ly constant in all cell cultures (see Table 1). It means that the cells with one X chromosome have fumarase activity per X chromosome two times higher than the cells with 2X chromosomes. The change of ratio between X chromosomes and autosomes from 1 to 0.5 causes the "switching" of gene activity from the low level to the high which means the existance of dosage compensation on the cell level (see Table 1).

The same data obtained for 6PGD varied greatly from passage to passage and from experiment to experiment. For instance, in 67j25 cell lines and KcH the ratio between 6PGD and α-GPDH activities was fluctuating from 1.8 to 4 and from 2 to 6.4, respectively.

Detection of dosage compensation on cell level will make it possible to make further investigation of this phenomenon.

References: Echalier, G. and A. Ohanessian 1970, In vitro 6(3):162-172; Kakpakov, V.T., V.A. Gvozdev, T.P. Platova and L.G. Polukarova 1969, Genetika 5:67-75; Luccheci, J.C. and Rawls, Jr. 1973, Bioch. genet. 9:41-51; Pipkin, S.B., P.K. Chakrabartty and T.A. Bremner 1977, J. Hered. 68:245-252.

Osipova, N., L. Korochkin, M. Golubovsky, T. Khlebodarova and V. Kulutchkov. Institute of Cytology and Genetics, Novosibirsk, USSR. Biochemical-genetical investigation of the unstable locus lozenge in D. melanogaster.

The following stocks of D. melanogaster have been investigated: Oregon R - wild type. Lozenge 50 (stable allele) - eye narrower than wild type and ovoid, facets are absent; females are fertile. Lozenge A (unstable allele) - males are characterized by oval small eyes; facets are absent, tarsal claws reduced; females are sterile. Stock A+1 (stable allele A^+) - reverse of unstable lzA to wild type (A^+); phenotype of males is identical to the wild type. Stock B+5 (stable allele A^+) - revertant of unstable lzA to the wild type; males are phenotypically identical to stocks Oregon R and A+1. In all stocks (except Oregon R and lz50) males cross to females $\widehat{XX}$ (linked X chromosomes) with markers w of ywf. The development of flies was synchronized beginning with the stage of white pupa (the formation of puparium). The pupae have been investigated in different times after pupariation. We detected the activity of phenol oxidase (Mitchell 1966) and pattern of isozymes of this enzyme, using the microelectrophoretic method (Korochkin et al. 1977).

Table 1. Changes of the activity of phenol oxidase during the development of pupae of D. melanogaster.

Age of pupae (hours)	Total activity of phenol oxidase (units of act./mg/min)				
	Oregon R	lozenge A	A+1	lz50	B+5
0	43.5±0.5	18.0±1.0	29.5±0.5	34.0±1.0	32.5±1.0
24	17.5±1.1	22.5±1.2	21.0±0.5	16.8±1.0	21.5±1.5
48	23.0±0.5	30.0±1.0	24.5±1.25	17.8±1.0	15.1±1.0
72	26.0±1.0	28.0±1.0	23.5±1.0	23.0±1.0	28.1±1.8
96	17.5±1.0	12.5±0.7	11.5±0.5	17.0±0.2	10.0±0.5

Table 2. Ratio A_2/A_1 fractions of phenol oxidase during the development of pupae of D. melanogaster.

Age of pupae (hours)	Ratio A_2/A_1				
	Oregon R	lozenge A	A+1	lz50	B+5
0	0.76±0.07	---	0.71±0.07	0.50±0.05	0.65±0.12
24	1.20±0.04	3.70±0.40	0.78±0.08	1.54±0.02	1.02±0.11
48	0.98±0.10	1.43±0.14	1.28±0.19	1.67±0.30	0.87±0.05
72	0.44±0.14	0.07±0.06	0.83±0.21	2.25±0.30	1.05±0.24
96	2.02±0.31	---	0.61±0.05	1.05±0.24	0.65±0.05

The results of the detection of enzymatic activity are depicted in Table 1. The similarity of changes of enzymatic activity in stocks Oregon R and lz50 can be seen.

The unstable stock lzA is characterized by the low level of enzymatic activity on the stage of white pupae and in 96 h after pupariation and by the high level of the activity of phenol oxidase during the middle pupal period.

It is interesting that the pattern of enzymatic activity during the development of two reversible stocks is different on the stage 48 h after pupariation. In this period the enzymatic activity is higher in stock A+1 in comparison with stock B+5 (see Table 1).

Reversible stocks differ from the unstable stock 1zA, which is their ancestor. These differences are especially distinct during pupariation and 48 h later. In the first stage of pupal development the activity of phenol oxidase is higher in reversible stocks in comparison with 1zA ($P > 0.999$) but 48 h later the enzymatic activity is higher in stock 1zA. The similar pattern of changes of the enzymatic activity in the reversible stock A+1 and Oregon R was established.

After microelectrophoretic investigations and densitometry we determined the ratio A_2/A_1 - fractions of phenol oxidase. The results are shown in Table 2. Stock Oregon R is characterized by the predominance of A_1 fraction (monophenol oxidase). The ratio $A_2/A1$ in this time is equal to 0.76 ± 0.07. Then (24 h after pupariation) the activity of the fraction A_2 (diphenol oxidase) is higher. The total enzymatic activity decreases in this period (see Table 1). Probably this process is caused mainly by the change of activity of monophenol oxidase. However, in the following stages of pupal development (48 h and 72 h after pupariation) the ratio A_2/A_1 decreases again. In this period the total enzymatic activity increases and we suggest that the activity of A_2 fraction is not changed and the activity of A_1 fraction increases. The activity of A2 fraction is twice that of A_1 at 96 h after pupariation. The total enzymatic activity is relatively low in this period. Probably the predominance of A_2 fraction is explained mainly by the decrease of activity of monphenol oxidase. It can be proposed that the changes of the enzymatic activity and the pattern of phenol oxidase isozymes is caused by the changes of the level of activity of monophenol oxidase.

Unstable stock 1z50 is characterized by the specific change of the pattern of isozymes of phenol oxidase during ontogenesis. In this stock diphenol oxidase is absent during puparium formation. Its activity is detected at 24 h after pupariation and is very high at this time (ratio A_2/A_1 is 3.7 ± 0.4). Monophenol and diphenol oxidases are present at 48 h after pupariation. However, the activity of A2 fraction sharply decreases at the end of pupa development. Diphenol oxidase is not detected at 96 h after pupariation. The activity of diphenol oxidase is not detected in the unstable stock 1zA during pupariation and 72 and 96 h after pupariation. The pattern of changes of the ratio A_2/A_1 in the unstable stock 1z50 is different from Oregon at this time, although the total activity of enzyme is similar. Unlike the Oregon R stock, 1z50 is characterized by the predominance of diphenol oxidase at 72 h after pupariation (ratio A_2/A_1 is 2.25 ± 0.3), but the activity of monophenol oxidase is higher at 96 h (A_2/A_1 is 0.61 ± 0.08). The ratio A_2/A_1 in this case at 72 h after pupariation is intermediate between Oregon and 1z50.

We conclude that the unstable stock A has some specific capacities in the pattern of changes of activity of phenol oxidase and pattern of isozymes of phenol oxidase during development and is different from the stable stock 1z50, reversible stocks and wild stock Oregon. Probably the instability of locus 1z is explained by the insertion and exclusion of a strange segment of DNA into the region of this locus. In this case the regulatory effect of locus 1z on the ratio A_2/A_1 is changed.

References: Korochkin, L. et al. 1977, Genetics of Isozymes, Nauka, Moscow (in Russian); Mitchell, H. 1966, J. Insect Physiol. 12:755.

Platt, S.A. Northern Michigan University, Marquette, Michigan and University of Illinois, Champaign, Illinois. Discrimination learning in individual D. melanogaster.

By using a unique methodology and a versatile series of choice points in two distinct apparatus, individual Drosophila were shown to possess the ability to learn (Platt, Holliday and Drudge 1980). This behavior can be controlled by a discriminative stimulus (substrate texture). Following a correct response in the presence of the discriminative stimulus at a horizontal choice point, D. melanogaster bred for negative geotaxis in a Hirsch-type geoselection maze were given the opportunity to ascend a vertical alley leading to another choice point. When cues were consistent reliable learning occurred. When cues were inconsistent learning did not occur. Cue reversal produced the classic temporary increase in "incorrect" responses.

The apparatus is inexpensive and versatile. It is described in a technical note herein (Platt and Holliday). We believe there are several factors responsible for our successful demonstration of discrimination learning in D. melanogaster. In general, we took an ethological perspective that the association of a discriminative stimulus with some response pattern would be possible if, and only if, we did not elicit tropistic or escape responses.