

4. Irradiation of growing I Sh Bz Wx/C sh bz wx/C sh bz wx endosperms.

Irradiation of heterozygous growing endosperm allows detection of numerous losses of the dominant markers. When C sh bz wx plants were pollinated by I Sh Bz Wx pollen and then transferred to a gamma field for their entire post-fertilization life, the F_1 kernels showed phenotypes that mimicked those obtained from mutable alleles. Subsequently, we irradiated the fertilized plants for fixed periods such as 6-24 hrs, 24-48 hrs, 48-72 hrs and so on. The frequency of sectors or dots was counted on the mature kernels. The following general observations were made:

(i) The sector size is correlated with the time of irradiation. The earlier the irradiation, the larger the sector of loss or change.

(ii) There is practically no effect of irradiation about the time the aleurone-pigment genes express themselves. This suggests that the expression of I and C is unaffected and that all the changes that occur are due to a loss or a change in the genetic material.

(iii) Although the number of I losses can be estimated by counting the C sectors, the data are complicated by the varying number of nuclei or cells present at the time of irradiation, lethality etc.

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5. Cryptic deletion on the short arm of chromosome 9.

A locus has been detected on the short arm of chromosome 9 which completely prevents the transmission of the male gametes carrying it. The female gametes bearing it also have a slightly, but significantly, lower rate of transmission (Table 3). The position of the locus was mapped 1.13 map units distal to I. The four markers linked to this locus show a polarity of transmission, the transmission of I, Sh, Bz and Wx being 1.13%, 2.26%, 4.49% and 27.18% respectively. For I, it was verified that the transmitted gametes were due to crossing-over between I and the distorting locus. The basis of the aberrant transmission was considered to be either a mutation of a gametophytic factor or a cryptic deletion. Cytologically, no aberration was detectable and stainability of pollen was normal. The data, however, appear to be more compatible

Table 3

Transmission of linked factors through pollen and egg cells of heterozygote

$$\frac{I \text{ Sh Bz Wx}}{C \text{ sh bz wx}}$$

Kernel type	Cross				
	♀ $\frac{C \text{ sh bz wx}}{+}$ x $\frac{I \text{ Sh Bz Wx}}{C \text{ sh bz wx}}$ ♂			♀ $\frac{I \text{ Sh Bz Wx}}{+}$ x $\frac{C \text{ sh bz wx}}{♂}$	$\frac{I \text{ Sh Bz Wx}}{C \text{ sh bz wx}}$ ⊗
	Upper half	Lower half	Total		
* $\frac{I \text{ Sh Bz Wx}}{C \text{ sh bz wx}}$	26	25	51	1540	763
$\frac{C \text{ sh bz wx}}$	1603	1655	3258	1681	465
* $\frac{I \text{ sh bz wx}}{C \text{ Sh Bz Wx}}$	0	1	1	15	10
$\frac{C \text{ Sh Bz Wx}}$	42	38	80	17	30
* $\frac{I \text{ Sh bz wx}}{C \text{ sh Bz Wx}}$	0	0	0	9	-
$\frac{C \text{ sh Bz Wx}}$	26	38	64	9	17
* $\frac{I \text{ Sh Bz wx}}{C \text{ sh bz Wx}}$	0	0	0	283	117
$\frac{C \text{ sh bz Wx}}$	530	496	1026	308	308
* $\frac{I \text{ sh Bz Wx}}{C \text{ Sh bz wx}}$	0	0	0	2	2
$\frac{C \text{ Sh bz wx}}$	5	6	11	0	-
* $\frac{C \text{ sh Bz wx}}{C \text{ Sh Bz wx}}$	1	2	3	1	-
$\frac{C \text{ Sh Bz wx}}$	2	3	5	2	-
$\frac{C \text{ Sh bz Wx}}$	4	2	6	1	-
			4515	3868	1712

*In the presence of I, Bz or bz cannot be classified. The classification of Bz or bz given along with I is the more probable one.

with the deletion model since a slightly lower transmission through the female would be unexpected from a gametophytic mutation and the expected type of cross-sterility remains undiscovered.

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6. Electrophoresis of analogous enzymes in teosinte and maize-teosinte hybrids.

Six different races of teosinte (Chalco, Balsas, Guatemala, Huehuetenango, Nobogame and Central Plateau), a maize (Wilbur's flint) x teosinte hybrid and the parental maize line (seed of all these stocks was kindly supplied by Dr. H. G. Wilkes) were examined for analogous enzymes. Endosperms from dry seeds were extracted in 0.01 M sodium pyrophosphate and separated by disc electrophoresis. Esterases, peroxidases, alcohol dehydrogenase (ADH) and malate dehydrogenase (MDH) were investigated.

Esterase zymograms of the teosinte lines were not very different from those of maize (Wilbur's flint). Migration of the major esterase band relative to the front (Rf) was the same for teosinte and maize. The teosinte line Chalco showed a different esterase pattern from other races. Peroxidase zymograms of teosinte were different from maize. In teosinte race Guatemala, the major peroxidase band showed a different Rf value. MDH of teosinte and maize migrated to the same position. ADH activity could not be detected in the endosperm extracts from teosinte. The zymograms for the maize x teosinte hybrid were similar to the maize lines used as the female parent for all the enzymes considered. The limited electrophoretic data gathered so far suggest close structural homologies between teosinte and maize enzymes.

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7. Buoyant density in cesium chloride of DNAs of maize and teosinte.

DNAs from maize and teosinte (races Chalco, Balsas, and Guatemala) when banded in cesium chloride density-gradients yielded only a single peak in each case. Both ^{32}P -labelled maize DNA and ^3H -labelled teosinte