

It is obvious from the results set forth in Table 1 that the hybrids between A158 and Nobogame teosinte have a general tendency towards polystichous arrangement whereas those between modified derivatives and Nobogame show more tendency towards distichous arrangement. This demonstrates the fact that both types of derivatives carry concealed genes for distichous arrangement which is one of the distinguishing characteristics of teosinte and Tripsacum. Most of the "Tripsacum" derivatives, however, fail to show single spikelets. It is possible that Nobogame teosinte which is one of the most maize-like of the teosinte varieties, has failed to produce a threshold effect for this character. Crosses with Florida teosinte have been made during the past summer to see whether this teosinte would, in crosses, expose the hidden features in "Tripsacum" derivatives.

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1. Proembryo irradiation to produce blue-fluorescent and albino seedlings.

Maize plants were given approximately 750 r of gamma radiation (cobalt⁶⁰) at various times after pollination in order to produce chimeras in embryos, sectored for chlorophyll or carotenoid deficient phenotypes and normal tissue.

In one experiment the resulting embryos heterozygous for factors on chromosome 9 from the following cross were irradiated at various periods after pollination: wd* - C - sh - bz - wx/Yg₂ - C - Sh - Bz - wx (McClintock's rearranged chromosome*) X wx - Bf₁. The kernels from 10 ears of the treatment above were grown and the number of albino and blue fluorescent seedlings was observed. The loss of wild-type markers was independent in these two cases since these factors were on different homologous chromosomes. The results are given in Table 1.

Table 1. Frequency of seedling mutants resulting from irradiated proembryos.

Total seeds	Phenotype of seedlings				Period after fertilization of 750 r treatment
	wd +	wd Bf ₁	+ Bf ₁	+ + gl**	
723 (percent)	4 0.55	2 0.27	8 1.1	--	28 - 45 hours
596 (percent)	--	--	1 0.16	1** 0.16	52 - 68 hours

*See McClintock (1941) Genetics 26: 234-282 and (1944) Genetics 29: 478-502.

**Sectored seedling, 1/2 glossy and 1/2 non-glossy.

All of the irradiated embryos were heterozygous for Bf_1 but only 1/2 were heterozygous for wd . The observed loss of each (Bf_1 to wd is 11 to 6) was about as expected according to their position on the long and short arms of 9. It should be noted that the blue fluorescent plants, hemizygous for Bf_1 , were fluorescent in leaves 1, 2, 3 and 4 at the time plants were taken to the field. As indicated by E. G. Anderson (M.N.L. 33,6) Bf_1 , Bf_1 plants fluoresce best in the first leaf and fluorescence greatly decreases in leaves that follow. Anthranilic acid appears to accumulate in greater amounts when Bf_1 is hemizygous.

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2. Patterns of sectoring in seedling with reference to early embryonic development.

From the studies of Stadler (1930, J. Hered. 21: 3-19) and Casper (M.N.L. 34,3) no sectored seedlings arose from ears irradiated during the first day after pollination. From the detailed account of early embryonic development presented by Randolph (1936, J. Agr. Res. 53: 881-916) one can deduce that sectored seedling could first be induced in the 6 or 8 celled embryo, which occurs at about 42 hours after pollination (maximum day temperature $27.5^\circ \pm 2.5^\circ$ C. and minimum night temperature $15^\circ \pm 2^\circ$ C.). A perfectly bilateral seedling could occur only when a transverse division had occurred (Fig. 4, G to N from Randolph, 1936), one cell carrying the dominant factor, the other deficient.

Preliminary observations of sectoring patterns have indicated that bilateral symmetry in seedlings is produced in proembryos irradiated 29 to 48 hours after fertilization. The plane of the leaf axis must be determined at this time because of the production of exactly bilaterally sectored seedlings having half green tissue on one side of the midribs and albino tissue on the other. During this 29 to 48 hour period, more completely albino seedlings were produced than seedlings with leaf area 1/2, 1/3, or 1/4 sectored. In one seedling the leaves were completely albino but the coleoptile was half green and half albino indicating that the "anlagen" of the coleoptile is also determined during this period.

These experiments were not designed to study the early embryonic development of maize but were done to obtain sectored plants for cytoplasmic inheritance studies with chlorophyll and/or carotenoid mutants (wd , $w - 8624$, w_3 and $pastel - 8549$) in the hemizygotic state. Out of the 6,057 seeds planted, only one wd -sectored plant survived to maturity giving an ear with 3 inviable seeds. The method may be sound but will require larger populations and special care of sectored plants to assure seed set.

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3. Mosaic phenotypes from endosperm nuclei irradiated after fertilization.

The endosperm nuclei begin to divide before the embryo divides. In the period of irradiation (750 r of Cobalt-gamma rays) 28 to 48 hours after fertilization, treated endosperm nuclei heterozygous for the factors Sh sh sh , Bz bz bz and Pr pr pr gave at least 10% kernels with mosaic endosperm.