

For example, in *Drosophila*

eye color:  $v^+$  = wildtype and  $v$  = vermilion eye color

wing venation:  $cv^+$  = wildtype and  $cv$  = crossveinless

wing morphology:  $ct^+$  = wildtype and  $ct$  = cut wing edge

Parental cross: crossveinless, cut winged ( $v^+ cv ct / v^+ cv ct$ ) X vermilion ( $v cv^+ ct^+ / v cv^+ ct^+$ )

F1 were triple heterozygotes ( $v^+ cv ct^+ / v cv^+ ct^+$ ) wildtype phenotype

Test cross: F1 wildtype ( $v^+ cv ct^+ / v cv^+ ct^+$ ) X triple mutant ( $v cv ct / v cv ct$ )

F2 progeny

phenotype	genotype	# of progeny
$v^+ cv ct$	$v^+ cv ct / v cv ct$	592
$v cv^+ ct^+$	$v cv^+ ct^+ / v cv ct$	580
$v cv ct^+$	$v cv ct^+ / v cv ct$	45
$v^+ cv^+ ct$	$v^+ cv^+ ct / v cv ct$	40
$v cv ct$	$v cv ct / v cv ct$	89
$v^+ cv^+ ct^+$	$v^+ cv^+ ct^+ / v cv ct$	94
$v cv^+ ct$	$v cv^+ ct / v cv ct$	3
$v^+ cv ct^+$	$v^+ cv ct^+ / v cv ct$	5
		1448

$v \rightarrow ct$   
5% (592 + 94 + 3 + 5)  
1448

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Chapter 5 Notes

<http://www.edu.utexas.edu/hunyen/bio554/lectnotes/>

1. Parental phenotypes are the most numerous classes =  $v^+ cv ct$  and  $v cv^+ ct^+$
2. Double crossovers are the least numerous classes =  $v cv^+ ct$  and  $v^+ cv ct^+$
3. Determination of the gene order by comparison of the parental and double cross over classes (the gene in the middle "flips" or switches with respect to the other two flanking genes in the double crossover when compared back to the parental): so in this case, the gene order is  $v ct cv$

4. Rewrite the crosses:

Parental cross: crossveinless, cut winged ( $v^+ ct cv / v^+ ct cv$ ) X vermilion ( $v ct^+ cv^+ / v ct^+ cv^+$ )

F1 were triple heterozygotes ( $v^+ ct cv / v ct^+ cv^+$ ) wildtype phenotype

as F1 wildtype ( $v^+ ct cv / v ct^+ cv^+$ ) X triple mutant ( $v ct cv / v ct cv$ )

5a. Determine the frequency of crossover between the  $v$  and  $ct$  loci:

Parentals are  $v^+ ct$  and  $v ct^+$  and recombinants are  $v^+ ct^+$  and  $v ct$   
 $(89+94+3+5)/1448 = 0.132 = 13.2\% = 13.2 \text{ m.u.}$

5b. Determine the frequency of crossover between the  $ct$  and  $cv$  loci:

Parentals are  $ct cv$  and  $ct^+ cv^+$  and recombinants are  $ct cv^+$  and  $ct^+ cv$   
 $(45+40+3+5)/1448 = 0.064 = 6.4\% = 6.4 \text{ m.u.}$

6. Thus the map is

