reduced at the high concentrations. The root length in the highest concentration (0.004%) produced at 59.1% reduction over the control value.

The various types of cytological abnormalities of root tip mitoses and their frequencies are shown in Table 3. Anaphase bridges and fragments occurred frequently in the treated materials, although very few aberrations were found in the control material. The frequency of chromosomal aberration was proportional to the concentration. The reduction of root length as well as the percentage of abnormal cells showed a correlation with the concentration.

The most striking phenotypic changes in the MC-treated M_1 plants were yellow, albino, and pale-green longitudinal stripes of various sizes in the leaves. The frequency of viable chlorophyll mutations is shown in Table 2. One albino plant was observed in this experiment. No chlorophyll mutants were found in the control. These experiments suggest that MC is also a mutagen in maize.

References:

Holliday, R., 1964. The induction of mitotic recombination by mitomycin C in Ustilago and Saccharomyces. Genetics 50: 323-335.

Iijima, T., and A. Hagiwara, 1960. Mutagenic action of mitomycin C on Escherichia coli. Nature 185: 395-396.

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3. The effects of hydroxylamine sulfate on the nuclear cycle and endoreduplication in maize root tips.

Two experiments have been conducted to study the effects of hydroxylamine sulfate (HAS) on the nuclear cycle and endoreduplication. Intact roots of "Seneca - 60" were exposed to ^{3}H-thymidine (1 uc/ml final concentration) for 30 min., followed by a 0.05% HAS treatment for 2 hrs. After washing, the intact roots were returned to the germination chamber (24±1°C) for further growth and fixed at 2-hour intervals up to 32 hrs. post-treatment. Autoradiographs were prepared according to the schedule of Douglas (MGCNL 42: 175-178, 1969) and from Feulgen squashes of this material. For each treatment and control, the mitotic index and prophase labelling index were determined.

Table 1. Relation between the mitotic index and the proportion of prophases labelled at various times after a 2 hour treatment with 0.05% HAS.

Time after treatment (hr.)	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
Control	9.53	-	-	-	-	-	-	-	8.30	-	-	-	-	-	-	-	9.34
Mitotic index (%)	10.01	7.37	1.84	0.85	1.24	0.77	9.04	11.31	9.65	9.78	9.56	11.08	8.67	11.25	8.00	10.19	9.95
Prophases labelled (%)	0	3.62	5.56	9.09	13.64	21.21	64.04	82.44	74.14	62.25	37.54	34.67	38.92	53.92	61.23	42.24	33.24

The results indicated that the mitotic index was affected immediately, during the incubation period. The relation between mitotic index and prophase labelling at various time intervals after HAS treatment indicated that the mitotic index had decreased to about 0.7% - 1.8% during the 4 to 10-hour period after HAS treatment, which in turn indicated that those nuclei were in G_2 and at the end of S period during HAS treatment. The mitotic index returned to the control value at 12 hrs. The data showed that the effect of HAS on the nuclear cycle was to inhibit and prolong the duration of G_2 and to inhibit the transition of late S to G_2 (treatment: $G_2 + P = 12.5$ hr.; control: $G_2 + P = 2.1$ hr.). The S period was also increased 2.5 hr. by this drug (treatment = 7.5 hr.; control = 5 hr.).

In the second experiment, intact roots were treated with HAS (0.05%) for 2 hr., washed thoroughly, returned to the germination chamber (24 $\pm$ 1°C) for further growth, and fixed at 4-hour intervals up to 32 hr. post-treatment. One group of the intact roots was immersed in a 0.03% solution of 8-hydroxyquinoline for 2.5 hr. prior to fixation.

A cytological feature of endoreduplicated cells is the presence during prophase and metaphase of the subsequent mitosis. At prophase, the chromosomes show a quadripartite structure instead of the usual bipartite structure. The four threads of chromatids, coiled 2 by 2, form two major strands (each strand with 2 chromatids). Each centromere joins 4 chromatids (2 major strands). The centromere divides into two during late prophase or metaphase. The chromosomes reach their greatest contraction and the four chromatids lie in parallel. The number of chromosomes doubles and they remain arranged in pairs. These are called "diplochromosomes." Immediately afterwards the centromeres divide once more and the anaphase movement begins. The cytological behaviour at anaphase and telophase is similar in diplochromosomes and in a tetraploid nucleus.

The frequencies of endoreduplicated cells at metaphase are presented in Table 2. These results show that the cells with diplochromosomes were first seen at 20 hr. after treatment. There was an increase in the frequency between 24 hr. and 28 hr. after treatment.

Table 2. Frequencies of endoreduplicated cells (at metaphase) at various times after the intact roots were given a 2 hour treatment with HAS at 24 ± 1°C.

Treatment (conc.)	Hour after treatment	No. of metaphases scored	No. of metaphase cells with diplochromosomes	% of cells with diplochromosomes
0.05%	20	71	2	2.82
0.05%	24	227	12	5.29
0.05%	28	266	19	7.14
0.05%	32	225	0	-
0.2%	28	353	36	10.20

At 32 hr. after treatment, no cells with diplochromosomes were observed. Apparently, the induction of endoreduplication by this drug occurs at a certain stage in the nuclear cycle. If we compared the duration of endoreduplication with that of the nuclear cycle (Table 1) after HAS treatment, the endoreduplication might take place after (G_2) and/or during (S) DNA synthesis at the time of HAS treatment (G_2, because of a complete omission of mitosis between two DNA doublings; S, because of successive DNA doublings). Cells with endoreduplication should undergo two series of DNA replication in interphase before entering mitosis. Therefore the following question arose. During which stage of the nuclear cycle (S or G_2) can cells be induced to undergo the second series of DNA replication by HAS at the time of treatment? With a view to answering this question, ^{3}H-thymidine and autoradiographs will be used for this study.

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1. <u>The effects of sexual differentiation and B-chromosomes on the rate of transposition of modulator from the Wx locus in maize</u>.

This article describes the results of tests for possible interaction between the heterochromatic B-chromosomes of maize, and the transposable non-specific repressor element Modulator (<u>Mp</u>) which has been shown to interact with the partially heterochromatic abnormal chromosome 10 (K10) segment (Williams & Brink, 1972).

Numbers of B-chromosomes ranging from 1 to 5 were introduced into W23 x W22 F_1 hybrids carrying an unstable waxy allele <u>WxMp</u> (<u>wx</u>$^{m-1}$, Ashman) heterozygous with the stable recessive <u>wx</u>. To test transposition in sporophytic tissues, equivalent numbers of plants carrying B-chromosomes and controls without B-chromosomes were crossed reciprocally with a W23 homozygous recessive stable <u>wx/wx</u> line. Numbers of whole kernel <u>Wx</u> selections on the resulting ears were tabulated, together