

Barigozzi, C. and Sari Gorla M. University of Milan, Italy. Mitotic recombination in *Drosophila melanogaster*.

Freckled (Frd; 2; 102) in male sex, when heterozygous in cis or in trans with several chromosomal abnormalities of the 2nd chromosome (Cy, Gl, M(2)33a), gives rise erratically to unexpected segregation which sometimes comprise recombinants. As example, the following cases are here presented: 1) 8 pairs σ $\frac{\text{Frd M(2)33a}}{+}$ x ϕ $\frac{+}{+}$ produced in 7 cases normal offspring (Frd M(2)33a and + + in equal proportions) and in 1 case 106 + + and 60 Frd (one parental and one recombinant class lack, and the other recombinant is unexpectedly frequent). If one assumes that mitotic recombination has occurred very early in the embryo, the results quoted above can be easily understood: mitotic recombination followed by sorting out of the two chromatids + + and Frd + (according to Stern mechanism) can have produced a gonadic tissue consisting only of two classes of cells (higher advantage of + + gametes over the Frd + ones can explain the significant difference between 106 and 60).

2) σ $\frac{\text{Cy Frd}}{+}$ x ϕ $\frac{+}{+}$ (1 pair) produced 3 Cy Frd, 1 Cy +, 55 + Frd and 54 + +. These results can be interpreted as the gonadic tissue being derived from two cells. Most of them may have derived from a cell characterized by one parental chromosome and by one of the two recombinants. A minority, however, must come from one cell containing the other two chromosomes (Cy Frd and Cy +); there Cy is present in double dose, so the genotype is nearly lethal: its rarity is thus explained.

These types of segregation never occurred when Frd is heterozygous with Cy L, which is well known for its ability to eliminate recombinants.

A somewhat different effect gives heterozygosity with Pm. Crossing-over in male meiosis seems here to occur homogeneously in all cultures at low rate, in the chromosome section located between the right break of Pm and Frd.

During the feminine meiosis the phenomenon occurs, but more weakly. In the absence of structural abnormalities, Frd behaves normally, and no recombinations occur in males. In the presence of inversions in the 1st chromosome (M-5) or in the 3rd (Sb M $\frac{2}{3}$ /H) no mitotic recombination has been found.

We may conclude that Frd has the peculiar property of inducing mitotic recombination in the early development. The presence of Frd male sex and some structural abnormalities, which can be responsible for disturbance in chromosome contact, seem to be critical in causing mitotic recombination.

The reason why Frd is capable of such activity in those conditions remains unexplained.

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"brown spots" (bsp) is characterized by superficial pigmented areas restricted to pleurae (DIS 37:40). These brown areas are variable in size and can be reduced to dot-like spots (dottings);

without exception, they appear only in the female after copulation. Following artificial stimulation (introduction into the vagina of a thin glass needle) "brown masses" appear, consisting of small pigmented masses, which are located deeper than the spots. They are scattered throughout the whole body.

Brown spots begin to appear at the 2nd hour after copulation, and their manifestation is complete at the 6th hour. Brown masses begin again at the 2nd hour after artificial stimulation, but require 24 hours to complete their formation. They are more precocious when located in the abdomen.

Histological examination of spots revealed that the structure of the cuticula is normal, and only the cupulae are thicker and pigmented. The difference between spots and dottings consists only in a different number of thick cupulae, which is very low in dottings. Spotted flies show sometimes a brown layer added to the vaginal wall.

The histological examination of the brown masses has shown that pigmented small masses are present not only in the cuticula, but also in the epidermis, in the connective tissue and, sometimes, in fat and muscle. Pigmented masses are found also (in variable number and size) in different abdominal organs (intestine, uterus, tracheae). The pigmented masses in the epidermis and the other tissues mask the histological structure. Small pigmented masses are found attached to cuticula, to the muscle elements and to the intestinal wall of the thorax.