

Introduction to Genetics

Gene

- Any segment of DNA that codes for a protein

Alleles

- Alternative forms of a gene for the same characteristic.
- Different traits
 - Purple vs. white
 - Dominant or recessive

Alleles vs. Genes

Dominant Allele

- The allele that shows up in the phenotype.

Recessive Allele

- The allele that is masked, not expressed in the phenotype.

Dominant vs. Recessive

Homozygous

- alleles carried on the homologous chromosomes are for the same trait
- BB = homozygous dominant
- bb = homozygous recessive

Heterozygous

- alleles carried on the homologous chromosomes are for different traits.
- Bb = heterozygous

Homozygous vs. Heterozygous

Genotype

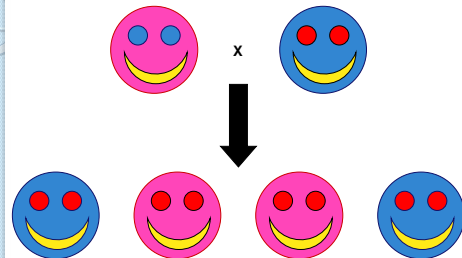
- The collection of genes an individual has.
- Homozygous dominant - BB
- Heterozygous - Bb
- Homozygous recessive - bb

Phenotype

- The physical expression of the genotype.
- PHOTOGRAPH

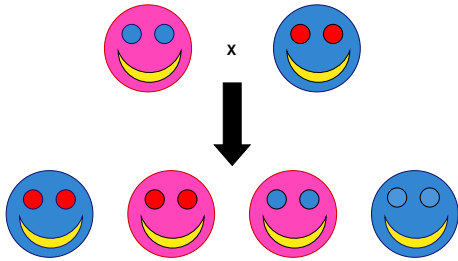
Genotype vs. Phenotype

Genes affect what you look like ...



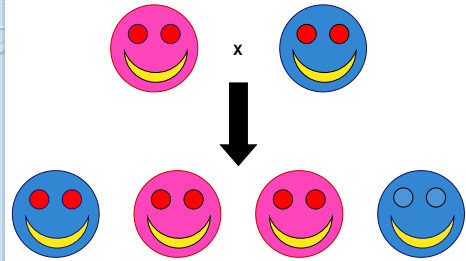
Where did the blue eyes go??

Genes affect what you look like ...



Why did the blue eyes stay??

Genes affect what you look like ...



Where did the blue eyes come from??

- **Law of Dominance**

- organisms have two alleles coding for each characteristic.
- In the phenotype, the dominant allele can cover up the recessive allele

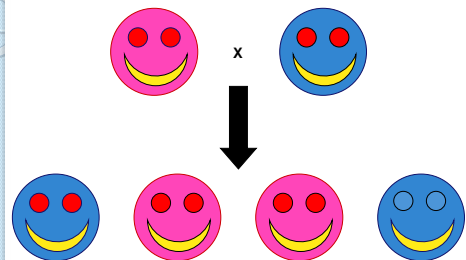
- **Law of Segregation**

- during gamete formation, the pair of alleles separate. One of each pair comes from each parental gamete.
- Sounds a little like homologous pairs of chromosomes, huh?

- **Law of Independent Assortment**

- A plant could be:
 - Tall/white
 - Tall/purple
 - Short/white
 - Short/purple
- THEREFORE, the alleles controlling height were "sorted out independently" from the alleles controlling flower color.

Genes affect what you look like ...



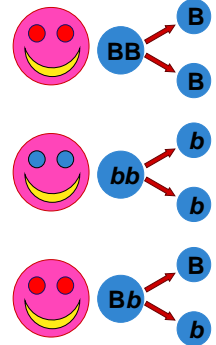
Where did the blue eyes come from??

What did we show?

- Genes come in “versions”
 - Red vs. blue eye color
 - alleles
- Alleles are inherited separately from each parent
- Some alleles mask others
 - Red eye color masked blue

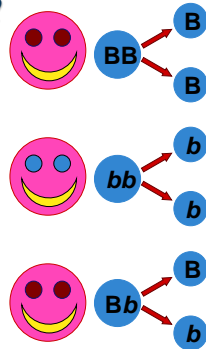
Making gametes

- Meiosis!!
 - Red (B) is dominant over Blue
 - Blue (b) is recessive to Red
- BB = Red
Bb = Red
bb = Blue

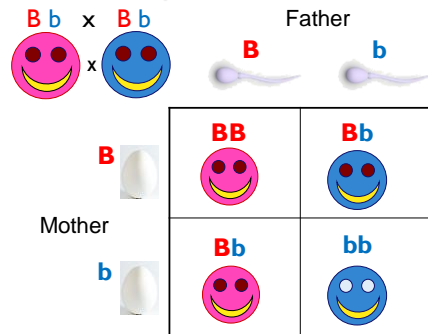


How do we say it?

- BB = homozygous dominant
- bb = homozygous recessive
- Bb = heterozygous



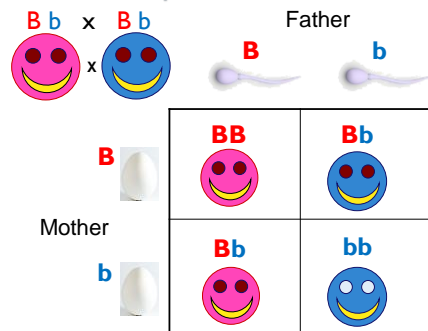
Punnett squares



The Ratios (heterozygous cross)

- Genotypic ratio:
 - The number of possible offspring with each genotype
 - Can be expressed as: fraction, ratio, percentage

Punnett squares



The Ratios (heterozygous cross)

- Phenotypic ratio:
 - The number of possible offspring with each phenotype
 - Can be expressed as: fraction, ratio, percentage

Punnett squares

