible use in the commercial production of hybrid corn.

A preliminary report on this project has been given (MNL 46: 142-146). Additional data have been collected and will be presented.

The telocentric 6L chromosome arose spontaneously in a culture of primary trisomic 6, probably by the transverse division of a univalent chromosome 6 at meiosis.

The telocentric is apparently stable; conversion into an isochromosome has not yet been observed, but only 59 plants have been examined cytologically. It is possible that isochromosomes are formed in chimeric ($\underline{Y-y}$) kernels if the telocentric behaves like the B^9 chromosomes described by Carlson. Individuals from chimeric kernels have not yet been examined. However, some sort of change has been occurring in the telocentric chromosome because the trivalent frequency is quite variable and, perhaps related to this, the rates of male and female transmission are also variable.

A total of 1,024 P.M.C.'s from 11 plants was examined. The tri-valent frequency ranged from 35% to 62% with a mean of 48%. The chi square for homogeneity gives a p value of less than .0005.

The disjunction patterns of the chromosomes may be determined by examining the quartet stage. Quartets with two anucleolate spores are formed when the two normal chromosomes 6 go to the same pole. The frequency of these quartets has been determined in 21 plants. Out of a total of 7,483 quartets, 3.62% had two anucleolate spores. A chi square test for homogeneity gave a p value between .10 and .05.

The genetic data are summarized in Table 2.

Table 2

Cross	No. of plants	No. of gametes	%Y	%y
t6Y/y/y x y/y	522	163,809	31.30	68.70
y/y x t6Y/y/y	202	113,381	1.39	98.61
t6Y/t6Y/y/y x y/y	1	341	68.03	31.97
y/y x t6Y/t6Y/y/y	2	662	42.60	57.40

The chi square for the cases where the telocentric trisome is the male is very high, with a probability of less than .0001. The female data are not homogeneous; the rate of transmission of the t6/6 gametes seems to be heritable. One family had transmission rates all around 40%; another had rates around 25%. There seems to be no clear pattern.

The telocentric tetrasome or ditelocentric has been isolated. From the limited data, it appears that there is a high rate of quadrivalent formation which leads to the production of t6/t6, t6/6, and 6/6 gametes. Also, the 3 to 1 disjunction of the quadrivalent leads to t6, t6/6/6, t6/t6/6, and 6 types of gametes. Gametes with only the t6 chromosome do not function. When the ditelocentric trisome is used as the male parent, most of the functioning gametes are the 6 type. This is not desirable if the breeding scheme outlined in MNL 46 is to work. Structural differences must be introduced so that only 6/6 and t6/t6

bivalents are formed in the ditelocentric. This should be 20 times less difficult than the project of allotetraploidizing corn in which all 20 arms must be structurally differentiated. The telocentric has been crossed with inversions and translocations and has been irradiated.

Another problem is the transmission of $t6/6$ gametes in the male sterile maintainer stock (the telocentric trisome). Progeny tests indicate that the frequency of crossing over of the Ms onto the normal chromosomes is very low and this problem can be disposed of by the structural modifications mentioned above. The results of progeny tests of plants from Y kernels are given in Table 3. Diploid plants with Y/y are the result of crossing over. A large number of plants from Y kernels were found to be y/y, particularly when the telocentric came through the pollen. The telocentric is apparently lost.

Table 3

Cross	$t6Y/y/y$ and $Y/y/y$	Y/y	y/y	Total	% "cross- overs"	% cross- overs
$[t6Y/y/y \times y/y] \times YY$	570	5	7	582	0.86	0.54
$[y/y \times t6Y/y/y] \times YY$	264	39	44	347	11.24	0.30

Since only part of the population can be progeny-tested (the Y class), the figures in the % "crossovers" must be multiplied by the % Y and multiplied by 2 to estimate the true crossover frequency between Y and the centromere.

There are some grievous errors in the 1972 report. Among the progeny of the $ms/ms \times t6 \underline{Ms/ms/ms}$ there would be two crossover types $\underline{Ms/ms}$ and $\underline{Ms/ms/ms}$. While the trisomic would be in a lower frequency, it is probable that a few of the plants in the first column in Table 2 are of this type. If $t6\underline{Y/y/y}$ and $\underline{Y/y/y}$ plants are progeny-tested as the female they cannot be distinguished from each other.

Another error is the statement that the telocentric trisomic method of handling genic male sterility has an advantage over

Patterson's duplicate-deficient method because his method would lead to homogeneity of cytoplasm since the duplicate-deficient chromosome is not transmissible through the pollen. Obviously, the duplicate-deficient chromosome is not backcrossed into inbred lines, but the translocation is. The translocation is both male and female transmissible. The duplicate-deficient chromosome is extracted later.

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1. Relation of hydroxamic acid content (DIMBOA) to resistance to *Helminthosporium turcicum*.

In 1959, the cyclic hydroxamic acid 2,4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one (DIMBOA) was first reported in maize and has since been directly implicated in resistance to several pathogens. DIMBOA occurs naturally in the glucosidic form and is converted to the fungitoxic aglucone through mycelial penetration or mechanical injury.

The objectives of this study were to determine the amount of DIMBOA in thirteen inbred lines of corn utilizing the colorimetric procedure of Hamilton and to correlate DIMBOA concentration with resistance to *Helminthosporium turcicum* (northern corn leaf blight). Eleven inbred lines of maize obtained from R. Hallauer, Ames, Iowa, plus the two genotypes BxBx and bxbx obtained from R. H. Hamilton at Penn State University were used in this study. The bx allele designates plants deficient in DIMBOA whereas Bx is the normal allele. All of the eleven inbred lines were assumed to be carrying the Bx allele. Plants were grown in the greenhouse to 60-76 cm extended leaf height (height of the youngest leaf fully extended) for the colorimetric analysis for DIMBOA. One to two gram samples of whorl tissue were collected and extracted in ethanol. The extracts were concentrated and chromatographed by method of thin layer chromatography. Areas of spots containing DIMBOA were removed, eluted in ethanol, centrifuged and decanted into a cuvette. Upon addition of FeCl_3 , a blue color developed which was analyzed colorimetrically