♀ \ ♂	1/2(1-x) Wx 4^9a 9^4a	1/2(1-x) wx 4^9b 9^4b	x Wx wx 4^9a 9^4b	0 4^9b 9^4a
1/3 Wx 4^9a 9^4a	Wx	Wx	Wx	--
1/3 4^9b wx 9^4b	Wx	wx	Wx	--
1/3 Wx 4^9a wx 9^4b	Wx	Wx	Wx	--
0 4^9b 9^4a	--	--	--	--

G. G. Doyle

6. New sources of ae.

Two new sources of ae have been found in an exotic strain Bolivia 561, NRC No. 9815 and a South African open-pollinated variety, Potchefstroom Pearl, PI 221825.

M. S. Zuber

7. Mutants recovered in the selfed progeny of chemically and x-ray treated seeds.

In an earlier experiment (MNL 36, p. 57, 1962) Yg_2 yg_2 and Wd wd seeds were treated with ethyl methanesulfonate (EMS) and diethyl sulfate (DES). The frequent yellow-green and albino sectors on the leaves of the treated plants were regarded as phenotypic expressions of the mutation or loss of the dominant genes.

The purpose of the experiment reported here was to induce mutations in homozygous multiple dominant embryos using 5-bromouracil (5-BU) and maleic hydrazide (MH) in addition to the previously tested EMS and DES, and x-rays as a standard, to isolate the mutants through selfing, and subsequently to study the type and behavior of the mutants induced, thereby characterizing the genetic effects of the mutagens used.

Homozygous multiple dominant seeds were soaked with frequent stirring in the dilute solutions of chemicals (columns 1 and 2 in Table) for 8 hours at 25°C, and were rinsed before planting. For comparison a group of dry seeds were x-rayed with 10000 r. Only the EMS, DES and x-ray treated material showed moderate retardation of growth. In the EMS material frequent yellow-green and rare albino sectors, and in the x-rayed M_1 plants a few yellow-green sectors, occurred.

The treated plants were selfed (column 3 in Table) and approximately 1/3 of the seeds were planted. The emerging seedlings and the resulting M_2 plants were all normal in phenotype. However, some of the EMS and x-ray treated M_2 plants had approximately 50% normal and 50% empty pollen (column 4 in Table). The M_2 plants were selfed and after harvest the ears were examined for segregating endosperm mutants and for seedling mutants in the sand bench. All the endosperm and seedling mutants were recovered from one or more segregating ears with 3 normal : 1 mutant ratios, (columns 5 and 6 in Table). Two ears showed exceptional ratios. The segregating ear from the 5-BU treatment segregated 29 green : 42 albino : 4 green with albino sectors. One of the 3 segregating ears from the MH treatment yielded 5 green : 23 albino : 5 green with albino sectors. The green seedlings with albino sectors are not necessarily due to the treatments since such seedlings occurred in the M_2 control and in the progeny of x-rays, DES, EMS treated plants also (column 7 in Table). Allelic and linkage studies are in progress to identify and place the recovered mutants.

In the progeny of one EMS-treated plant 9 of 26 plants showed pollen abnormality. 13 ears of the same 26 plants also segregated for pr. Six such segregating ears were from plants with abnormal pollen, but this frequency of correspondence is expected by chance alone. In the progeny of the other EMS-treated plant, and in one x-ray treated plant, no mutations were detected, although they showed pollen abnormalities indicating gross chromosome aberrations.

The experiment indicates the following: (1) Changes induced by EMS are either gross chromosome aberrations not transmitted through the male gametophyte (inferred from pollen abnormality) or less drastic chromosomal changes which have been transmitted through the pollen at least once and were recovered in the homozygous condition. It is indeed remarkable that in the progeny of 6 EMS-treated plants 8 different mutants occurred, while with x-rays only 2 different mutants

were recovered in the progeny of 9 treated plants. (2) DES in this experiment induced no pollen abnormalities and was at least as effective a mutagen as x-rays at optimum dose. (3) MH and 5-BU perhaps both induced mutations which at present are suspected to be -- as one possible interpretation -- dominant.

The effect of chemical and x-ray treatments on homozygous multiple dominant seeds.

1	2	3	4	5	6	7
Treatment	Conc. M/l or dose (r)	No. of M_1 selfed plants	No. of M_2 plants with abnormal pollen	No. of segregating M_2 ears	No. and type of different mutants recovered	Fr. of green seedlings with albino sectors per 10^4 seedlings
DES	0.05	4	0/65	10/60	2 r, weak yellow green	41
EMS	0.075	6	11/155	42/138	8 *	3
5-BU	0.10	4	0/70	1/68	1 albino	7
MH	0.05	9	0/112	3/103	1 albino	32
x-rays	10000	9	6/74	2/78	2 albino	21
control		5	0/62	0/64	0	8

* pr, su, gl, a or c, dilute with abnormal endosperm and inviable embryo, dilute with normal endosperm and inviable embryo, 2 different weak yellow-greens.

G. Ficsor

8. Analysis of fertilization in diploid x tetraploid crosses.

The different possibilities of abnormality in corn fertilization are being investigated in marked crosses of diploid x tetraploid. Diploid females heterozygous for one gene in each of the ten chromosomes (bm_2, lg, a, su, pr, y, gl, j, wx, and g) were crossed by pr-tetraploid and Synthetic-B tetraploid males. The majority of seeds obtained were shrivelled and the germination was very poor. Seeds from 51 crossed ears were classified for size and endosperm markers and planted. Almost all of the shrivelled seeds failed to germinate. However, a good-sized population was obtained from the rest. 83 plants were tested by selfing and crossing to a multiple tester line.