The comparison of the induced and spontaneous frequencies of somatic mosaicism for the abdomen and the eye-antennal, prothoracal and wing imaginal disk derivatives in *Drosophila melanogaster*.

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The somatic recombination of the recessive on the homozygous X-chromosomal marker genes in *D. melanogaster* individuals is widely used in the test systems for chemical compounds mutagenic activity.

We studied the induced and spontaneous frequencies of the *y* and *sn* spots, appearing as a result of somatic mutations and recombinations in the *y* + +/+ *w sn*^{3} females' abdominal tergites and imaginal disk derivatives: head, notum, humerus and sternopleura. It is expected that the mosaic spots registration on the head, notum, humeras, sternopleura and on the abdomenal tergites will allow identification of mutagens, which require or do not require metabolic activation. The stable will affect primarily the abdominal cells, which start division during the prepuparitation, and less affect the imaginal disks cells, which start division earlier (in 15 - 17 hours after the larva hatching). The direct acting unstable mutagens (which do not need metabolic activation) will affect both the imaginal disks derivatives and the histoblasts nests derivatives in the abdomen.

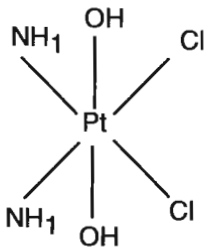

Figure 1. Structural formula of oxoplatin.

In the course of the experiment the *y* females × *w sn*^{3} males were crossed. The parents were placed into the standard vials with 10 ml of the agar-yeast nutrient medium for a period of 30 hours under a temperature of 25 °C. Upon this period the parents were taken out, and the newly hatched first instar larvae (F_1) were put to experimental use. In the case of the induced mosaicism the nutrient medium with the first instar larvae was treated by the 2 g/l oxoplatin solution (the anti-tumor drug, which is a strong mutagen of the platinum family). For its structural formula see Figure 1. The rate of induced mosaicism was compared to that of untreated control. For details see Reference 1.

The *y* + +/+ *w sn*^{3} females from the F_1 were examined and the *y* and *sn* macrochaeta spots were registered. On the imaginal disks derivatives the 7 head macrochaetes, 2 humeral, 11 notal and 2 sternopleural ones on each side were taken to account (44 macrochaetes total). On the abdomen the 11 macrochaetes of the posterior row on each side on the segments II-VI were considered (110 macrochaetes total). The spot localization was presented by a small scheme. The results of the experiments are shown in Table 1.

Table 1. Induced and spontaneous mosaic spots frequencies on the imaginal disks derivatives and abdomen of the *y* + + / + *w sn*^{3} females.

	Spontaneous mosaicism			Induced mosaicism (oxoplatin, 2g/l)		
Females observed	4053			625		
Mosaic spots and their frequencies Spots localisation	y (p, %) [p_1, %]	sn (p, %) [p_1, %]	Σ spots (p, %) [p_1, %]	y (p, %) [p_1, %]	sn (p, %) [p_1, %]	Σ spots (p, %) [p_1, %]
Head, humeras, notum, sternopleura	12 (0.296)* [6.729×10^{-3}]	29 (0.716)* [1.626×10^{-2}]	41 (1.012)* [2.300×10^{-2}]	145 (23.200) * [0.527]!	203 (32.480)* [0.738]!	348 (55.680) * [1.265]!
Abdomen	49 (1.209) * [1.099×10^{-2}]	62 (1.530) * [1.391×10^{-2}]	111 (2.739) * [2.490×10^{-2}]	263 (42.080) * [0.383]!	278 (44.480) * [0.404]!	541 (86.560) * [0.787]!
Total	61 (1.505) * [9.773×10^{-3}]	91 (2.245) * [1.458×10^{-2}]	152 (3.750) * [2.435×10^{-2}]	408 (65.280) [0.424]	481 (76.960) [0.500]	889 (142.240) [0.924]

The differences between the pairs of frequencies within same column marked by asterisk (*) or by notes of exclamation (!) are significantly different in the Fisher's test at 1% significance level. p is the somatic mosaicism frequency per 1 female, %, p_1 is the somatic mosaicism frequency per 1 macrochaeta, %, p_1 = spots number/ (females number x macrochaetes number on the given structure), where macrochaetes number = 44 for head, humeras, notum and sternopleura taken together, 110 for abdomen and 154 for total flies.

Table 2. The χ^2 values at 1 degree of freedom for H_0 about 1:1 *y* and *sn* mosaic spots ratio on abdomen and on the head, notum, humeras, sternopleura in cases of spontaneous and induced mosaicism.

	Spontaneous mosaicism	Induced mosaicism
Imaginal disks derivatives	7.048 p< 0.01	9.666 p< 0.005
Abdomen	1.523 p> 0.10	0.416 p> 0.50

It was shown that:

1. The somatic mosaicism frequencies per 1 fly are significantly higher for abdomen than for other studied areas of the fly surface both in spontaneous and induced mosaicism cases (see Table 2). Therefore, observing of abdomen, which carries many more macrochaetes in comparison with other studied structures, considerably improves the test resolution. The increase in the number of bristles taken into account has the same effect as with increased number of flies examined.

2. The somatic mosaicism frequencies per 1 macrochaeta have no statistically significant differences for abdomen and imaginal disks derivatives both in case of induced and spontaneous mosaicism.

3. It's known that on the imaginal disks derivatives in $y + +/+ w\ sn^3$ heterozygotes the mosaic spot frequency *y* is higher than the mosaic spots frequency of *sn* (Stern, 1936). This regularity remains also for the imaginal disk derivatives in $y + +/+ w\ sn^3$ *vg/vg* heterozygotes both in the case of induced and spontaneous mosaicism. However, the *y* and *sn* mosaic spot frequencies obtained from the abdominal macrochaetes are related as 1:1 both in the case of induced and spontaneous mosaicism (see Table 2).

References: Ref. 1, 1982, Metodicheskie rekomendatsii po primeneniu somatichestogo mutagenesa u *Drosophila Melanogaster* v kachestve test-sistemi dlia uskorennogo opredelenia kanzerogenov, - M. MZ USSR, 1982; Stern, C., 1936, Genetics, 21: 625-730.

The behavior of *Drosophila pavani*, *Drosophila gaucha*, and their reciprocal hybrids in stressful environments.

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Drosophila pavani and *D. gaucha* are two sibling species that with another six constitute the *mesophragmatica* group; these species are endemic to South America (Val *et al.*, 1981). They are predominantly Andean in their distribution. In addition, *D. pavani* and *D. gaucha* may produce abundant interspecific hybrids under laboratory conditions; these hybrids are, however, sterile (Brncic and Koref-Santibañez, 1957). In the present study we compare the behavior of *D. pavani*, *D. gaucha* adult flies and their reciprocal hybrids in a reduced space in the presence and in the absence of food. The aim of this investigation is to inquire whether adults of these four types of genotypes exhibit a similar behavior in response to stress. It is important to investigate this type of problem because behavioral changes under stress conditions may reveal information on the role of behavior in determining patterns of geographical distribution (Hoffmann and Parsons, 1994). Under environmental stress the parental species may show a similar behavior, but the species hybrids may exhibit a different one. In this case we could infer that the species differ genetically in the control of the behaviors observed.

We used strains originated from adults collected in Chillán (*D. pavani*) and Buenos Aires (*D. gaucha*). Virgin flies of those strains were reciprocally crossed and the behavior of F_1 adults of the four types of genotypes (p × p, g × g, p × g, and g × p) was observed in vials of 18 and 36 cm^3 in volume. The flies used were grown individually in isolation vials filled with 4 cm^3 of culture medium. Once filled with the medium, the vials had 36 cm^3 of free space; they will henceforth be called "big space vials". In one experiment, adult flies of the Chillán and Buenos Aires strains were introduced individually in "virgin" big space vials and their behavior was observed for 2 min. In another experiment, the flies were introduced in vials with food where the available space was 18 cm^3 ("reduced space vials"), and their behavior recorded for 2 min. In a third experiment, flies of the mentioned strains were individually introduced in reduced space vials without food