

The absence of proportionality of specific activities of 6-phosphogluconate and glucose-6-phosphate dehydrogenases to the number of X-chromosomes carrying their structural genes may be therefore attributed to a phenomenon of dosage compensation for sex-linked genes which may take place not only in whole flies but also at the cell level in culture.

References: Gvozdev, V.A., V.J. Birstein and L.Z. Faizullin In: Structure and genetical functions of Biopolymers, Moscow, 1969, Vol. I: 137-165 (in Russ.); Seecoff, R.L., W.D. Kaplan and D.G. Futch, 1969 Proc. Natl. Acad. Sci. 62, 2: 528-36.

Alexandrov, I.D. Research Institute of Medical Radiology, Academy of Medical Sciences of U.S.S.R., Obninsk, U.S.S.R. Mutation isoalleles or modification of frequencies of radiation-induced viable point mutations by attendant chromosome rearrangements in *D. melanogaster*?

First Timofeeff-Ressovsky (Biol. Zbl. 52: 468-476, 1932) for  $w^+$  locus and then Lefevre (Genetics 40: 374-387, 1955) for  $y^+$  locus reported the existence of alleles with significantly different rates of mutations following X-irradiation of adult males. Such alleles were termed "mutation isoalleles". In both cases the detected frequencies of viable point mutations served essentially as an estimate of

mutability of the wild-type homoalleles.

In a previous note (DIS 44: 78) the preliminary data on comparative mutability of five wild-type genes in two stocks of *D. melanogaster* (D-32 and D-18) induced gamma-irradiation (4000 r) of adult males were presented. The frequencies of point mutations permitted to suggest the existence of the mutation isoalleles for  $y^+$ ,  $w^+$  and  $cn^+$  loci. Genetics and cytogenetics analyses allowed further to determine more precisely the frequencies of these mutations. They are listed in the Table below. It may be seen that the detected frequencies of viable point mutations for each locus are nearly three times as high in one stock (in D-18 for the  $y$  and  $w$  but in D-32 for the  $cn$ ) as in the other. The inter-stock difference for  $w$  is statistically significant. The  $w^+$  locus is known to be one of the highly mutable loci. Therefore, lack of the significant difference for  $y$  and  $cn$  point mutations may well depend on the insufficient samples of examined flies. All the same, this finding, in principle, is parallel to those reported by Timofeeff-Ressovsky for  $w^+$  alleles and Lefevre for  $y^+$  alleles.

However, if  $y$ ,  $w$  and  $cn$  mutations being taken into consideration with attendant physiological effects (sterile  $F_1$  mutations, mutations with recessive lethality) and viable chromosomal rearrangements, the mutation rates for each of the loci are practically the same in our two stocks. It seems reasonable to suppose that many of these physiological effects are associated with chromosomal rearrangements of all kinds (for example, large deletions or translocations for the sterile mutations according to Lefevre, Genetics 55: 263-276, 1967; *ibid.*, 63: 589-600, 1969; Lindsley, Proc. XII Intern. Congr. Genet. I: 144, 1968).

Thus the same gene mutation may be accompanied by rearrangements of some kinds occurring with definite but different probability in each of the two stocks. Therefore, the rearrangements occurring with different frequencies in different genotypes may differently modify the frequency of true point mutations. If this is the case, the detected frequencies of viable point mutations in different stocks may hardly provide evidence of different mutational potentialities of homoalleles themselves. Do the "mutation isoalleles" exist in this case? At least, all cases of the "mutation isoalleles" in *D. melanogaster* may be as well explained now by this hypothesis of modificatory effect of independently and simultaneously occurring chromosomal rearrangements as an attendant factor with regard to intragenic mutation.

One more aspect of the finding requires explanation: What does determine in the two stocks the different probability of complication of point mutations by rearrangements? So long as our data were obtained under the same experimental conditions and the pattern of difference in the frequencies of  $w$  and  $cn$  point mutations in D-32 is opposite to that in D-18 the stochastic of complication of these point mutations by rearrangements seems to depend upon some peculiarities of chromosomal environment neighbouring to homoalleles rather than the peculiarity of genotype as a whole. The nature of these chromosomal differences is still obscure although it can point to a possible role of amount of intercalary heterochromatin adjacent to a particular locus. The high radiosensitivity of this heterochromatin in respect to breakage is known, and the quantity of that in different stocks may be quite different (Lefevre, 1955, *loc. cit.*).

(Table on next page:)

The different types of y, w, cn mutations following gamma-irradiation (4000 r) of adult males of two wild-type stocks of *D. melanogaster*.

		Mutations with attendant chromosome rearrangements										
Loci	Stocks	Point mutations		Sterile F <sub>1</sub> mutations		Recessive lethality		Viable chr.rear.		Overall mutations		Total chr. studied
		Mut.freq.**	P***	Mut.freq.	P	Mut.freq.	Mut.freq.	Total		Mut.freq.	P	
								Mut.freq.	P			
y <sup>+</sup>	D-32	( 1 ) 0.69	>0.05	( 1 ) 0.69		( 2 ) 1.38	( 1 ) 0.69	( 4 ) 2.78	( 5 ) 3.47	>0.05	35,843	
	D-18	( 3 ) 2.27		( 1 ) 0.76		( 0 ) 0	( 2 ) 1.52	( 3 ) 2.27	( 6 ) 4.54		33,000	
w <sup>+</sup>	D-32	( 3 ) 2.09	=0.05	( 20 ) 13.94	>0.05	( 2 ) 1.39	( 0 ) 0	( 22 ) 15.34	( 25 ) 17.43	>0.05	35,843	
	D-18	( 10 ) 7.57		( 11 ) 8.33		( 1 ) 0.76	( 2 ) 1.52	( 14 ) 10.61	( 24 ) 18.18		33,000	
cn <sup>+</sup>	D-32	( 11 ) 4.10	>0.05	( 8 ) 2.98	<0.05	( 3 ) 1.12	( 3 ) 1.12	( 14 ) 5.22	( 25 ) 9.32	>0.05	67,030	
	D-18	( 5 ) 1.87		( 20 ) 7.50		( 3 ) 1.13	( 0 ) 0	( 23 ) 8.63	( 28 ) 10.50		66,614	

\* In parenthesis the number of mutations found is given.

\*\* The average mutation frequency/locus/r x 10<sup>-8</sup>.

\*\*\* P was estimated by use of the tables of Kastenbaum & Bowman (Mut. Res. 9: 527-549, 1970).