Two different genetic tests were needed to detect presence of tuh-3. The mutant gene acts as a semidominant in the presence of an X-linked maternal effect gene, symbolized tuh-1h, to cause growths of abdominal and/or genital tissue in the head. Tuh-3 acts as a simple recessive in the presence of a second maternal effect gene, symbolized tuh-1g, which causes the defect to switch from the head to the posterior of the fly where internal and external genitalia may be completely absent. The maternal effect genes tuh-1h (head defects) and tuh-1g (genital defects) are naturally occurring alleles. The semidominant head defect phenotype was detected among F_1 progeny resulting from mating males of each cross-over strain to females that carried an attached X-chromosome homozygous for tuh-1h and a 3rd chromosome gene that enhances the penetrance and expression of the head defects. The recessive phenotype was found by mating the appropriate males to females possessing an attached X-chromosome homozygous for tuh-1g and backcrossing the attached X-chromosome bearing female offspring to the males from each strain being tested.

Table 1 shows that 15 of the 20 cross-overs between pbx and fl occurred distal to or right of tuh-3. The remaining 5 cross-overs were between pbx and tuh-3. Tuh-3 was mapped much closer to pbx at 58.8+ than to fl at 59.7+. This places tuh-3 at about 59.0+. However, it must be emphasized that an exact placement of tuh-3 was not possible because the viability of flies with recombinant chromosomes was quite low. A total of 93 males was originally selected as potential cross-over types. Of these, 40 either were sterile or did not survive even light etherization. The 15 tuh-3 fl cross-over types showed both the head defect with tuh-1h and the genital defect with tuh-1g. The tumorous-head phenotype was seen in 68.6% of the flies examined with average penetrance ranging from a low of 51.4% to a high of 91.2%, while the genital disc defect was found in 50.0% of the males examined with a low of 5.1% penetrance to a high of 81.7% penetrance. The five tuh-3^+ fl strains of flies lacked a mutant phenotype when confronted with either maternal effect gene. Strain #57 had 1 of 45 males showing the trait. However, when the tuh-3^+ fl chromosome was made hemizygous for tuh-3^+ by placing it with Df(3R)P9, which uncovers tuh-3, none of the 100 males tested showed the phenotype.

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Larochelle, C., J.Côté, and F.Garcin. Laval University, Quebec, Canada. The ethanol metabolic pathway in D.melanogaster and D.simulans.

The two cosmopolitan sibling species D.melanogaster and D.simulans are able to use environmental ethanol as source of energy; however, D.melanogaster exhibits better capacity to handle high ethanol concentrations than D.simulans (Parsons et al. 1979).

This differential tolerance to ethanol could be explained at the biochemical level by a much higher alcohol dehydrogenase (ADH) activity in D.melanogaster than in D.simulans. Nevertheless the ADH-mediated oxidation of ethanol generates acetaldehyde, a highly toxic product. For fly survival it is essential that acetaldehyde be rapidly oxidized into acetate.

In most animal species this critical step involves and NAD^+-dependent aldehyde dehydrogenase (ALDH). In Drosophila, aldehyde oxidase (ALDOX) a flavine enzyme using many aldehydes as substrates, was assumed to be the active enzyme (see Courtright 1967; Dickinson 1970, 1971). Recently we have provided evidence that ALDH is present in Drosophila and that its physico-chemical properties are very similar to those of other animal species (Garcin et al. 1981,1983).

In these experiments we have carried out a comparative study of ADH, ALDH, and ALDOX activities in D.melanogaster and D.simulans. We show that ADH and ALDH activities are directly correlated with the level of tolerance to ethanol and acetaldehyde whereas ALDOX activities are inversely correlated.

Drosophila melanogaster collected from Colmar (France) and Drosophila simulans collected from Villeurbanne (France) were kindly made available by Prof. J. David Laboratoire de Biologie et de Genetique Evolutive Gif-sur-Yvette (France). The flies were grown in low density populations on Drosophila medium (Carolina medium 4-24) and maintained in an incubator providing a constant temperature (25±1°C) and an 18 hr light/6 hr dark photoperiod with fluorescent light. Adult flies, 5 to 6 days old were frozen in liquid nitrogen, homogenized and centrifuged as described in Garcin et al. 1983. The resultant supernatants were kept

Table 1. Specific activities of ADH, ALDH and ALDOX in D.melanogaster and D.simulans.

	D.melanogaster	D.simulans
ADH mU/mg prot.	74.0±4*	23.0±0.8
ALDH mU/mg prot.	25.7±1.5	11.3±0.6
ALDOX U/mg prot.	0.74±0.02	1.41±0.13

* each value represents the mean ±SD of 4 independent experiments.

Table 2. Ethanol and acetaldehyde toxicity in D. melanogaster and D.simulans.

	D.melanogaster	D.simulans
Ethanol LC_{50}	11.3	4.2
Acetaldehyde LC_{50}	2.6	1.5

at -80°C until assayed. ADH and ALDH activities were determined spectrophotometrically by monitoring the formation of NADH at 340 nm (see Garcin 1979; Garcin et al. 1983). ALDOX activity were determined according to Dickinson (1971). Protein concentrations were measured according to the method of Bradford (1976) using serum albumin as the standard. Enzymatic specific activities are expressed in Units (or milliUnits) per mg. protein.

Table 1 shows the results obtained in the two sibling species for the activities of ADH, ALDH and ALDOX. These data were obtained from four independent experiments. ADH and ALDH in D.melanogaster are respectively threefold and two fold higher than those in D.simulans. In contrast ALDOX activity is twofold higher in D.simulans.

For comparison purposes we present in Table 2 in vivo data obtained in previous experiments on ethanol and acetaldehyde toxicity in the two sibling species. It can be seen from the concentrations inducing 50% lethality in the population, (LC 50s) that D.melanogaster is much more tolerant to both agents than D.simulans.

Thus it appears from our biochemical data that both dehydrogenases(ADH and ALDH) play a significant biological role for the expression of alcohol and acetaldehyde tolerance in the two species. The data on ALDOX activity confirm our previous hypothesis that this enzyme is possibly not involved in the ethanol metabolic pathway. Though the biological role of ALDOX is not yet precisely known, our data suggest that the higher ALDOX activity in D.simulans could confer to this species an adaptive advantage over D.melanogaster in environments where other aldehyde substrates are present in large concentrations.

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Latorre, A., R.deFrutos & L.Pascual. Universidad de Valencia, Espana. Loci activity in three A chromosomal arrangements of Drosophila subobscura.

The authors who have studied the patterns of puffing activity in several Drosophila strains carrying different chromosomal aberrations found that, in general, chromosomal arrangements do not affect puffing (see revision of Ashburner & Berendes 1978). A great similarity in the puffing patterns of species carrying different inversions was also obtained by Moriwaky & Ito (1969). However, deFrutos & Latorre (1982) found some differences in the puffing patterns of two different U chromosomal arrangements.

In the present work, patterns of puffing activity of the sex chromosome of three strains are statistically compared. The strains studied were: H271, from a locality near of Helsinki (Finland), which is homozygotic for the A_{st} arrangement; Ra121, from Las Raices, Canary Islands (Spain), which is homozygotic for the A_2 arrangement and R225, from Ribarroja, Valencia (Spain), which was fixed in homozygous for the A_1 chromosomal arrangement. The study was carried out at the 0h. prepupa stage, which coincides morphologically with the eversion of the anterior spiracles. A total of 50 preparations were prepared per strain. Of these, only the females were analyzed. Thus, a total of 33 preparations for A_{st} chromosome,