

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.

The range of the size of endosperm mosaics varies from 1/2 to 1/4 or smaller of the endosperm. Some of the bz-sh phenotype were of the usual breakage-fusion-bridge-cycle products. Endosperm nuclei treated between 52 to 68 hours after fertilization gave seed of which at least half contained one or more small mosaic losses. Quantitative studies could very well be done at this stage because of the relatively large number of sectors and ease of identification.

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4. Studies on induced non-disjunction.

In the studies where losses of the short arm of chromosome 9 have been followed in the endosperm and aleurone layers, it has always been assumed that losses of C - sh - bz - wx genes are due to a break between waxy and the centromere. A loss of the entire chromosome 9 would give the same result.

A homozygous 5-9 translocation (Anderson and Longley's 7205) carrying a dominant marker was used to test this latter possibility. The break in the long arm of 9 is attached to the segment of 5 containing Pr. Irradiated pollen was crossed to the recessive C - sh - bz - wx, pr thereby permitting one to detect loss on both the short and the long arm of 9. Roughly about 1/10 of the losses of Wx also lost Pr. As expected, it appears that chromosome breakage between wx and the centromere does explain the majority of losses. Coincident losses of Wx and Pr can be explained by two separate detachments (i.e. dicentrics and centric rings) although a low frequency of complete chromosome loss cannot be ruled out.

Four different compounds were selected for tassel treatment because of their known properties and reactions with sulfhydryl groups. According to Mazia and others, sulfhydryl groups are reported to be involved with spindle function. The following compounds were used at the concentration indicated: 0.001 M $HgCl_2$, 0.005 or 0.0001 M $CuSO_4$, 0.002 M iodoacetamide and 0.01% betamercaptoethanol. Solutions of these compounds were injected with a hypodermic syringe into the tassel well after meiosis had occurred with the idea of disturbing the second pollen grain division. The desired situation was to get 11 chromosomes in one sperm and 9 in the other.

Pollen from treated plants was then crossed to recessive testers as follows: C - sh - bz - wx, pr, y X c - Sh - Bz - Wx - Wc - Pr, Y (homozygous 5-9 translocation). Aberrant kernels possessing the recessive phenotype were selected from 4,593 seeds and planted in order to test the possibility that the plants were trisomic for chromosome 9. Root tips were collected from each of the 29 plants which resulted. Backcrosses were made to the recessive tester to detect any evidence of trisomic-type ratios and contamination. Of the 24 plants checked out completely, all were diploid as far as chromosome 9 was concerned. No clear cut case for non-disjunction giving rise to trisomic plants was found.

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