Khishin, A.F. and M.M. Megaheid. University of Assuit, U.A.R. Storage of germ cells and process of mutation in Drosophila melanogaster.

This research is designed to study the effects of storing Drosophila melanogaster male germ cells on the spontaneous and induced sex-linked and second chromosome lethal mutations. Three different storage periods of 3, 6 and 9 days were used. Adult males 3 days old were irradiated with 2352 r of X-rays.

The Muller-5 (M-5) and the Curly Lobe (Cy/L) methods were used for the determination of the mutation rates for sex-linked and second chromosome lethals respectively. The result obtained suggests that:

The frequency of the spontaneous recessive sex-linked lethal mutations are not different statistically for different storage periods, or when compared with the unstored.

X-ray induced sex-linked lethal mutations may increase slightly after storing male germ cells in untreated females for 3, 6 and 9 days; the difference, however, is not statistically significant.

The percentage of spontaneous second chromosome lethals increases by storage. The difference is significant when storage continues for 6 and 9 days.

Storage of irradiated sperm for different periods increases the rates of second chromosome lethals over the rates obtained from the unstored irradiated sperm.

The effect of storage is more pronounced in the case of irradiated than in the case of untreated sperm.

The present study shows that the ratio between the induced sex-linked and second chromosome lethals increases by sperm storage.

Rosenfeld, A., A. Carpenter, and L. Sandler. University of Washington, Seattle, Washington. A nonchromosomal factor causing factor causing female sterility in D. melanogaster.

A homozygous pr cn stock in our laboratory appears to carry a nonchromosomal factor which will sterilize females that carry specific chromosomes contributed by the male parent. This system has features similar to the case of CO_2 sensitivity studied by L'Héritier and his collaborators and to the delta-factor-induced lethality studied by Minamori, and is perhaps the same as the "maternally inherited factor" reported by Picard and L'Héritier (DIS 46:54, 1971).

The standard experiment, here, is to cross the two stocks to be examined such that each serves as female parent. F_1 females are tested for fertility by crossing to Canton-S ♂♂. F_1 daughters of pr cn mothers are fertile when the male is pr cn, Canton-S, or Muller-5; sterile when the male is y^+; abo/Cy or Muller-5_A (=Muller-5/y^+Y; +/+; +/+; spa^{pol}/spa^{pol} ♂♂ from a stock kept as Muller-5/Muller-5; Sm1/+; +/+; spa^{pol}/spa^{pol} x Muller-5/y^+Y; Sm1/+; Ly Pr/+ +; spa^{pol}/spa^{pol}) and Cy daughters are fertile, but Cy^+ daughters are sterile, when the male parent is y; abo/Cy. All other pairwise crosses gave fertile F_1 females (Muller-5_A was not tested with y^+; abo/Cy, y; abo/Cy, or Muller-5).

These data indicate: (1) that both parents much contribute something to the female-sterility phenotype; (2) that chromosome 2 may be of especial importance (from the results of pr cn ♀♀ x y; abo/Cy ♂♂), and (3) that abo (Sandler, Genetics 64:481-493, 1970) is not specifically involved (from the results of pr cn ♀♀ x Muller-5_A ♂♂).

To examine the nature of the maternal contribution from the pr cn ♀♀, F_1 ♀♀ from the crosses: (A) pr cn ♀♀ X Muller-5 ♂♂ and (B) pr cn ♀♀ x Canton-S ♂♂ were crossed to y^+; abo/Cy ♂♂ and F_2 ♀♀ tested for fertility (by mating with Canton-S males). In cross A, 52 B; Cy^+ and 50 B^+; Cy^+ F_2 females were tested and all were sterile; in cross B, 59 Cy^+ F_2 females were tested and all were sterile. The pr cn maternal contribution, therefore, appears to be non-chromosomal since 1/16 of the sterile females should have received no chromosomes from the pr cn stock (except for the B; Cy^+ ♀♀ from cross B, where 1/8 would lack such chromosomes).

Further evidence on the nature of the non-chromosomal element in the pr cn stock comes from the results of the following experiment. F_1 females from a cross of pr cn ♂♂ by Canton-S ♀♀ were backcrossed to pr cn males. From this cross, 173 F_2 females were crossed to y^+; abo/Cy males and the F_3 Cy^+ female progeny tested for fertility. In these crosses, pr cn ♀♀ were not involved; nevertheless 21 females were sterile, 81 were semisterile (producing one or occasionally two larvae), and only 71 were normally fertile. These data strongly suggest some transmission of the nonchromosomal element through the sperm and the existence of quantitative effects; the parallel with the unstable state of sigma in the CO_2 sensitivity system is striking.