Hodgetts, R.B. University of Alberta, Edmonton, Alberta, Canada. A cytogenetic description of three duplications in which portions of proximal 2L have been inserted into the Y-chromosome.

Three derivatives of Dp(2;Y)G, the aneuploid segregant from T(Y;2)G (Lindsley and Grell 1968) have been constructed. In Dp(2;Y)G, a region of 2L between 36B4-5 and 40F has been inserted into an arm (unknown) of the Y-chromosome. In the derivatives, most of the material in the inserted segment between the dopa decarboxylase locus ($Ddc^+$) and the heterochromatin has been deleted. As a result, the new duplications can be carried in either sex without the serious effects on viability and fertility experienced with Dp(2;Y)G. While the arm of the Y-chromosome into which the 2L fragment is inserted is not known, Y-fertility is unaffected by the translocations.

(a) Dp(2;Y)H1 $rdo^+$ $hk^+$ $Ddc^+$ $pr^-$ $lt^+$. This derivative was obtained following γ-irradiation of a stock carrying Dp(2;Y)G and contains a large deletion of the purple (pr) locus. The breakpoints of the deletion fall between the following limits: distal 37F4 - 38A1; proximal 29C2 - 39D1. Thus, the new order in Dp(2;Y)H1 is: 36B4 - 37F/39C - 40F.

(b) Dp(2;Y)H2 $rdo^+$ $hk^+$ $Ddc^+$ $pr^-$ $lt^+$. This derivative was also obtained from Dp(2;Y)G and like Dp(2;Y)H1, contains a γ-ray induced pr deficiency. The breakpoints of this deficiency fall between the following limits: distal 38B2 - 38C1; proximal 39E2-3. Thus, the new order in Dp(2;Y)H2 is: 36B4 - 38B/39E3 - 40F.

(c) Dp(2;Y)H3 $rdo^+$ $hk^+$ $Ddc^+$ $pr^-$ $lt^-$. This derivative was obtained from Dp(2;Y)H1 and contains a γ-ray induced deficiency for the light (lt) locus. The breakpoints of this deficiency fall between the limits: distal 37E2 - 37F1; proximal 40B2 - 40F. Thus, the new order in Dp(2;Y)H3 is: 36B4 - 37E/40.

We have used one of these duplications, Dp(2;Y)H1, in a recent work (Clark et al. 1978) where it was referred to as Dp(2;Y)$Ddc^+$.

References: Clark, W.C., P.S. Pass, B. Venkataraman and R.B. Hodgetts 1978, Molec. Gen. Genet. 162:287-297; Lindsley, D.L. and E.H. Grell 1968, Carnegie Inst. Wash. Publ. 627.

Ingham, P.W. University of Sussex, U.K. Genetic analysis of trithorax, trx, a new homoeotic mutant of D. melanogaster.

A spontaneous recessive allele, trx, defining a new locus on chromosome 3 has been isolated. The incomplete penetrance of the allele necessitated its being mapped by the selection and test crossing of individual recombinant chromosomes. An approximate localization was achieved by generating several different sets of reciprocal recombinants from 'rucuca'/trx ♀♀. This enabled the identification of cu (50.0 cMs) and Sb (58.2 cMs) as proximal and distal flanking markers respectively. 124 recombinants between these two loci were tested for the presence or absence of trx. The results are consistent with trx mapping to a single locus at 54.2 cMs (±0.4).

Penetrance and expressivity are highly variable. The phenotype consists of the homoeotic transformation of various adult structures. The most extremely affected individuals exhibit the following morphological changes. In the ventral prothoracic segment sternopleural bristles appear between the humerus and the first leg coxa. Transverse rows in the tibia are reduced in number or abolished; large apical and pre-apical bristles are present on the distal tibia (Fig. 1). In the basitarsus, there is a reduction in the number of transverse rows, and in males a concomitant decrease in the number of sex comb teeth. Similar changes in segment specific landmarks also occur in the third leg. The derivatives of the haltere disc are replaced distally by wing blade material and more proximally by notal and scutellar structures (Fig. 2).

The range and variety of the metathoracic transformations are closely analogous to the effects produced by ether phenocopying (Bownes and Seiler 1977; Capdevila and Garcia-Bellido 1978). The ventral prothoracic transformation has not previously been reported. The dorsal prothorax is apparently unaffected. Rotated genitalia and disruption of tergite pigmentation are also common in males.

At 25° the penetrance (P) of the selected homozygous line is 85%. However, there is a substantial maternal influence on penetrance; thus for homozygotes generated by crossing trx/+ ♀♀ with trx/trx ♂♂, P = 9%, while for the reciprocal cross of trx/trx ♀♀ with trx/+ ♂♂, P = 85%.


Fig. 1. SEM of transformed female. Right: lateral thorax showing sternopleural bristles (SP) above first and second legs. Top left: Detail of prothoracic sternopleurals. Bottom left: Apical and pre-apical bristles on distal tibia.

Fig. 2. SEM of dorsal surface of transformed fly showing extra notum and scutellum (arrowed) between scutellum and first abdominal segment.

Flies of the genotype trx/Df(3)red, produced by crossing trx/trx ♀♀ with Df(3)red/+ ♂♂ always show the transformation, and with high expressivity. This is suggestive of this deficiency including the trx locus, and is consistent with the map position obtained by recombinational analysis, red mapping at 53.6 cMs.

It is interesting that the mutant tetrapter, which is described as having at least some phenotypic characteristics in common with trx, was also mapped to a similar region of the genome (Lindsley and Grell 1968).

References: Bownes, M. and M. Seiler 1977, J. Exp. Zool. 199:9-24; Capdevila, M.P. and A. Garcia-Bellido 1978, Wilhelm Roux. Archiv. 185(2):105-126; Lindsley, D.L. and E.H. Grell 1968, Carnegie Inst. Wash. Publ. 627.

Itoh, K. St. Mariana University School of Medicine, Kawasaki, Japan. Lack of chromosomal polymorphism and low frequencies of unique inversions in D. simulans.

Four hundred and forty-nine wild inseminated females of D. simulans were collected in a month from August to September of 1975, on the campus of Kyushu University, Fukuoaka, Japan. They were individually kept in vials to establish iso-female lines. Salivary gland chromosomes of one larva from each line were cytologically examined within half a year to find any changes in gene sequences. Although polymorphic inversions were not detected even in a heterozygous condition, three unique inversions, one for each of the X, 2nd and 3rd chromosomes, were found. Since D. simulans has similar banding patterns of D. melanogaster, except for a large inversion in 3R, Bridges' map of D. melanogaster was used for the location of their breakpoints. They were:

In(1), 15A; 18D
In(2LR), 24F; 57F
in(3R), 87B; 90C

It is not certain whether these inversions had been carried by the original wild females or were newly produced during the maintenance of lines in the laboratory. At any rate, the frequencies of unique inversions in D. simulans can be calculated as 1/448 = 0.00223 for the X chromosome (224 female larvae were tested) and 2/1796 = 0.00111 for the major autosome. These low frequencies seem to be consistent with the lack of polymorphism in this species.