Zamburlini, P. University of Padua, Italy.

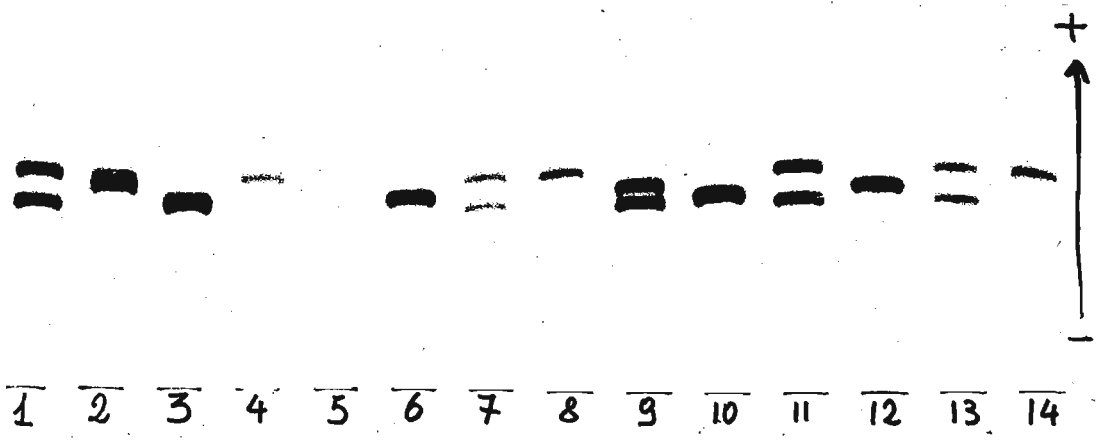
The polymorphism of Est-6 in a wild population of Drosophila simulans.

The polymorphism of the enzymatic system Esterase-6, described in Drosophila melanogaster and Drosophila simulans by Wright and MacIntyre (1963) was investigated in a wild population of Drosophila simulans by acrylamide-gel electrophoresis. The traps were placed in a garden biotope in the surroundings of Udine (North-East of Italy) during the summer. Single flies were homogenized in Tris-EDTA-borate buffer (pH 9.0) and contrifuged at 15,000 rpm; the supernatant was used for the electrophoretic analysis of the enzyme.

Electrophoresis was carried out in vertical acrylamide-gel slab in continuous Tris-EDTA-borate buffer, (pH 9.0) at constant current of 40 mA for 70 minutes, in the cold (4°C).

Except for a few slight modifications, the technique used for the detection and the characterization of the enzyme was the same as that described by Wright (1963). Zymograms of single-fly homogenates show that the wild population of Drosophila simulans investigated contains four forms of the enzymatic system Esterase-6, each showing different electrophoretic mobility; from the cathode to the anode: Est-$6^4$, Est-$6^3$, Est-$6^2$, and Est-$6^1$.

Figure 1 shows zymograms of single-fly homogenates: in the same slab, homozygous Est-$6^3$/Est-$6^3$ (samples 3, 10), Est-$6^2$/Est-$6^2$ (samples 6, 12), Est-$6^1$/Est-$6^1$ (samples 4, 8, 14) are presented, along with the heterozygous Est-$6^1$/Est-$6^4$ (samples 1, 5, 7, 11, 13), Est-$6^1$/Est-$6^2$ (sample 2) and Est-$6^2$/Est-$6^4$ (sample 9). The four forms of Esterase-6 system just described




are heat-stable at 60°C for 10 minutes; they are also insensitive to $10^{-2}$ M $AgNO_3$, $10^{-3}$ M $CuSO_4$ $10^{-2}$ M EDTA; they are slightly inhibited by $10^{-4}$ M eserine sulfate.

Unfortunately, a direct comparison with the Est-6 forms described by Wright and MacIntyre (1963) in Drosophila simulans is impossible at the moment.

Table 1 shows the allele frequencies found in the wild population investigated.

Table 1

| Est-$6^1$ | Est-$6^2$ | Est-$6^3$ | Est-$6^4$ |
|---|---|---|---|
| 0.057 | 0.545 | 0.093 | 0.303 |

Table 2 shows the observed values for the 10 genotypes tested against the values expected in a Hardy-Weinberg distribution, in a total sample of 252 individuals.

Table 2

| Est-$6^1$/Est-$6^1$ | Est-$6^2$/Est-$6^2$ | Est-$6^3$/Est-$6^3$ | Est-$6^4$/Est-$6^4$ | Est-$6^1$/Est-$6^2$ | |
|---|---|---|---|---|---|
| 2 | 81 | 10 | 35 | 16 | observed |
| 0.75 | 74.84 | 2.01 | 22.93 | 15.62 | expected |
| Est-$6^1$/Est-$6^3$ | Est-$6^1$/Est-$6^4$ | Est-$6^2$/Est-$6^3$ | Est-$6^2$/Est-$6^4$ | Est-$6^3$/Est-$6^4$ | |
| 3 | 6 | 22 | 75 | 2 | observed |
| 2,52 | 8.56 | 25,20 | 83.16 | 14.11 | expected |

The disagreement between the observed and the expected distributions is very significant ($P<0.001$). It is mainly due to an excess of homozygous genotypes. This situation is difficult to explain; one possibility is that the sample is, for instance, a mixture of different populations. However the presence of non-random mating cannot be excluded.

References: Wright, R.F. and R.J. MacIntyre, 1963 A homologous gene-enzyme system, Esterase 6, in Drosophila melanogaster and D. simulans. Genetics 48: 1717-1726.

Koliantz, G. University of Tehran, Iran.

Spontaneous changes on second chromosome of Drosophila melanogaster.

A previously localized stock (six years ago by our curator of stocks) which exhibits curvature of wings (Cy), bright red eye color (cn) and a recessive lethal gene on the second chromosome, has been recently relocated.

Virgin females from this stock were crossed with brown males. In the $F_1$, brown and Curly flies with the ratio of 50-50 appeared. The $F_1$ was divided into three lines:

First line: $F_1$ brown females backcrossed with their mothertype flies; in the $F_2$ Curly-cinnabar, Curly, brown and white eye flies appeared.

Second line: $F_1$ Curly females backcrossed with their mothertype flies. The offspring of the $F_2$ were Curly, Curly-cinnabar and brown.

Third line: $F_1$ Curly females produced wild type and Curly-cinnabar when crossed with the cinnabar (Tehran) pure stock.

Genotypical properties: The existence of a deficiency on the right arm of the second chromosome causes the appearance of brown phenotype in the main cross (Table 1).

Table 1

| females | males | $F_1$ genotypes | $F_1$ phenotypes |
|---|---|---|---|
| Cy cn +/+ cn Df | bw/bw | Cy cn +/+ + bw<br>+ cn Df/+ + bw | Curly wings<br>brown eye color |

By the cross of the first line we demonstrated that crossing over occurred in the + cn Df/ + + bw genotype (Table 2).

Table 2

| females | males | $F_1$ genotypes non C.O. | $F_1$ genotypes C.O. |
|---|---|---|---|
| + cn Df/+ + bw | Cy cn +/+ cn Df | + cn Df/Cy cn +<br>cn Df/cn Df*<br>+ + bw/Cy cn +<br>+ bw/cn Df | + + Df/Cy cn +<br>+ Df/cn Df*<br>+ cn bw/Cy cn +<br>cn bw/cn Df |

* lethal

By other crosses, when + bw/cn Df x + bw/cn Df produces brown flies and when a crossing-over occurs, we obtain flies with white eyes which have the genotype cn bw/cn Df. All of the white eyed females are sterile but such males show normal fertility.

The results of the second line indicate that no crossing over takes place in the right arm of the second chromosome with the Cy cn +/+ + bw genotype, and in crosses such as Cy cn +/ + + bw x Cy cn +/+ + bw only brown and Curly individuals appear as the offspring (Table 3).

Table 3

| parents | offspring | |
|---|---|---|
| Cy cn +/+ + bw | 2 | Cy cn +/+ + bw |
| | 1 | + + bw/+ + bw |
| | 1 | Cy cn +/Cy cn +* |

* lethal

The cross of the third line demonstrates that the genotype of the flies is Cy cn +/+ + bw.

By a comparison of the given data, we conclude that there is a suppressor of crossing over on the right arm of the second chromosome. Therefore final genotype of the stock would be Cy cn C +/+cn + Df(2R)59D2-5;59E1-3.

The cultures were kept at $24^{\circ}\pm1$ C under constant light on Mostashfi medium.

References: Koliantz, G., 1968 The frequency of spontaneous visible mutations in Iranian natural populations of D. melanogaster; Lindsley, D.L. and E.H. Grell, 1968 Genetic Variations of Drosophila melanogaster.