that, with respect to chromosome segregation and fertility, they differ from those produced by x-ray treatment.

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4. Effects of colchicine, using multiple interchange heterozygotes.

In M.N.L. 42:120 (1968), Ghobrial reported that, when seedlings heterozygous for two rings of 10, e.g., T1-5-6-7-8 x T3-2-4-9-10, were treated with colchicine, a few of the plants produced sectors that extruded their anthers and shed pollen. The anthers had normal-appearing pollen that was much larger than normal. We concluded that tetraploidy had restored fertility. In M.N.L. 44:146-147 (1970), we reported that three plants were obtained from selfing, but the one that matured had a well-filled ear and kernels that varied somewhat in size. Plants from both classes of seed were diploid.

The crosses of those plants with the standard normal mentioned in that report have been grown. All F_1 plants were fertile, and hence the plants tested carried no interchanges. Barring an error, the 2n fertile plant from selfs using pollen from the fertile sector must have come from a ♂ and a ♀ gamete that carried only the normal chromosomes from the heterozygote with two rings, each ring having 5 normal and 5 interchanged chromosomes. If they arose by a haploidization process followed by chromosome doubling, only a combination which had all normal chromosomes, all the interchanged chromosomes plus the other 5 normal ones from either parent that contributed the ring of 10, or all the interchanged chromosomes from both parents would be able to produce viable diploid tissue. Certain aneuploids might also be viable. This still would not account for the abnormally large size of the pollen. Except for that point, the results appear to be similar to those reported by Franzke and Ross (1952, Jour. Hered. 43:107-115) in which true-breeding new types arose in C_2 progeny from colchicine-treated seed. Our experiment with corn should be repeated. The multiple interchange stocks are available from the Coop. If haploidization followed by chromosome doubling does occur, this might be a method of obtaining a line homozygous for the interchanges present in both rings of 10 chromosomes. This I have been unable to do by conventional breeding methods (see following note). I hope to repeat this phase of the experiment but if anyone wishes to try it also, they will have my best wishes for success.

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5. Progress report on establishing a line with all chromosomes interchanged.

As reported earlier, we have the following stocks which will produce large rings when crossed with normal: (1) T1-5-6-7-8, (2) T3-2-4-9-10, (3) T3-2-4-6-8, (4) T5-7-1-9-10, and (5) T5-7-1-9-10-8. Crosses of #1, 2, 3, and 4 with normal give a ring of 10 + 5II. The cross of #5 with normal gives a ring of 12. These F_1's are highly sterile but will set seed from self-pollination. The cross of (5) x (3) gives a ring of 20. The crosses of (1) x (2) and (3) x (4) produce plants with 2 rings of 10 which do not shed pollen although the anthers have a few normal appearing pollen grains. Plants obtained by backcrossing these F_1 plants to either parent should include some that are homozygous for the interchanges from the recurrent parent and heterozygous for the interchanges from the other parent. Their progeny from self-pollination should include plants homozygous for both groups of interchanges. These could then be x-rayed to combine them in a single line that would produce a ring of 20 when crossed with normal stocks.

Plants with 2 rings of 10 do not shed pollen, but, when backcrossed as ♀ to either parental ring of 10 homozygote, they have 0 to 7 or 8 seeds.

In 1972, we grew 800 seeds from those backcrosses and in the last two years have checked testcrosses of 66 fertile second generation descendants from those produced in previous years. No plant has been found that had all the interchanges from both multiple interchange parents.

This past summer, certain of the testcrosses did not shed pollen, but cytological examination shows that ones with the highest number of interchanges had only a ring of 10 + 2 rings of 4 + 1 II. What apparently happens is that crossovers occur between homologous differential segments in the chromosomes in each ring of 10 in the F_1 with 2 rings of 10,