Krutovsky, K.V., A.N. Milishnikov & Yu.P. Altukhov. Institute of General Genetics, Moscow, USSR. Frequency of induced null-mutations in three allozyme loci at different stages of Drosophila melanogaster ontogenesis.

Using standard protein electrophoresis in polyacrylamide and starch gels we studied de nova mutations in D. melanogaster causing the loss of the activity of enzymes (so-called null-mutations) coded for by genes α-Gpdh, Adh and Est-6 expressed early in ontogenesis. To obtain a heterozygous offspring we carried out individual matings of flies of laboratory strains homozygous for alternative electrophoretically detected alleles of the above three loci: $\alpha\text{-Gpdh}^{FF}$, Adh^{FF}, Est^{FF} --designated by F and $\alpha\text{-Gpdh}^{SS}$, Adh^{SS}, Est^{SS}--designated by S. Mutations were induced by treating males with ethylnitrosoureа (ENU) in concert with radiation (70 ♂♂F; 500 r,Cs^{137}; 70 mg ENU, 3.5 h, gaseous medium) and with ethylmethanesulfonate (20 ♂♂F and 20 ♂♂S) by the method of Lewis and Baker (1968). The third group served as a control (15 ♂♂F and 15 ♂♂S). After egg-laying (2-3 days) the parents were subject to electrophoretic analysis. III star larvae from the offspring and adult flies preliminarily mated to the tester strain Cy/Pm; Ubx/Sb were selected for electrophoresis. The presence of null-mutations was determined by the absence upon histochemical staining of a band corresponding to the location of EST-6) or a homodimer (in case of ADH and α-GPDH) encoded by an allele obtained from a treated male. The mutant allele was considered as "null" even if a residual activity was preserved in heterodimers consisting of a mutant and normal subunits (in the absence of the mutant homodimer's activity).

It is seen from Table 1 A,B that the frequency of null-mutations detected in the analysis of larvae significantly differs (except Adh and Est-6 loci in the first group, Table 1A) from that in adult flies both for individual loci and when summarized (statistical analysis according to Traut 1981).

Table 1. Frequency of null mutations in three allozyme loci of Drosophila melanogaster:

A. ENU and radiation treatment.

	Larvae			Adults				
Loci	1	2	3	1	2	3	χ^2	p
α-Gpdh	15 (7")	1086	1.38×10^{-2}	2	1854	1.11×10^{-3}	17.16	>0.99
Adh	2	860	2.35×10^{-3}	1"	1710	0.58×10^{-3}		
Est-6	-	746	-	-	1584	-	-	-
Total	17	2692	6.32×10^{-3}	3	5148	5.83×10^{-4}	19.56	>0.999

B. EMS treatment.

	Larvae			Adults				
Loci	1	2	3	1	2	3	χ^2	p
α-Gpdh	9 (2")	2126	4.23×10^{-3}	1	2986	3.35×10^{-4}	7.78	>0.99
Adh	6	2466	2.43×10^{-3}	1	3570	2.80×10^{-4}	4.13	>0.95
Est-6	10	1928	5.19×10^{-3}	6	3512	1.71×10^{-3}	4.02	>0.95
Total	25	6520	3.83×10^{-3}	8	10068	7.95×10^{-4}	16.85	>0.999

1 = number of detected mutations; 2 = number of alleles studied; 3 = frequency of null mutations; " = a null allele displaying a residual activity.

In the control group only one out of 3540 null-alleles studied at the larval stage was discovered which most likely has a spontaneous mutation origin, and no mutations were discovered among 4740 alleles studied in adult flies.

The detected differences in the frequencies of null-mutations in larvae and adult flies indicate the action of a strong selection against new mutations in allozymic loci early in

ontogenesis, as was proposed previously (Altukhov 1980). The data of some authors on the viability of null-alleles in a homozygote or a heterozygote with a deletion for a majority of enzymic loci in which they are discovered do not reflect the dynamics of their formation and concern nulls which probably passed already the selection at early stages of ontogenesis. The conducted work indicates it is necessary to take into account this fact in estimating the mutation tempo, studying the correlation between the molecular weight of protein subunits and mutation frequency for corresponding genes, as well as in elucidating the role of selection in maintaining biochemical polymorphism.

References: Lewis, E. and F. Backer 1968, DIS 43:193; Traut, H. 1981, DIS 56:140-141; Altukhov 1980, Proc. XIV Intl.Genet.Congr. 1(1):238-256(Moscow).

Lambert, D.M. & M.C. McLea. University of Auckland, New Zealand. Drosophila pseudoobscura in New Zealand.

We report here the existence of populations of Drosophila pseudoobscura from a number of localities in the North Island of New Zealand. Individuals have been captured from 8 localities in the Bay of Plenty/Rotorua area (see Fig. 1).

Fig. 1. Sites in North Island, New Zealand, where individuals of D. pseudoobscura have been collected. (1) Apple Valley Orchard, 5 km from Ngongotaha; (2) Suburban Rotorua; (3) Fairbank Orchard, opposite Rotorua Airport; (4) On Highway 5 near Rainbow Mountain; (5) at outlet of Tarawera River; (6) Edgecumbe; (7) MacDonnel Road off Highway 30; (8) Suburban Taneatua.