THE BEHAVIOR OF VERMILION-SUPPRESSOR IN MOSAICS

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It is a point of interest whether the suppressors of the effects of mutant genes affect development in the same way as do the wild-type allelomorphs of these genes, or behave in some other manner. The case of vermilion-suppressor in *Drosophila melanogaster* presents the advantage for the study of this problem that the suppressor is known to be a recessive mutant gene at another locus, and not a duplicating wild-type allelomorph of vermilion (Schultz and Bridges, 1932).

The gene vermilion has the peculiarity (Sturtevant, 1920) that, in mosaics, not only the genetic constitution of the eye, but also that of the rest of the fly, determines the color of the mosaic patch. Tissue that is genetically wild type in such a mosaic, however, is "self-differentiating;" its characteristics are determined, as Sturtevant points out, by its own genetic constitution. The behavior of vermilion-suppressor in mosaics therefore provides a test of the similarity of its behavior to that of the wild-type allelomorph of vermilion.

Two series of experiments were carried out. In one set, males containing the genes vermilion-suppressor, apricot, crossveinless, vermilion and forked, were made heterozygous for a duplication covering the suppressor. This duplication (134), found in an x-ray experiment by Dr. Th. Dobzhansky, belongs to the group of eversporting chromosome rearrangements, and thus frequently gives mosaic patches. In the presence of Duplication 134 the color of the eyes of the flies in question was apricot vermilion. Those cells from which this duplication was lost, however, are genetically vermilion-suppressor as well as apricot vermilion, and whole flies of this type are apricot suppressed-vermilion (brown instead of lemon-yellow). In a series of about a thousand such males, no apricot spots (i.e., with vermilion suppressed) were found. This evidence was not regarded as entirely conclusive, however, since Duplication 134 gives quite small patches, and since in these experiments there could be no independent method of checking the genetic constitution of a given piece of tissue.

Accordingly, females of the constitution vermilion Minute-*n*/vermilion-suppressor apricot crossveinless vermilion forked were synthesized. The Minute-*n* chromosome is frequently eliminated (Bridges, 1925), so females carrying this chromosome often show mosaic patches in which only the not-Minute-*n* sex chromosome remains. As Bridges has shown, in these

Minute-*n* mosaics, vermilion behaves just as in ordinary gynandromorphs, that is, may fail to show in tissue genetically vermilion. In the present case, the patches are of the genetic constitution vermilion-suppressor apricot crossveinless vermilion forked. The characters apricot and forked serve as aids to the detection of such spots in the head; in the mosaic a few apricot ommatidia are clearly distinguishable in the vermilion eye, as are the forked bristles from their Minute neighbors. Moreover, in the larger patches occasionally occurring, the characteristic apricot color is clearly distinguishable from the lemon-yellow of the apricot-vermilion combination. The ability to make this distinction is crucial; for if the action of vermilion-suppressor is dependent on factors outside the cell which is the site of reaction, the mosaic tissue should appear apricot vermilion. But if it behaves like the normal allelomorph of vermilion, that is, if the occurrence of its particular chain of reactions depends on the genetic constitution of the cell involved, such mosaic patches should be apricot, not apricot vermilion.

Fifteen individuals with mosaic eyes were obtained. In thirteen of these the patches were definitely apricot vermilion, four involving from one-fourth to one-half the eye. The two remaining cases were doubtful, since very small patches were concerned. It is clear that the suppressor of vermilion shows the same dependence on factors outside the mosaic tissue as does vermilion, and is not autonomous in its developmental effects, thus differing from the normal allelomorph of vermilion.

This fact indicates that the suppressor operates on a stage of the reaction other than that at which the difference between wild type and vermilion is established. It is interesting in this connection that the color changes in the pupal development of the eye of flies in which vermilion is suppressed resemble those of the wild type, not those of vermilion. The effect of the suppressor must therefore be exerted before the onset of pigment formation.

LITERATURE CITED

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