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Exchange between Y chromosomes.

Crossing over in the male between sterile Y chromosomes (derived from y^+ Y, Brosseau, '60 Genetics 45:257) and an X•Y^L chromosome was examined in the process of generating X•$Y^{KL^-}y^+$ chromosomes for another purpose. ycvvfcar•Y^L/ y^+ Y^{KL^-}•Y^S ♂♂ were mated to RA yf/ Y^{BS} ♀♀. The expected cross overs, unmarked fertile Y's and X•$Y^{KL^-}y^+$ were recovered as yf ♀♀ (RA yf/ 0 is lethal) and cvvfcar B ♂♂ respectively. The data are presented in Table 1.

Table 1. Exchange between marked free Y's and an attached X•Y^L chromosome.

RA yf/ Y^{BS} ♀♀ x ycvvfcar•Y^L/ $y^+Y^{KL^-}$•Y^S ♂♂

Stock	Loci Affected	Total No. Flies	Crossovers* yf♀	Crossovers* cvvfcarB♂	Frequency of Crossing over x 10^{-4}
L 3	kl 5	37,865	6	4	2.6
L 19	kl 3,4,5	11,023	2	2	3.6
L 24	kl 3,4,5	29,963	20	7	9.0
L 28+	kl 5	21,515+	34	12	10.7✱
L 36	kl 4,5	34,865	9	5	4.0
L 38	kl 3,4	14,471	14	7	14.4
L 41	kl 3	36,882	17	6	6.2
4-15	kl 1,2	38,751	20	23	11.1
4-65	kl 3,4,5	29,383	11	12	7.8
4-93	kl 3	14,928	10	7	11.4

*Corrected for nondisjunctional progeny.

+The ycvvfcar•Y^L was found to contain a y^+ suppressed lethal therefore only female and recombinant male survivors were recorded.

✱Calculated by doubling the number of females as an estimate of the total number of flies.

All of the free Y's used, except 4-15, show a variegation for male fertility (V-type position effects, Brosseau personal communication). It is therefore probable that these chromosomes contain intrachromosomal rearrangements which may account for the very different frequencies of crossing over as well as the differential recovery of the reciprocal recombinant classes of some chromosomes. Nonrandom recovery may reflect the occurrence of nonrandom disjunction of recombinant chromosomes.

It is likely that at least some of the crossing over occurs during premeiotic mitoses (Brosseau, '58 DIS 32:115). Since more than one male parent was used in each bottle the present data do not provide conclusive evidence for clustering.

Exchange between the free Y and the attached X•Y^L occurs with frequencies similar to the frequencies of exchanges between X heterochromatin and a Y (Lindsley '55 Genetics 40:24). One might expect that with more extensive regions of homology between the attached X•Y^L (probably containing a Y centromere and part of Y^S in addition to Y^L) and a free Y exchanges could occur in more than one place. This might be manifested by a higher frequency of exchange, however the frequencies are not substantially enhanced. The existence of multiple places of exchange is suggested by the additional finding that though the derived attached X•Y^L position effect chromosomes as a group often show different fertility levels from that of the free Y position effect chromosome, in some cases there exist two distinct classes of fertility levels among the recombinant chromosomes, perhaps reflecting qualitative differences in their basal heterochromatin.

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