San Miguel Salán, E. Universidad de León, España. Developmental time in four populations of formaldehyde-treated Drosophila melanogaster.

Formaldehyde is a toxic, contaminant, and mutagenic environmental agent (Auerbach 1967, 1971; Perera 1982). Several samples of eggs from four populations of D.melanogaster underwent toxification by the larval feeding method. The populations were caught on different sites from Asturias (Spain) with clear geographic and ecological diversities. They were maintained in the laboratory by mass culturing. Two types of culture media were used: control medium (basic yeast and sucrose), and treated medium (0.2% v/v formaldehyde in control medium). Ten ml of culture medium were poured into each vial (10 x 2.5cm ø).

Four day old virgins of both sexes from each population were put in plastic cylindrical cages (3.60 x 7.80cm ø) where females laid eggs for 24 hr on control medium. The eggs were transferred into vials (50 per vial). The experiment was performed at 21±1°C.

The developmental time was determined from egg-to-adult (in days). Results presented in Table 1 indicate the mean values of each sample for males and females together, and also the standard errors (X^{+}-S.E.). In parentheses are given the number of vials. Naranco, Felguera and Urbana population samples that were treated show a vial amount less than their respective control samples. This is due to 100% lethality found in some vials, which were excluded from the analysis.

The main effect of the treatment is the extreme increase in developmental time, as derived from the differences between the mean values of treated and control samples.

On the other hand (see Table 2), there are significant differences (at 5% level) between control samples and also for treated samples, as shown by the SNK test (Sokal 1979). Populations appear in increasing order of developmental time. Underlined populations show no significant differences at 5% level. Ms, mean square; Df, degrees freedom.

Table 1.

	Populations			
Samples	TEVERGA	NARANCO	FELGUERA	URBANA
Control	11.79±0.11 (10)	13.65±0.07 (20)	13.83±0.06 (20)	14.25±0.09 (20)
Treated	27.90±0.69 (10)	30.20±0.44 (16)	31.80±0.40 (11)	31.54±0.40 (12)

Table 2. Results by the SNK test.

Samples	Populations	Ms	Df
Control	TEVERGA < NARANCO FELGUERA < URBANA	0.10	66
Treated	TEVERGA < NARANCO URBANA FELGUERA	2.85	46

According to this, the estimation of the relative decrease in development (by the differences between mean values of treated and control samples with reference to this latter $[(\bar{X}_t-\bar{X}_c)/\bar{X}_c]$ was used to determine which populations were the most sensitive to the toxic. The relative decrease for the Teverga, Felguera, Naranco and Urbana populations were 1.37, 1.30, 1.21 and 1.21, respectively, showing that Teverga population was the most sensitive.

A remarkable aspect of this work is the phenotypic variability of the analyzed trait. The coefficient of variation gave an average value of 2.5% for the four control samples, and for the treated samples this coefficient was 5.55%. If the wide differences in developmental time by effect of the contaminant are basically determined by genotypic differences, the possibility exists of quick responses to selection. Further studies are under way to elucidate this point.

References: Auerbach 1967, Science 158:1141-1147; Auerbach & Kilbey 1971, Ann.Rev. Genet. 5:187; Perera 1982, Science 216:1285-1291; Sokal 1979, Biometria, H.Blume, Madrid.