

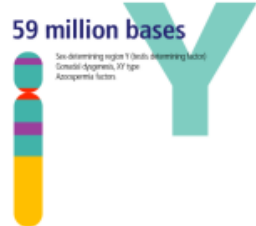
Punnett Squares Sex-linked

1. On what chromosomes are sex-linked traits carried?

The sex chromosomes, the ones that determine whether someone is a male or a female, are the X and Y chromosomes. As the next slide shows the X chromosome contains many genes while the Y chromosome only has three discovered so far. Therefore with sex-linked genes, the genes are carried on the X chromosome.

2. Why are sex-linked traits different in genetics?

The female has the normal two genes in her genotype for genes carried on the X chromosomes. The male, however, has only one gene, the one carried on the single X chromosome, to determine his phenotype.



Notice how few genes are carried on the Y chromosome in comparison to the large number on the X chromosome.

3. How are the genotype for males and females written with sex-linked traits?

In sex-linked genes the X and Y chromosomes are written in as part of the genotype. This shows us the sex of the possible genotypes as well as reminding us that the Y chromosome carries no genes. Examples: $X^N X^n$ and $X^N Y$

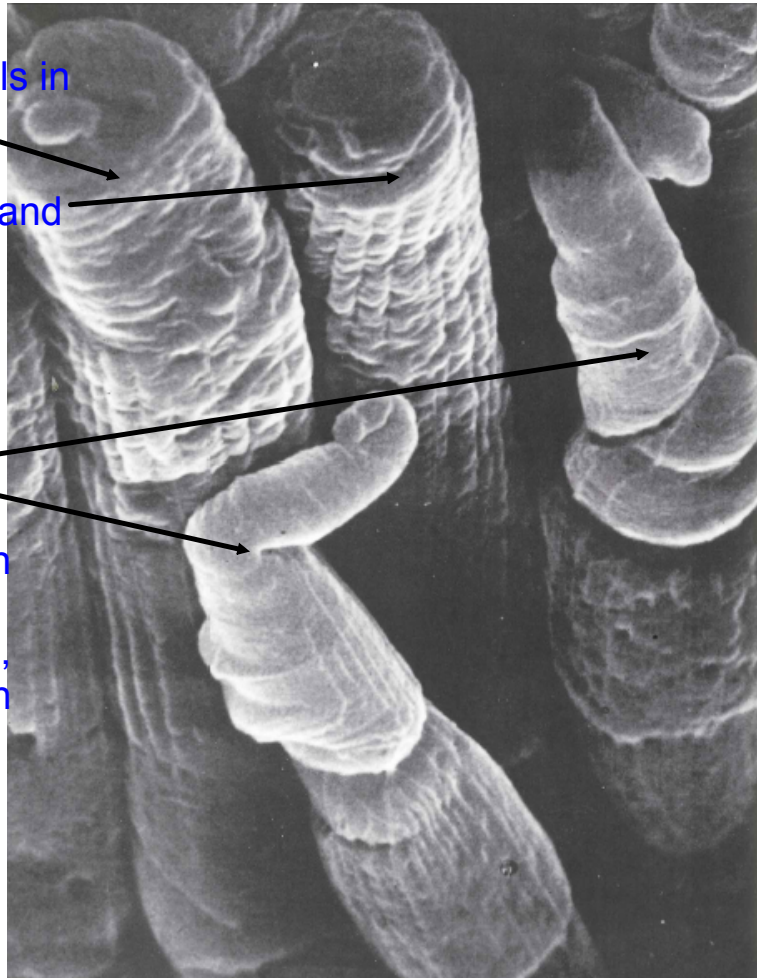
4. Why is it important to include the sex of the possible phenotypes after using a Punnett Square?

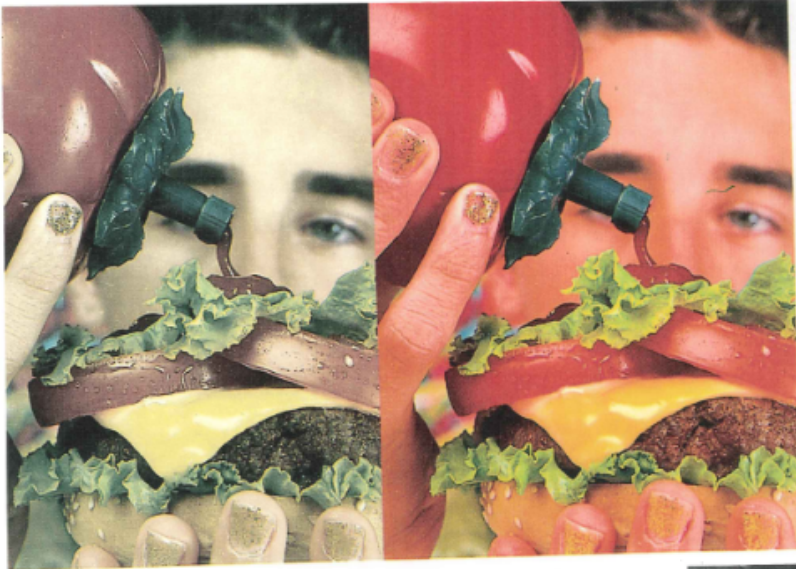
Males are affected differently from females with the phenotypes of sex-linked genes.

Rods and Cones

Rods are the cells in the eye's retina which see only shades of white and gray.

Cones are the cells responsible for color vision. The cones come in three types. Each type sees different colors - red, green, and blue. The brain takes in the information from the cones and interprets this information to see all the different colors in our environment. For example yellow is a combination of red and green.

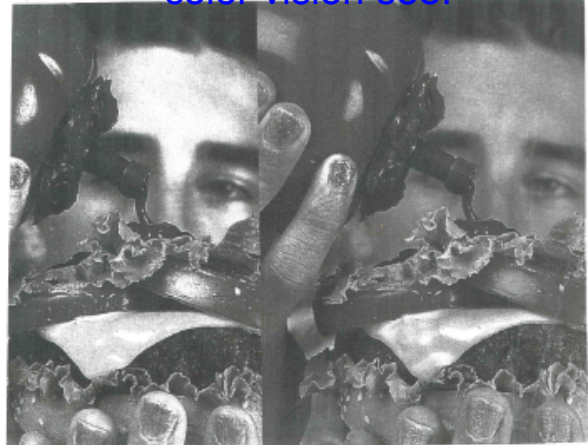


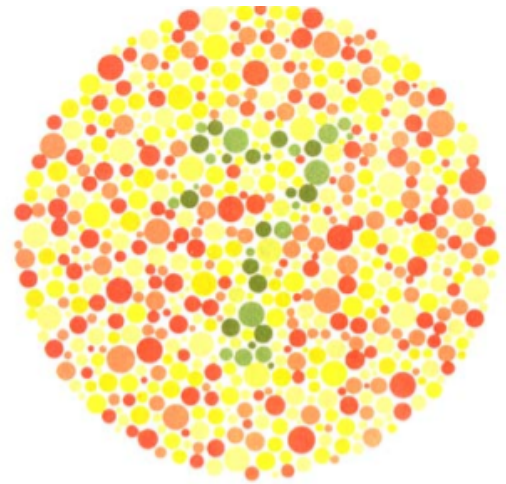
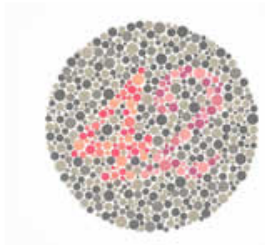
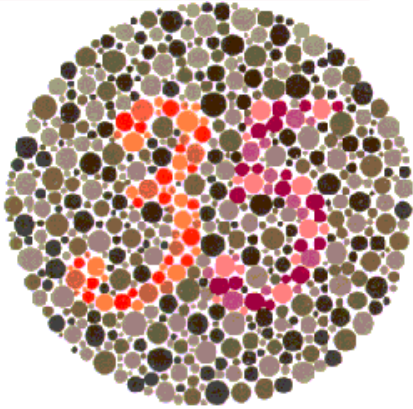
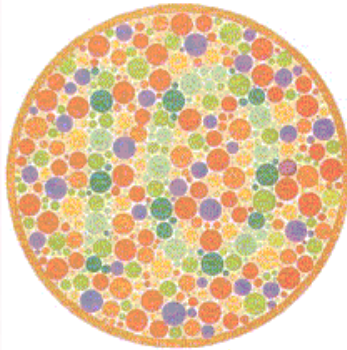


What a person with normal color vision sees.

What a color blind individual sees.

What animals with no color vision see.





These are different types of tests used to determine if someone is color blind and what kind of colorblindness each has. The numbers aren't always visible to someone who is colorblind.

5. **Sample** sex-linked trait Punnett Square.

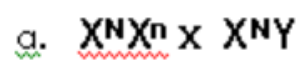
Colorblindness is sex-linked

N = normal color vision, n = colorblindness



	X^N	X^N	
X^n	$X^N X^n$	$X^N X^n$	50% females with normal color vision
Y	$X^N Y$	$X^N Y$	50% males with normal color vision

Make sure you include the **sex of the child** in the possible phenotypes. (1 point each)



Phenotype results as percentages