Gerasimova, T.I. and L.V. Matyunina. Inst. of General Genetics, USSR Academy of Sciences, 117908 Moscow, USSR. Simultaneous reversion of three unstable alleles at loci yellow, white, singed.

Among derivatives of unstable ct^{MR2} stockof great interest is the line $y^{MR19}w^{MR19}ct^{MRpN19}$ which contains three unstable mutations at loci yellow (0.0; 1AB), white (1.5; 3C2) and cut (20.0; 7B3-4). This line has a specific feature: the vast majority of revertants are triple and carry mutations at the locus singed (21.0; 7D1-2) $-y^+w^+ct^+sn$. Among 19,200 flies of the homozygous line $y^{MR19}w^{MR19}ct^{MRpN19}$, we observed seven independent revertants of the $y^+w^+ct^+sn$ type and only one $y^+w^+ct^{MRpN19}$ revertant; i.e., coordinated mutational events involving four loci occurred in the chromosome $y^{MR19}w^{MR19}ct^{MRpN19}$: mutations at the loci yellow, white, cut reverted to the wild type and simultaneously there was a mutation at the locus singed.

In the progeny from $y^{MR19}w^{MR19}ct^{MRpN19}$ females mated to males of the P-containing line (MRh12/Cy); the reversion frequency increased up to 2×10^{-3}. The effect of triple reversion remained but concomitant sn mutations disappeared. This indicates that the effect of triple reversion discovered in this work as well as the effect of double reversion discovered earlier (Gerasimova et al. 1984a) are associated with the nature of insertion mutations and concomitant specific mutagenesis depends strongly on the genotype and may change as the autosomal background is changed.

The allele ct^{MRpN19} and other ct-alleles arising from the parental line ct^{MR2} are induced by MDG4 (Gerasimova et al. 1984b). The nature of the yellow mutation is also found out (Gerasimova, DIS: this issue). The molecular nature of the transposon at the locus white is unknown, unfortunately.

The $y^{MR19}w^{MR19}ct^{MRpN19} \rightarrow y^+w^+ct^+sn$ reversion results in MDG4 excision from 7B region of the cut locus and MDG2 excision from the 1AB region of the locus yellow. X-chromosomes of the line $y^{MR19}w^{MR19}ct^{MRpN19}$ and of five independent revertants $y^+w^+ct^+sn$ were analyzed by in situ hybridization with MDG1, MDG2, MDG3, MDG4, copia, 5 to 20 individuals being analyzed in each case. The results are presented in Table 1. As seen from Table 1, the effect of triple reversion is a result of "transpositional bursts" (Gerasimova 1984c) which are accompanied by transposition of four mobile elements (MDG1, MDG2, MDG3, MDG4) and involve changes at four loci (y, w, ct, sn). The number of such transpositional events in the X-chromosome amounted to 18 including MDG excisions and incisions. Analysis of the data presented in Table 1 suggests a conclusion about high specificity of transpositions in the given family of related lines. Coordinated appearance or disappearance of several MDG hybridization sites was observed: for instance, simultaneous disappearance of three sites of MDG2-1AB, 2B, 3A hybridization in all analyzed revertants or simultaneous appearance of four new hybridization sites in the X-chromosome for MDG3 in the three independent revertants.

The nature of the effects of double and triple reversion as well as of coordinated disappearance or appearance of sites of hybridization of different mobile elements remains completely obscure, but it seems to be related to the structure of MDG themselves and to the nucleotide sequence of target genes (sites).

References: Gerasimova, T.I. 1981, Mol. Gen. Genet. 184:544-547; Gerasimova, T.I., L.V. Matyunina, Y.V. Ilyin, & G.P. Georgiev 1984a, Mol. Gen. Genet. 194:517-522; Gerasimova, T.I., Y.V. Ilyin, L.J. Mizrokhi, L.V. Semjonova & G.P. Georgiev 1984b, Mol. Gen. Genet. 193:488-492; Gerasimova, T.I., L.Y. Mizrokhi & G.P. Georgiev 1984c, Nature 309:714-716.

Table 1. Distribution of in situ hybridization sites on X-chromosomes of the $y^{MR19}w^{MR19}ct^{MRpN19}$ line and its derivatives.

Line	MDG1	MDG2	MDG3	MDG4	Number of transpositions
$y^{MR19}w^{MR19}ct^{MRpN19}$	3C,8A,15D, 19E,20	1AB,2B,3A, 5A,19E,20	2B,3E	7B	
$y^+w^+ct^+sn^{L1}$	3C,12A*, 19E,20	3C,5A,19E	8E,9E*	-	18
$y^+w^+ct^+sn^{P4}$	3C,9D*,20	5A,20	9A*,9E*, 13A*,19E*	-	15
$y^+w^+ct^+sn^{P5}$	3C,18A,20	5A,20	9A*,9E*, 13A*,19E*	-	15
$y^+w^+ct^+sn^{P6}$	3C,9D*,20	5A,20		-	9
$y^+w^+ct^+sn^{L2}$	3C,12A*, 19E,20	5A,20	9A*,9E* 13A*,19E*	-	14

"*" = similar sites of hybridization of different MDG in X-chromosomes of independent sn mutants.