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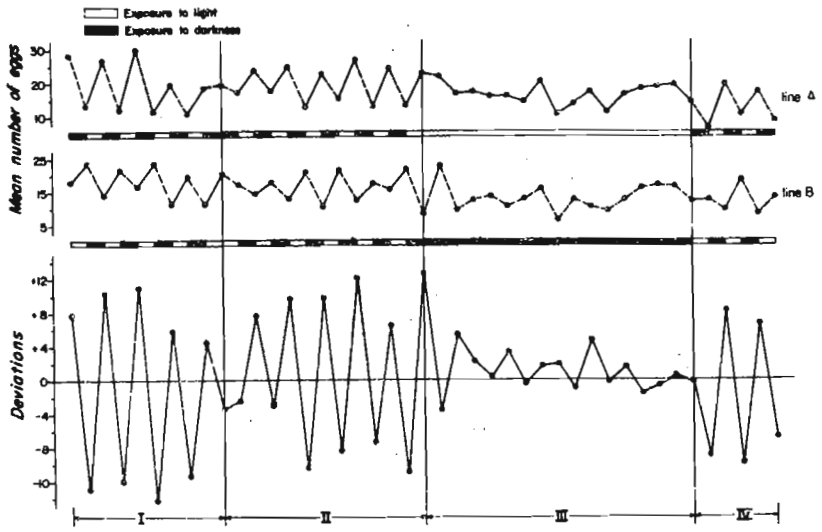
Light-dependence of oviposition in D. virilis.

In studies of oviposition in D. virilis we observed a striking difference between the number of eggs laid during the day and night time. Thirty females, ten days old, were placed individually in Plastainer bottles (Richardson, R.R. DIS 42, 1967) together with two males per bottle and allowed to lay eggs for a period of 12 hours. The illumination was controlled as follows:

I. Fifteen of the flies (Line A) maintained in 12 hrs darkness (12D) followed by 12 hrs of light (12L), while the other fifteen (Line B) were exposed to reverse illumination, 12L:12D. II. After ten sets of observations the conditions in both lines were reversed. III. After ten more observations, Line A was placed in continuous light and Line B in continuous darkness for 8 days. IV. Finally, Line A was placed in 12D:12L and Line B in 12L:12D.



The results summarized in Figure 1 show that at each observation in the sets I, II and IV, the mean number of eggs laid during the illuminated periods was significantly larger than those of the dark periods. No significant difference was found during continuous darkness or light (set III).

The deviations between the mean number of eggs for Line A and Line B for each set of observations illustrate more clearly the significance of illumination on the oviposition. Since the light conditions for each line were consistently the mirror image of each other, assuming that the alternation of light-darkness environment of the flies is the only or the primary stimulus for the periodicity, then we should expect the deviations in sets I, II and IV would take successive positive and negative values, the magnitude of which will indicate the significance of the difference between the means. In set III, the deviations should be equal to zero, if alternations of illumination is the only causal factor. Positive or negative values would be observed if a free running rhythm exists in light or dark environment. The lower part of Figure 1 shows that in sets I, II and IV, each positive value of the deviation is followed by a negative one, indicating that increased egg productivity in one of the lines is accompanied by a decrease in egg productivity for the other line.

In set III, the deviations fluctuate near zero, with a slight preference toward positive values. This indicates that an increase or decrease in egg productivity in Line A is accompanied by a parallel increase or decrease in Line B. A free running rhythm cannot be detected if the flies are considered as a group, although several individuals showed a clear persistence of the rhythm in total darkness.

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Genetic viability in D. melanogaster.

In the summer 1971, flies were collected from north of Tehran and lethal effects of the population were compared with a cage population. The Cy/Pm;D/Sb method was used for the detection of lethals, and in the F_3 four kinds of phenotype (Cy Sb, Cy, Sb, +) with the ratios of 4, 2, 2, 1 respectively, were observed (Tsuno,

1970). The following results were observed:

1) The frequency of lethal genes in the natural population was 32.5% for the third chromosome and 8.3% for the second.

2) In the cage population the frequencies of both second and third chromosome lethals were at the same level, 11.7%.

3) No significant differences were observed in sl + sv genes on both chromosomes in the cage and the natural populations.

4) Between 14 Cy/l genotypes in the cage population, 45 (observed) crosses were made and 6 (with the frequency of 13.3%) were observed to be alleles. The same percentage was calculated for the third chromosome. From the natural population, 2 alleles for the second and 18 for the third chromosomes were observed. The frequencies were 4.4% and 7.2% respectively. All flies were raised in Mostashfi medium and reared at 23 ± 1°C.

Conclusion: In natural populations of D. melanogaster in Tehran, the number of lethal genes on the third chromosome is higher than the second chromosome. In cage populations (set 15 years ago), the frequencies of lethal genes on both major autosomes are in equilibrium. No seasonal changes are observed in the natural population of Tehran.

Gerasimova, T.I., V.A. Gvozdev and V.J. Birstein. Kurchatov's Institute of Atomic Energy, Moscow, USSR. Position effect variegation of Pgd locus determining 6-phosphogluconate dehydrogenase in Drosophila melanogaster.

The structural gene Pgd for 6-phosphogluconate dehydrogenase (6PGD) was located at 0.65 to the left of pn locus of the X-chromosome of D. melanogaster (1). Position effect variegation of Pgd locus has been studied in the duplication Dp(1;f)R carrying the Pgd^A allele. This duplication covers y to kz (according to Schultz's data). Flies were cultivated at 18° in order to increase the extent of variegation. We have obtained the marked variegation for sc, dor and pn loci for XO males only. The specific activity of 6PGD in these mosaic XO males was compared with that of non-mosaic XY males. The results demonstrate that the variegation for dor, sc and pn correlates with the decrease of 6PGD activity. Various genotypes and X-chromosomes were used for the study of the position effect for Pgd locus (see Table). In the first two series of experiments the specific activity of 6PGD of XO males has been diminished approximately to 80% level of XY males. In the third series with X-chromosome lacking the Pgd locus (Pgd-kz deficiency) the enzyme activity of XO mosaics was reduced to 70% level of non-mosaic XY males. In this latter series the genotype of mosaic males differed from that of non-mosaics by the absence of Y-chromosome only.

The ratio of 6PGD specific activities of mosaic (XO) to non-mosaic (XY) males.

Series of exp.	No of tests	Markers of X-chromosome	Character of variegation	XO:XY ratio of 6PGD activities
1	11	y dor^1 Pgd^A	dor^v	0.79 ± 0.03
2	13	y ac sc Pgd^B w	sc^v	0.83 ± 0.02
3	15	Df(1)Pgd-kz (Pgd^- pn^-)	pn^v	0.71 ± 0.05

The elimination of Y chromosome from normal males without rearrangements leads to 20% increase of 6PGD activity. Therefore the absence of Y chromosome masked the true decrease of Pgd locus inactivation induced by position effect. The isozyme patterns of 6PGD obtained in acryl amide gel electrophoresis of crude extracts of XO and XY males carrying Pgd^B in the X-chromosome and Pgd^A in duplication Dp(1;f)R have been compared (see Table, the second series of experiments). The Pgd^A allele determines the fast isozyme of 6PGD and the Pgd^B the slow one (2). In the XO males the activities of the fast and hybrid isozymes were diminished while that of the slow one was not affected. We interpret the decrease of the total 6PGD activity and the change of isozyme pattern in phenotypically expressed mosaics as result of variegated position effect of Pgd locus.

References: 1. Gvozdev, V.A., V.J. Birstein and L.Z. Faizullin 1970, Moleculjarnaja Biologia (Russ.) 4:876; 2. Young, W.J. 1966, Science 57:58.