Guzmán, J., R. Félix and J. Ramírez, Comisión Nacional de Energía Nuclear, México City, Mexico. Effects of pre-treatment with Serotonin-Creatinine Sulfate Complex on the radiation-induced frequencies of X chromosome loss, recessive lethals and II-III translocations in D. melanogaster males.

The radiation protective effect of Serotonin (5-hydroxytriptamine) in animals was pointed out by Gray et al. (1952), Bacq and Herve (1952) and Langendorff and Kock (1957). Langendorff et al. (1958) tested the radioprotective effect of 5-HT given before radiation on the mortality rate of white mice within 30 days after the treatment. The results of the experiment showed that 5-HT is a very effective radiation-protective substance if given before irradiation. The decrease of oxygen tension inside the tissues as a result of the vasoconstrictive properties of Serotonin-Creatinine Sulfate Complex (S-CS) in mammals was the indirect mechanism proposed by Gray et al. (1952), Rothe et al. (1963), van den Brenk and Jamieson (1962), and van den Brenk and Moore (1959).

Laguarda-Figueras and Villalobos-Pietrini (1967) presented data demonstrating that S-CS protects planaria (Dugesia tigrina) against the lethal effects of X-rays. In planaria the radioprotection can not be explained by the lowering of the oxygen tension by vasoconstriction as such genera has no circulatory system. Villalobos-Pietrini and Laguarda-Figueras (1967) reported the radioprotective action of S-CS in Vicia faba seedlings pre-treated with S-CS, measuring the survival rate of roots after irradiation.

Alexander et al. (1955), Langendorff and Melching (1959), Dukor (1962), and Lohmann et al. (1966) proposed several hypothesis to account for the radioprotection afforded by S-CS.

In this experiment the effect of S-CS on chromosome X or Y loss, sex-linked recessive lethals, and II-III translocations was measured in the progeny of pre-treated and irradiated "Oster males" by means of the genetic scheme designed by Oster (1958). Male flies from a stock containing a marked sc^8 Y chromosome and the closed X, X^{c2} marked with the mutants yellow (y) and Bar (B) in the males, and yellow, forked (f), attached X chromosomes in the female (yf:=) were aged for 72 hours before the treatment with S-CS, irradiation, or both, and mated to virgin "Oster females" with markers in the I, II and III chromosomes (y sc^{S1} In-49 sc^8;bw;st pP). The use of the markers B and y, to identify the treated sex chromosomes of the males, makes the detection of sex-linked recessive lethals fairly easy. F_1 males and females are allowed to mate with each other for at least two days before being separated into vials. The F_1 fertilized females are tested for lethals by examining the F_2 offspring for the absence of Bar males which would indicate that a lethal has been induced in the paternal X chromosome. The frequency of exceptional (X/O) males among the F_1 flies is determined by counting the yellow males, which represent cases of loss of the whole or part of the X or Y chromosomes. Normal males have non-yellow bodies, since they carry the normal dominant allelomorph of yellow in the sc^8 insertion of their Y chromosome. The scoring of translocations is simplified by using the markers brown (bw) located on chromosome II, scarlet (st), and the peach allelomorph of pink (pP), which are both located on chromosome III. The eyes of the flies heterozygous for these markers appear brick-red in color while the eyes of those homozygous for brown and scarlet are white. The translocation tests can be carried out by mating one F_1 non-yellow male with one virgin female similar to his mother per vial. Such females are obtained from the "Sterilizer" stock (Y^{Lc}/XY^S;bw;st pP). The cross of males from this stock with "Oster females" produces automatically virgin F_1 females to be mated with the F_1 non-yellow males.

Several concentrations of the S-CS complex (Hycel, Houston, Texas) dissolved in 0.7N NaCl solution were administered by injection in the gonadal area of aged "Oster males" in order to determine the concentration to be used without interfering with their viability or fertility. Since Carlson and Oster (1962) have shown that the amount of liquid expelled after injection varies from fly to fly, estimates of the amount of solution injected into each fly were not attempted. A 100% concentration of S-CS killed all the injected males. The death of 25% of the injected males within five days of the treatment with the S-CS solution (50%), indicates that S-CS is being absorbed by the cells and interfering with cellular physiology to such an extent that death follows. A concentration of 25% was used; at this level no mortality was recorded among the injected adults within fifteen days. A physiological 0.7N NaCl solution was injected into male controls, instead of using distilled water which obviates the problem of induced sterility and possible cell selection by osmotic shock.

The source of radiation was an X-ray Stabilipan Siemens instrument operating at 220 kV and 15 mA, with an exposure rate of 85 R/min. The distance from the window was 30 cm. and a ThII filter was used.

"Oster males" collected within 72 hours of eclosion were injected with the S-CS solution or with the saline solution. Within an hour of injection half of the males were treated with 2,500 R, and mated to one "Oster female" per vial. Males and females were allowed to mate for two days before being separated. After 17 days the emerged F_1 flies from each vial were counted separately in order to count the X/O males per vial (Table I). No premeiotic events were included, as all the exceptional males were found in different vials. To detect sex-linked lethals, F_1 females and males were shaken over into fresh vials and the F_2 males from each vial were examined (Table II). The F_1 males were tested for translocations between autosomes II and III by being backcrossed to virgin females obtained from the mating of "Oster females" with "Sterilizer males" (Table III).

The chi-square data below each table show that no significant differences are found when the groups treated with S-CS are compared with the non-treated groups.

TABLE I. FREQUENCIES OF X/O MALES FOUND AMONG F_1 PROGENIES

Group	X/O Males	F_1 Females	F_1 Males	Total	%
A) Control	16	5039	4505	9560	0.3552
B) NaCl solution	5	2769	2265	5039	0.2207
C) S-CS solution	4	1708	1438	3150	0.2782
D) Control + 2,500 R	30	4008	3029	7067	0.9904
E) NaCl sol. + 2,500 R	25	3457	2673	6155	0.9353
F) S-CS sol. + 2,500 R	17	2170	1789	3976	0.9503

Chi-square values from the comparison of groups

A-B	A-C	B-C	D-E	D-F	E-F	A-D	B-E	C-F
1.066	0.246	0.135	0.026	0.001	0.027	9.738	9.767	5.404

TABLE II. SEX-LINKED RECESSIVE LETHALS FOUND AMONG F_2 PROGENIES

Group	Sex-linked lethals	Number of chromosomes tested	%
A) Control	4	1045	0.3828
B) NaCl solution	4	1064	0.3759
C) S-CS solution	4	1060	0.3774
D) Control + 2,500 R	43	942	4.5648
E) NaCl sol. + 2,500 R	35	1082	3.2348
F) S-CS sol. + 2,500 R	40	947	4.2239

Chi-square values from the comparison of groups

A-B	A-C	B-C	D-E	D-F	E-F	A-D	B-E	C-F
0.001	0.001	0.001	2.404	0.131	1.388	35.517	24.572	34.511

TABLE III. TRANSLOCATION FREQUENCIES AMONG F_2 PROGENIES

Group	Translocations	Number of chromosomes tested	%
A) Control	0	1555	0
B) NaCl solution	5	1030	0.4854
C) S-CS solution	2	818	0.2445
D) Control + 2,500 R	44	965	4.5596
E) NaCl sol. + 2,500 R	36	1024	3.5156
F) S-CS sol. + 2,500 R	36	793	4.5397

Chi-square values from the comparison of groups

A-B	A-C	B-C	D-E	D-F	E-F	A-D	B-E	C-F
7.563	3.810	0.701	1.403	0.001	1.232	72.161	24.102	32.253

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Gerdes, R.A. Texas Woman's University, Denton, Texas. Sex-linked recessive lethal test with hydrogen fluoride treated D. melanogaster.

There are many reports in the open literature relating to the mutagenicity of radiation and radiomimetic chemical mutagens. Recognizing this, we are evaluating potential air contaminents for mutagenic effects.

The experimental procedure was to place unetherized samples of Oregon-R into fumigation chambers, at various concentrations of HF contamination, for a 24 hour period. Then the males were mated to "Basc" females in a sequence of 3-3day broods. The standard sex-linked recessive lethal test was made on the F_1 females. The results of these tests are in the following table.

Treatment Level	Brood A	Brood B	Brood C	Pooled
0 HF Control	1/1809 = .00055	1/1720 = .00058	0/1702 =	2/5231 = .00032
1.3 ppm HF	0/1889 =	1/1871 = .00053	2/1873 = .0011	3/5633 = .00053
2.9 ppm HF	4/1719 = .0023	3/1742 = .0017	4/1720 = .0023	11/5181 = .00212
4.3 ppm HF	3/1907 = .0016	9/1832 = .0049	4/1775 1/ .0023	16/5514 = .0029

lethal/# chromosomes tested

Additional data is being collected to determine if brood differences are present, or if, as this data indicates, there are no brood differences.

Savontaus, M.-L. University of Turku, Finland. Tetrad analysis of control and X-ray irradiated females of D. melanogaster.

Females of the genotype y sc cv ct f car/y were collected within 6 hr of eclosion. They were divided into two groups one of which was irradiated with 3000 r at the rate of about 632 r/min at a focal distance of 10 cm and the other served as an untreated control. Immediately after irradiation both the treated and control females were mated individually with 2-3 males of the genotype sc cv ct f car/Y and transferred daily with their mates to fresh bottles for 9 days. Totally, 11387 flies were counted in the irradiated group and 3586 in the control. Crossing-over was scored in the regions: sc-cv, cv-ct, ct-f and f-car. Tetrad analysis of the cross-over data was as follows:

	control	irradiated
non exchange tetrads	4.8%	30.3%
single exchange tetrads	76.4%	56.7%
double exchange tetrads	17.5%	12.2%
triple exchange tetrads	1.3%	0.8%

Compared with the control results, the frequency of non-exchange tetrads in the treated group was greatly increased. This suggests that the net reduction in crossing-over observed by Chandley (1968, Mutation Res. 5) after X-irradiation and heat-treatment is probably due to an increased desynapsis or asynapsis of the treated chromosome.