

Biology – Chapters 11 & 14

Heredity

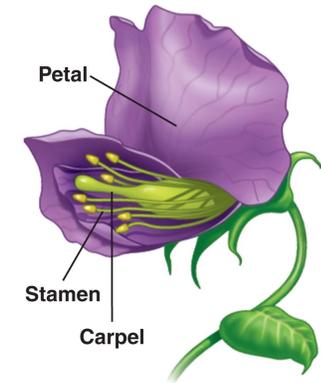
Honors Biology – Chapter 9

Patterns of Inheritance

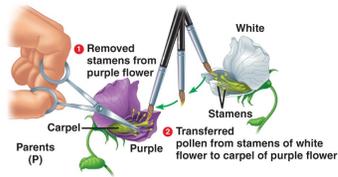
Ridgefield Memorial High School



Gregor Mendel discovered the principles of genetics in 1866, 7 years after Darwin's publication.

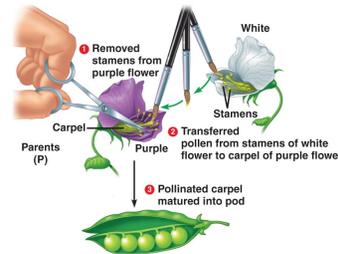


Mendel made most of his discoveries by mating pea plants.



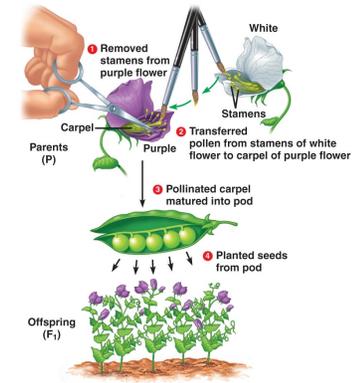
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This diagram summarizes Mendel's cross-fertilization experiments.



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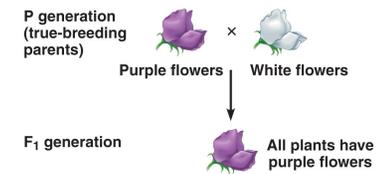
Flower color	Purple	White
Flower position	Axial	Terminal
Seed color	Yellow	Green
Seed shape	Round	Wrinkled
Pod shape	Inflated	Constricted
Pod color	Green	Yellow
Stem length	Tall	Dwarf

Mendel studied these 7 traits. Each trait has 2 different forms, called alleles.
Why was Mendel considered a LUCKY GUESSER?



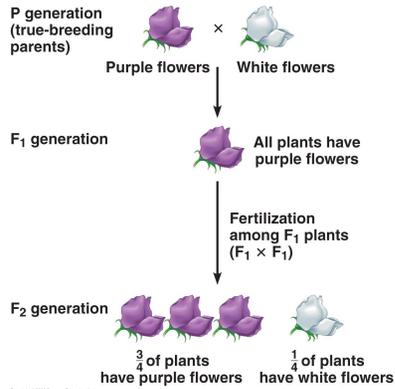
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What did Mendel prove by these two crosses?

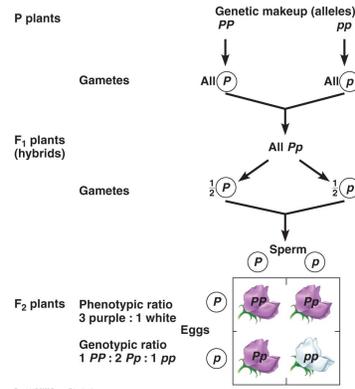


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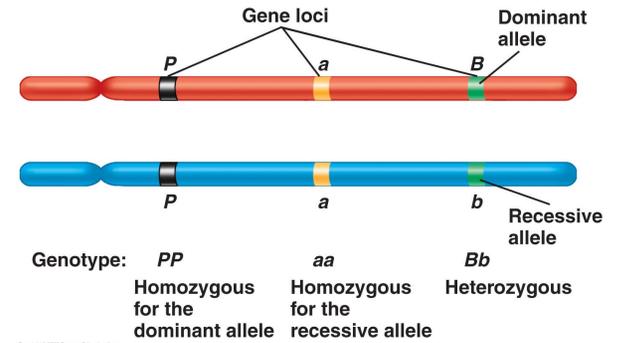
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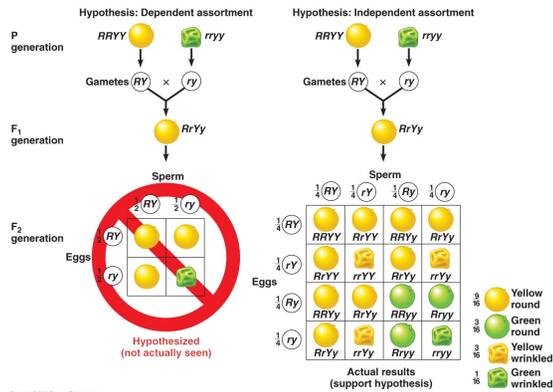
What did Mendel prove by these two crosses?



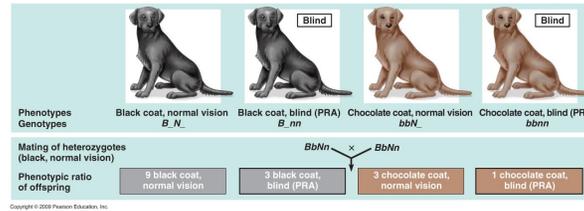
Punnett squares can explain the outcome of Mendel's experiments.



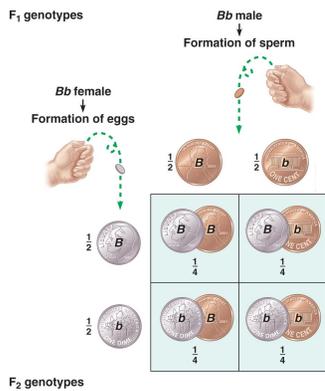
A locus is the location on a chromosome for a gene. Each chromosome has many genes.



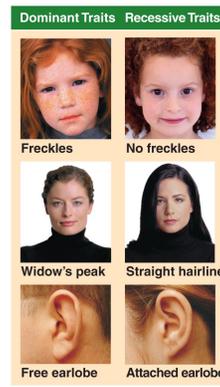
A dihybrid cross involves 2 traits at the same time.



Dihybrid crosses of 2 heterozygous parents usually result in a 9:3:3:1 ratio of traits. A ratio of 9:3:3:1 is equivalent to 9/16, 3/16, 3/16, 1/16.



The segregation of traits (anaphase I of meiosis) and the fertilization of eggs and sperm are both events of chance.



Freckles, hairline, and earlobe are three examples of human genetic traits.



Freckles

No freckles

Freckles, hairline, and earlobe are three examples of human genetic traits.



Widow's peak

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Straight hairline

Freckles, hairline, and earlobe are three examples of human genetic traits.



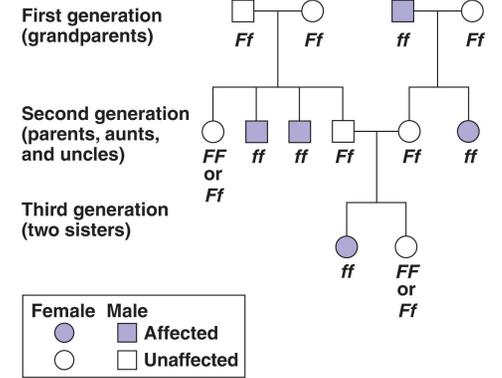
Free earlobe

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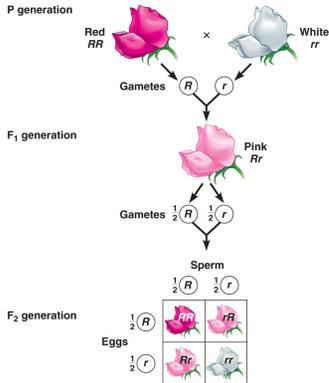


Attached earlobe

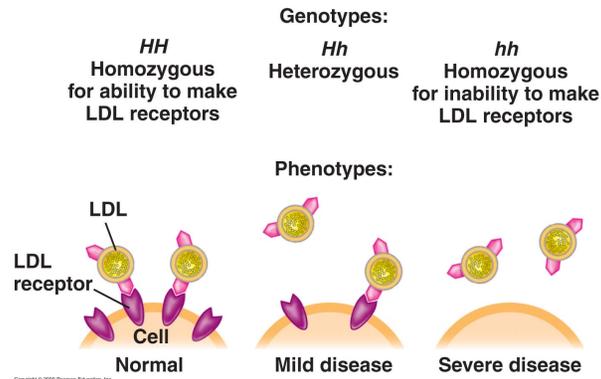
Freckles, hairline, and earlobe are three examples of human genetic traits.



A pedigree is a family tree chart that shows genotypes (the letters) and phenotypes (the shading).



Incomplete dominance is when the heterozygous form is a mixture or blending of two traits. For example, Rr would yield a pink phenotype.



High cholesterol is a genetic trait caused by incomplete dominance. Hh is not as severe as HH .

Blood Group (Phenotype)	Genotypes	Red Blood Cells	Antibodies Present in Blood	Reaction When Blood from Groups Below is Mixed with Antibodies from Groups at Left			
				O	A	B	AB
O	ii		Anti-A Anti-B				
A	$I^A I^A$ or $I^A i$		Anti-B				
B	$I^B I^B$ or $I^B i$		Anti-A				
AB	$I^A I^B$		—				

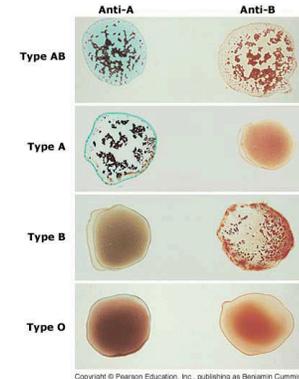
Blood types are an example of co-dominance. People with AB blood have both the A and B sugars on the exterior of their red blood cells.

Blood Group (Phenotype)	Genotypes	Red Blood Cells
O	ii	
A	$I^A I^A$ or $I^A i$	
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AB	$I^A I^B$	

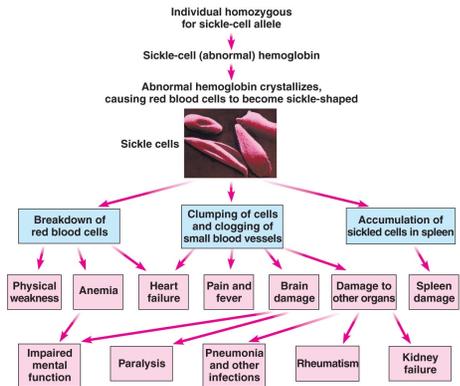
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Blood Group (Phenotype)	Antibodies Present in Blood	Reaction When Blood from Groups Below is Mixed with Antibodies from Groups at Left			
		O	A	B	AB
O	Anti-A Anti-B				
A	Anti-B				
B	Anti-A				
AB	—				

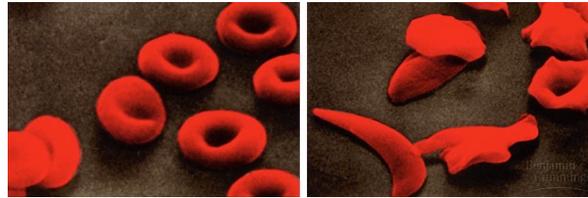
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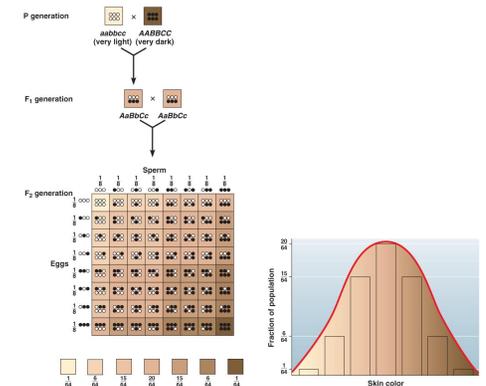
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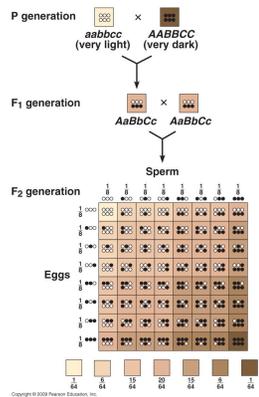
Pleiotropy occurs when multiple traits (phenotypes) are caused by 1 gene (like sickle cell disease).



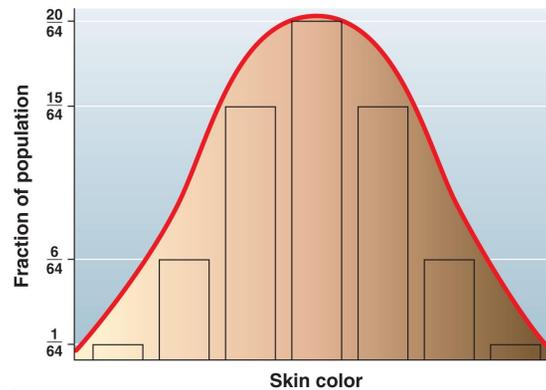
Normal blood cells are shown on the left. Sickle cells are shown on the right.



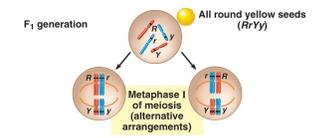
Polygenic inheritance (such as skin color) is when 1 trait is caused by multiple genes.



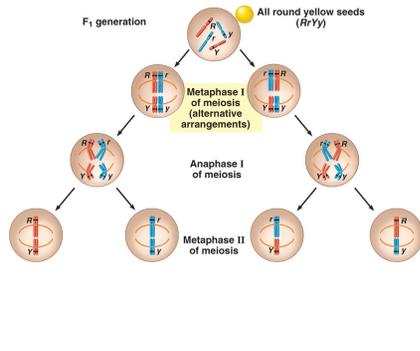
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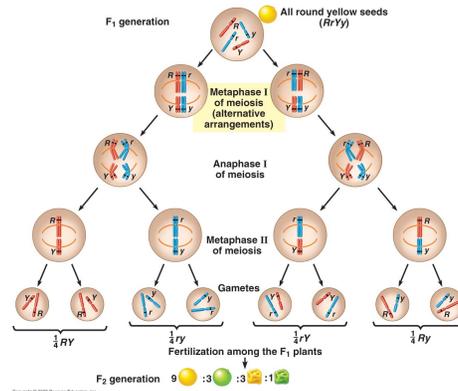
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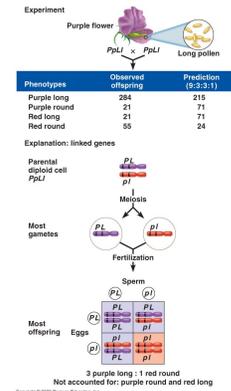
The process of meiosis supports Mendel's results.



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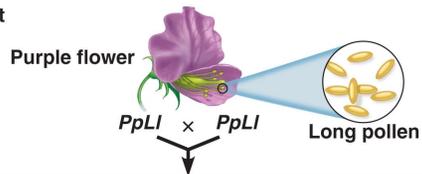


The process of meiosis supports Mendel's results.



Linked genes are inherited together because they are on the same chromosome.

Experiment

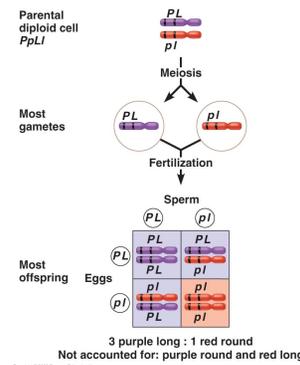


Phenotypes	Observed offspring	Prediction (9:3:3:1)
Purple long	284	215
Purple round	21	71
Red long	21	71
Red round	55	24

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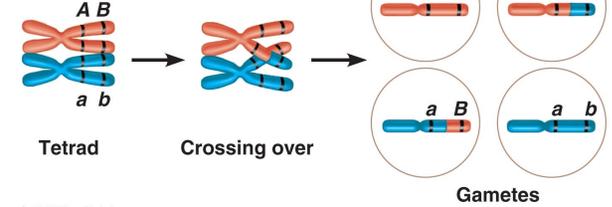
Linked genes are inherited together because they are on the same chromosome.

Explanation: linked genes



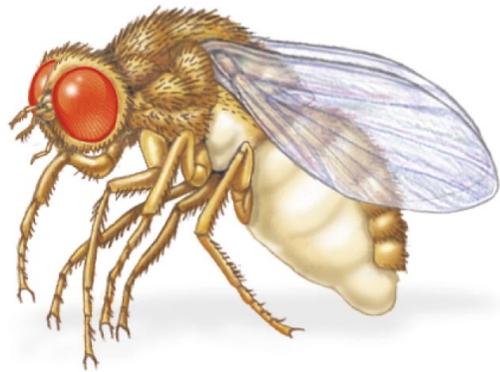
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Linked genes are inherited together because they are on the same chromosome.



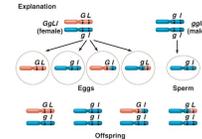
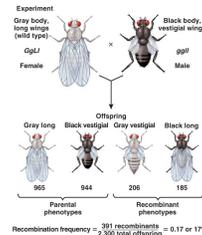
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Crossing over produces new genetic combinations, called recombinant genes.

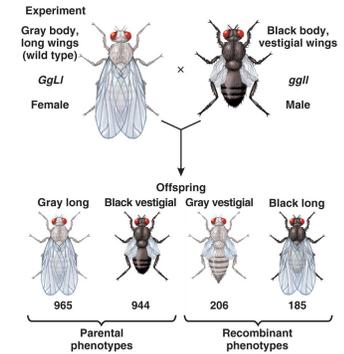


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Drosophila is the fruit fly which has been used in many famous genetic experiments.



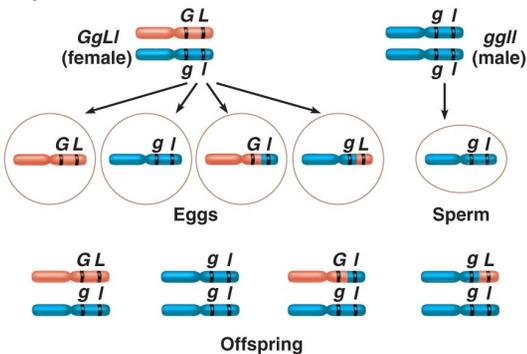
These offspring should have a 1:1 ratio, but do not because of recombination (crossing over).



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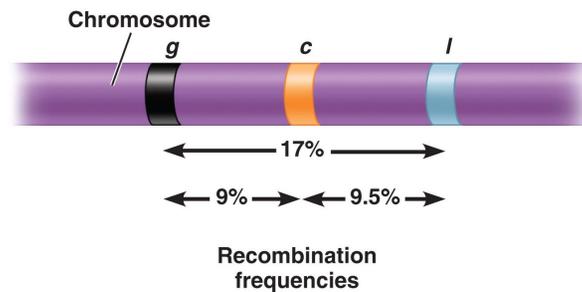
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Explanation



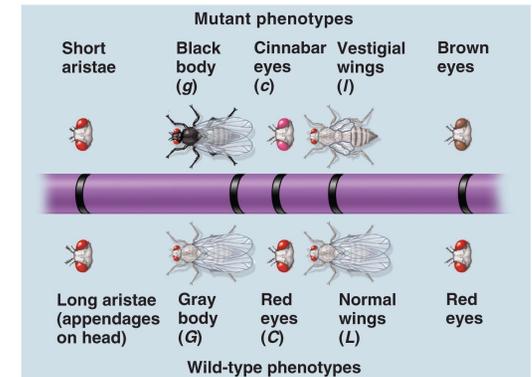
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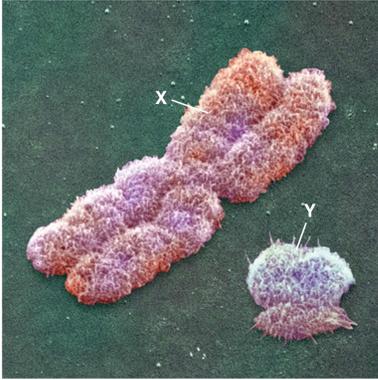
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The frequency of crossing over tells scientists how close together genes are on a chromosome. Genes that are closer together have a lower rate of crossing over than genes that are farther apart.

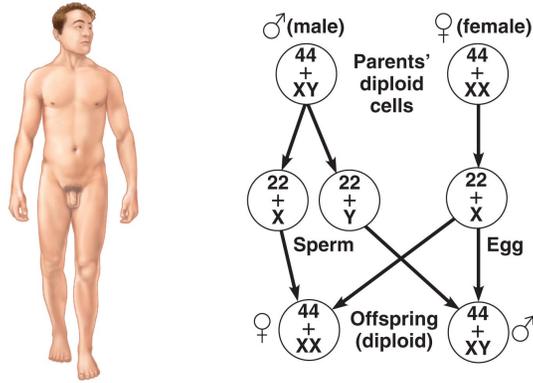


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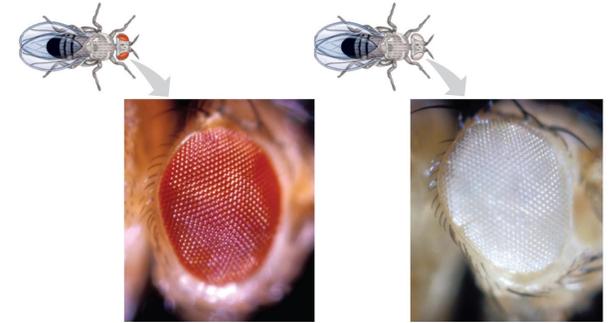
This is a genetic map of a fruit fly chromosome based on crossing over frequencies.



The X chromosome is very large and important, unlike the Y chromosome. 50% of the world's human population doesn't even have a Y chromosome.

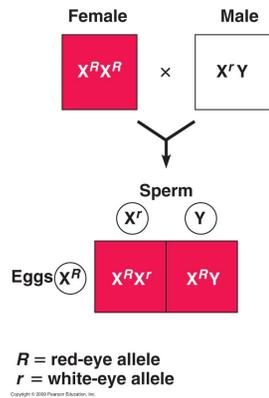


The Y chromosome determines the gender of a baby. IF YOU HAVE A "Y", THEN YOU ARE A GUY!



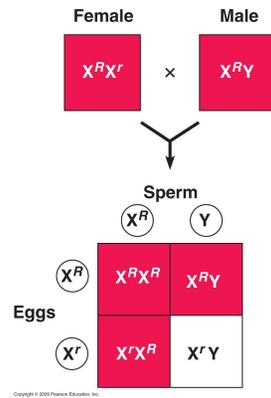
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In fruit flies, eye color is a sex-linked trait (found on the X chromosome). Sex-linked traits are inherited different than autosomal traits because males have one X and females have two.



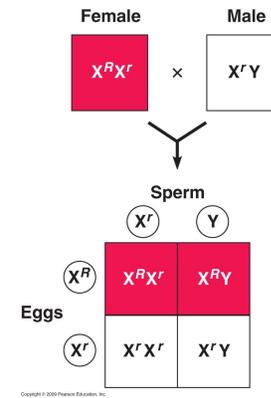
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This is a cross between a white-eyed male and a homozygous red-eyed female.



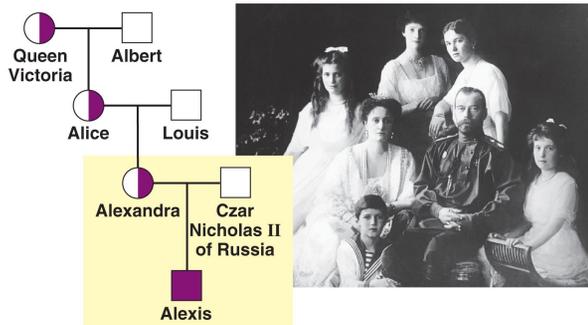
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This is a cross between a red-eyed male and a heterozygous female.



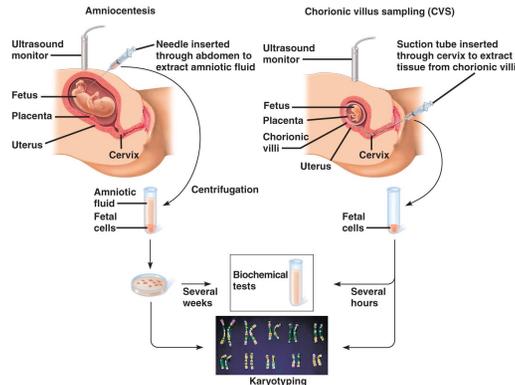
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This is a cross between a white-eyed male and a heterozygous female.



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Sex-linked traits affect men more than women because men cannot be carriers. Since men have only one X chromosome, they are considered hemizygous.



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Testing a fetus for genetic disorders involves taking fluid or cells from a pregnant woman.



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Ultrasounds are used to check for proper fetal growth and development.