

Tokunaga, C. Lawrence Radiation Laboratory, University of California, Berkeley, California. The effect on somatic crossing over of an ey^D insertion into chromosome 3.

In an earlier study Stern and Tokunaga (1967) described a striking example of nonautonomy in the differentiation of the multiple sex comb pattern of ey^D males. The evidence was based on the appearance of sex comb differentiation in genetic mosaics consisting of ey^D and not- ey^D areas. The genetic constitution of the zygotes was $y;T(1;3;4)sc^{J4}ey^D/+$ where the X chromosome carried y and one of the third chromosomes carried y^+ of the sc^{J4} translocation at its left tip and ey^D inserted in region 70C of the salivary map. The other third chromosome was normal. Somatic crossing over to the right of ey^D , i.e. between ey^D and the kinetochore can result in a $y;not-ey^D$ constitution and crossing over to the left of ey^D in $y;ey^D$. Both constitution may be recognized as yellow spots on a y^+ background. They could be distinguished from each other provided not- ey^D behaved autonomously on the ey^D background. As, however, the great majority of yellow spots formed multiple sex combs it was concluded that $y;not-ey^D$ spots behaved nonautonomously so that they could not be distinguished from $y;ey^D$ spots. An estimate of the relative frequency of the two kinds of y spots was based, in an independent experiment, on the relative frequency of somatic crossing over to the right and left of h , (3-26.5, salivary map unit 66D), this gene having been substituted for ey^D . Hairy (h) behaves autonomously in mosaics and the occurrence of h spots was studied on the scutellum of $y;T(1;3)sc^{J4}/h$ males. Sixty five spots that included at least one macrocheata were clearly recognizable as yellow. Of these, 45 were hairy and 20 were not-hairy giving a ratio of crossing over to the right and the left of h as 45:20 or more than 2:1.

It has been suggested that the ratio of right to left crossovers in the preceding experiment with h may not be a reliable index for the ratio in the main experiment which involved the insertion of ey^D . This was tested by a new experiment in which both ey^D and h were present. Among 3329 males of the genotype $y;T(1;3;4)sc^{J4}ey^D$, 36 had mosaic scutella exhibiting a yellow spot which included at least one macrochaeta. Of these spots, 28 were hairy and 8 were not-hairy, giving a ratio of crossing over to the right and the left of h as 28:8 or more than 3:1. This ratio does not differ significantly from that found in flies without the ey^D insertion. It is concluded that the estimate of the somatic crossing over ratio to the right and the left of ey^D that forms the basis of the interpretation of nonautonomy of the not- ey^D effect in sex comb mosaics is a valid one.

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Apparent heterosis in the second chromosome of D.m.

From two wild Amherst isofemale strains, pure slow and pure fast α -glycerophosphate dehydrogenase lines, respectively, were obtained. These were crossed, and the F_1 's were backcrossed to each parent line in each direction. Uncrowded (25-50 eggs per vial) and crowded (400 eggs per vial)

backcross progeny were examined. All flies emerging from each vial were counted.

Table 1

Numbers of each genotype among flies tested and survival

Cross	Genotype	N		Adults/Eggs*	
		Crowded	Uncrowded	Crowded	Uncrowded
Slow x F_1	FS	575	270	0.31	0.72
	SS	481	260		
F_1 x Slow	FS	561	283	0.42	0.79
	SS	505	272		
Fast x F_1	FS	563	289	0.34	0.83
	FF	258	271		
F_1 x Fast	FS	534	303	0.27	0.88
	FF	337	309		

* In all crosses, about 94% of the eggs hatched (137-142 of 150)

The data in Table 1 suggest density-dependent heterosis. Moreover the heterozygotes emerged much earlier than fast homozygotes in crowded, but not in uncrowded, vials. We have no evidence that the α -glycerophosphate dehydrogenase locus is itself involved in the apparent heterosis: indeed comparison of reciprocal cross result in Table 1 tends to suggest a contribution some distance away, since the excess of heterozygotes is not so great when the F_1 parent permitted crossing over.

The multiple applicator (see Technical Notes, this issue) was used.