Table 2
Progeny Test Confirmation of Induced Mutations

| Treatment | No. mutations observed | No. tested mutations germinated | No. mutations confirmed |
|---|---|---|---|
| wx mutations | | | |
| Fast Neutrons | 1 | 1 | 0 |
| Early EMS appl. | 27 | 27 | 27 |
| EMS injection | 3 | 3 | 2 |
| sh mutations | | | |
| Fast neutrons | 1 | 1 | 1 |
| Early EMS appl. | 25 | 21 | 17 |
| EMS injection | 2 | 2 | 1 |
| c mutations | | | |
| Fast neutrons | 3 | 3 | 2 |
| Early EMS appl. | 21 | 21 | 14(15) |
| EMS injection | 0 | - | - |

The interpretation that true gene mutations, free of major change in chromosome structure, may be produced in Zea mays by EMS is encouraged by: 1) induction almost exclusively of single locus mutations; 2) the high fertility of most mutants and normal segregation of chromosome 9 markers in some; 3) alternative explanations to deletion for the I→c mutations; and 4) preliminary evidence of recombination among induced wx mutants.

E. Amano
H. H. Smith

2. Mechanisms of genetic recombination.

In 1928 Stadler irradiated maize plants in meiosis and reported no significant effect on intergenic recombinations. Since O. E. Nelson has demonstrated intragenic recombination at the waxy locus in maize an opportunity is provided to determine the effects of irradiation on intragenic recombination.

Table 3
Parents and Heteroallelic Material. The Irradiated Values Are From One Plant, The Control Values From Several Plants.

| | Estimated no. microspores x $10^3$ | $\bar{X}$ no. Wx x $10^{-5}$ $\pm s_{\bar{x}}$ | Z value |
|---|---|---|---|
| Irradiated | | | |
| $wx^C$ | 162 | 3.70 ± 1.51 | |
| $wx^{90}$ | 217 | 2.77 ± 1.13 | |
| $wx^C$ x $wx^{90}$-1 | 66 | 22.55 ± 5.82 | -8.4441* |
| -2 | 61 | 57.49 ± 9.72 | -2.7318* |
| -3 | 87 | 89.74 ± 10.16 | 0.2121 |
| -4 | 50 | 52.21 ± 10.24 | -3.0841* |
| -5 | 94 | 84.43 ± 9.50 | -0.2706 |
| -6 | 112 | 41.01 ± 6.04 | -5.9058* |
| -7 | 69 | 66.22 ± 9.76 | -1.9262† |
| -8 | 64 | 122.33 ± 13.84 | 2.3776† |
| -9 | 48 | 53.73 ± 10.53 | -2.8829* |
| -10 | 49 | 60.73 ± 11.08 | -2.1886† |
| -11 | 40 | 103.19 ± 16.11 | 0.9399 |
| -12 | 42 | 50.38 ± 10.99 | -3.0606† |
| Control | | | |
| $wx^C$ | 166 | 2.42 ± 1.21 | |
| $wx^{90}$ | 395 | 0.76 ± 0.44 | |
| $wx^C$ x $wx^{90}$ | 362 | 85.69 ± 4.86 | |

* Exceeds .1% (.001) level of significance.

† Exceeds 5% (.05) level of significance.

Some of this work and the details of analysis have been reported by Briggs and Smith in MNL 38 (pp. 25-27). The $\underline{wx}^{0}$ x $\underline{wx}^{90}$ heteroallelic cross received 200 r of x-rays in meiosis. An effect on intragenic recombination is noted in that x-rays increase and decrease genetic recombination as compared to unirradiated plants (Table 3). A rough extrapolation of Stadler's data provides an estimate that he used doses of x irradiation up to approximately twenty times higher than those used here. His doses ranged from about 250 to 4000 r.

Maize and other organisms may have two mechanisms of genetic recombination, i.e., one for intergenic and one for intragenic recombination. If there are two mechanisms of genetic recombination in maize, the mechanism involved in intragenic recombination appears to be affected by irradiation, whereas the mechanism involved in intergenic recombination does not appear to be affected. Therefore, on the basis of an indirect comparison, there is some indication that there may be two mechanisms of genetic recombination in maize.

R. W. Briggs

3. Chemical mutagens on maize: Myleran.

In an experiment designed to investigate the mutagenicity of chemical mutagens on several endosperm genes on the short arm of chromosome 9, the agent Myleran (di-methane-sulphonyloxy-butane) was used. Myleran (m. w. 246.31) was investigated because its molecular relationship to ethyl methane-sulfonate (m. w. 124.16) is essentially that of two EMS molecules joined together, and it is bifunctional. Effects of this agent have been reported in the literature, particularly by the Moutschen-Dahmens and Michaelis and Rieger. This experiment was performed to determine the most efficient treatment procedures for using this agent.

The Myleran used was obtained from Burroughs Wellcome and Co., Tuckahoe, New York. Its solubility presents a problem which, under current experimental procedures, seems to be even more difficult than has been reported. Methods for increasing solubility have been investigated by varying temperature, time and organic solvents. To date the maximum treatment time has been 24 hours and