Matveeva, N.M., L.I. Korochkin, Institute of Cytology and Genetics, Novosibirsk, USSR. The comparison of esterase spectra of the 3rd instar larvae, pupae and imago in Drosophila virilis.

Esterases in several strains of D. virilis and their hybrids, from the collection of Prof. N. Sokoloff (Moscow, Institute of Developmental Biology), have been investigated using starch gel electrophoresis of individual flies and larvae. Differences in esterase spectra were shown to be present in different stages of the flies ontogenesis. Although esterase-1 is not usually changed, the activity of esterase-2 is higher in imago than in 3rd instar larvae and pupae. Both parental and one hybrid esterase-2 bands are expressed in 3rd instar larvae. Esterase-3 appears rather late and varies in its phenotypical expression in imago. There are some

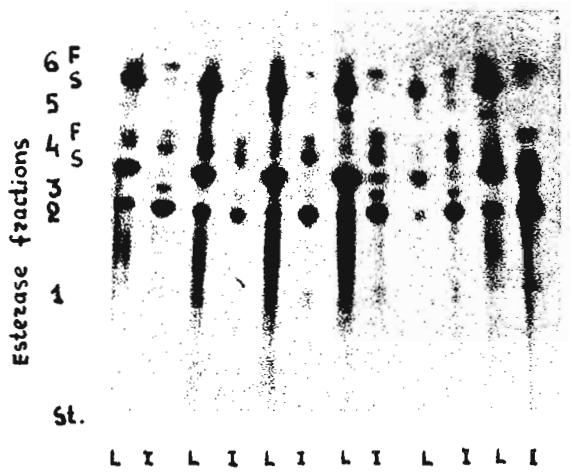

Fig. 1. Electropherograms of esterases of 3rd instar larvae and imago in D. virilis. Individual flies and larvae were used for electrophoresis in each case. I-4=103 B2 strain, 5-10=103 3a strain, II-12=147 strain, L-3rd instar larvae, I-imago. F=fast subband and S=slow subband of the corresponding esterase.

similar regularities in the phenotypical expression of esterases-4 and -6 in larvae and imago (Fig. 1, Table 1). These esterases are represented by two subfractions fast(F) and slow(S), one of which usually predominates in imago in different D. virilis strains. If the F-form of esterase-4 or esterase-6 predominates in

Table 1.
The comparison of relative activities of F- and S-subbands of esterase-6 and esterase-4 during ontogenesis of D. virilis. Activities are expressed in parts of total activity, determined from areas under the curves using a "Joyce and Loebl" microdensitometer.

Designation of strains of D. virilis in our collection		Esterase-6 Subfractions Fast (F)	Esterase-6 Subfractions Slow (S)	Esterase-4 Subfractions Fast (F)	Esterase-4 Subfractions Slow (S)
103 B2 (R,gl)	Imago	0.62	0.38	0.86	0.14
		0.70	0.30	0.90	0.10
	3rd instar larva	0.06	0.94	0.23	0.77
		0.08	0.92	0.10	0.90
103 3a (R,gl)	Imago	0.61	0.39	0.76	0.24
		0.80	0.20	0.90	0.10
		0.67	0.33	0.90	0.10
		0.70	0.30	0.90	0.10
		0.72	0.28	0.92	0.08
	3rd instar larva	0.05	0.92	0.05	0.95
		0.16	0.84	0.10	0.90
		0.16	0.84	0.10	0.90
		0.10	0.90	0.20	0.80
		0.05	0.95	0.10	0.90
		0.10	0.90	0.11	0.89
147 1B2 (b bk dt)	Imago	0.87	0.13		
	3rd instar larva	0.13	1.87		

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Clark, A.M. State University of Leiden, The Netherlands. Differential viabilities of X/0 males.

Würgler and Maier (Mutation Research, 1972 15: 41-53) have reported that after irradiation of mature sperm carrying a ring-X chromosome, the rate of chromosome loss, as recorded by the frequency of X/0 males, depends on the type of female used. They concluded that viability differences cannot account for their data, and suggested that a maternal influence on the repair of X-ray induced lesions might provide an explanation. The following data, obtained by methods similar to those used by Würgler and colleagues, indicate that substantial viability differences between various kinds of X/0 males may be density dependent and may in fact account for the different frequencies of X/0 males recorded in irradiation experiments.

Egg-laying females per bottle	Mean progeny per bottle	Ratio $\frac{y\ sn^3/0}{Oster/0}$
2	148	2.22
6	394	2.12) *
15	562	3.26)

* Difference significant at the 1% level

Method 1. Females of the genotype $\frac{Oster}{y\ sn^3}$ (Oster stands for y sc^{S1} In 49 sc^8) were mated to X·Y males which lacked a free Y chromosome, and the proportions of Oster/0 and y sn^3/0 males in the progeny recorded. A range in population densities was achieved by using 2, 6 or 15 egg-laying females per bottle. Egg laying was restricted to 48 hours.

Method 2. Oster females, or y sn^3 females, were crossed to X·Y males and the percent of X/0 progeny recorded in each case. Again, varying population densities were achieved by placing 2, 6 or 15 females in each bottle.

Egg-laying females per bottle	Mean progeny per bottle	Percent of X/0 progeny obtained from: y sn^3 females	Oster females
2	112	69.1%	65.9%
6	229	70.1%	58.7%
15	385	70.4%	49.2%

In method 1, developing Oster/0 and y sn^3/0 males are in competition in the same culture, while in method 2, the particular X/0 males are in competition with Oster/X·Y females as the case may be. Both methods lead to the same conclusion, that as population density increases, Oster/0 males are at increasing disadvantage; this effect could well be related to the Y-suppressed viability factor of chromosomes of the sc^{S1} sc^8 type. (See, for example: Hess, Zool. Anz. Suppl. 1963, 26:87-92; Traut, Scheid and Wind, Mutation Res. 1970, 9:489-499.) On the other hand, y sn^3/0 males seem to be relatively insensitive to population density over the range covered in these experiments. There is no single measure of the relative viabilities of Oster/0 males and y sn^3/0 males. In view of the need to control population density very carefully, it seems that viability difference should still be considered as a possible explanation for the results obtained by Würgler and Maier.

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imago, the larvae are characterized by higher levels of the S-band activity. The changes from the "larval" type of isozymes to the "adult" type take place at the stage of middle pupae. If the S-form predominates in imago, or both the F- and S-subfractions have identical activities, a picture similar to that in imago can be seen in electropherograms of 3rd instar larvae. Equal activity of F- and S-subfractions was observed in the 3rd instar larvae and imago of hybrids between flies of "S" and "F" strains. This work on the esterases of D. virilis yielded results similar to those of Doane (1969), who studied changes in the activities of amylase subfractions, controlled by duplicating genes in D. melanogaster.

References: Doane, W. 1969, Drosophila amylases and problems in cellular differentiation. In: Problems in Biology: RNA in Development (Univ. of Utah Press) 73-109.