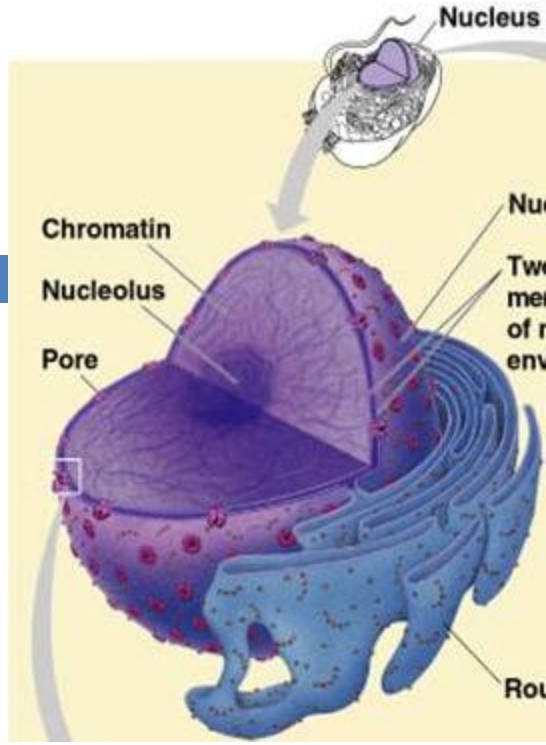
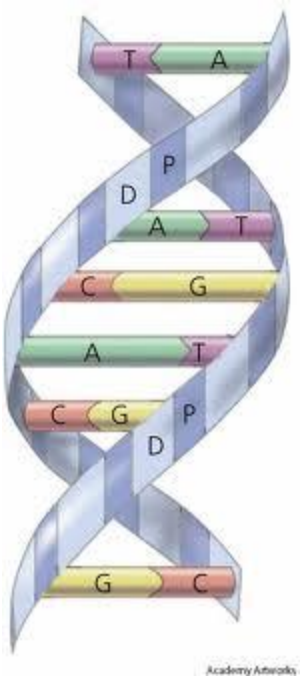
GENETICS

The Nucleus, DNA, and types of Reproduction

DNA

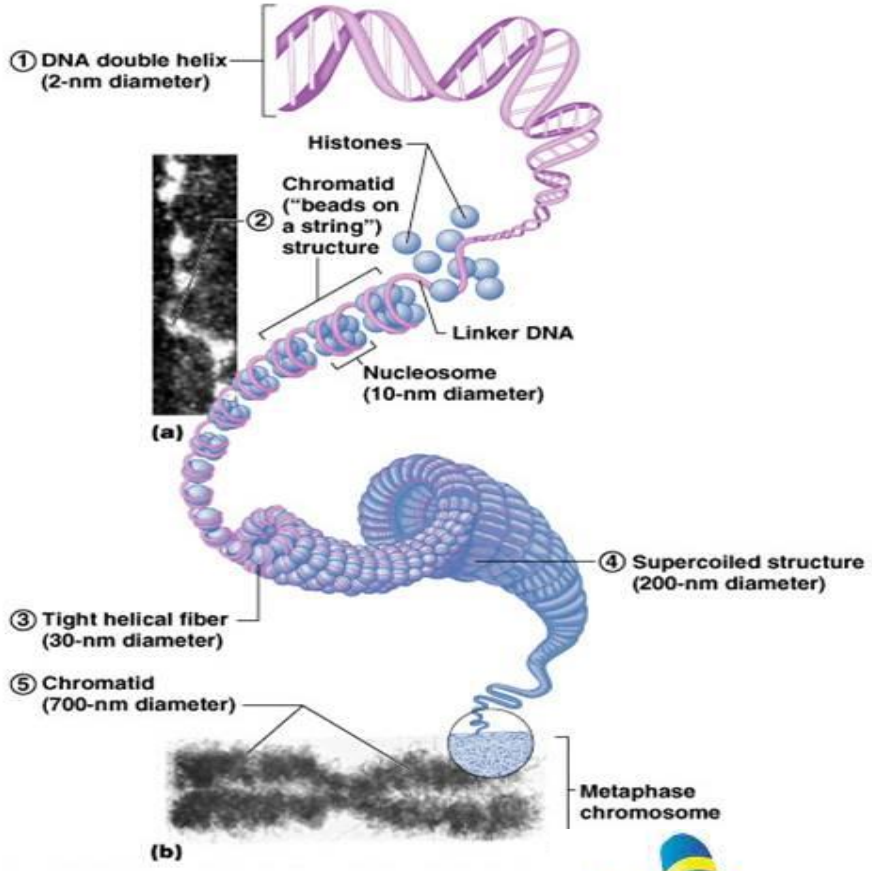
- The nucleus of each Eukaryotic cell contains DNA.
- DNA is a “double helix” strand of genetic information.
- DNA contains information that determines nearly everything about you.





DNA and Chromosomes

- DNA is like a long thread. It winds up tightly to form chromosomes.
- The human cell contains 23 pairs of chromosomes (46 total).
- Chromosomes are the genetic information that gets passed on to offspring.
- Offspring = children



Types of Reproduction

- Sexual Reproduction
- In sexual reproduction, there are 2 parents that make 1 offspring.
- The offspring is a genetic mixture of the parents.
- Half of the offspring's chromosomes come from the male and the other half come from the female.

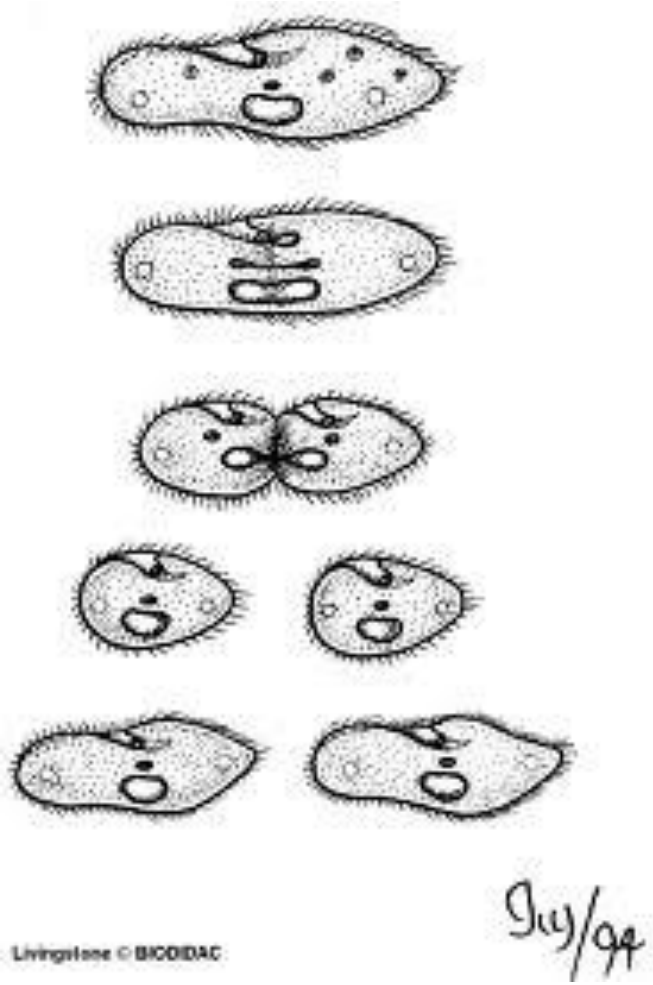
Half Male Chromosomes

Half Female Chromosomes

Genetic Mixture of Parents

Types of Reproduction

- Asexual Reproduction
- In asexual reproduction, there is 1 parent that produces 1 offspring.
- The offspring is an exact genetic match to the parent.



Reproduction

Sexual Reproduction

- 2 parents
- 1 offspring

- Offspring is a genetic <u>mixture</u> of the parents.

Asexual Reproduction

- 1 parent
- 1 offspring

- Offspring is a genetic <u>match</u> to the parent.

GENETICS

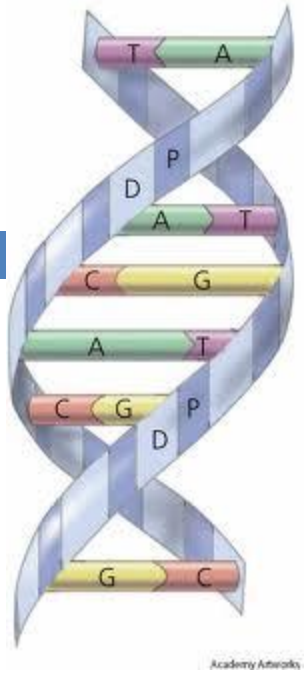
Traits, Genes, and Alleles, oh my

Heredity

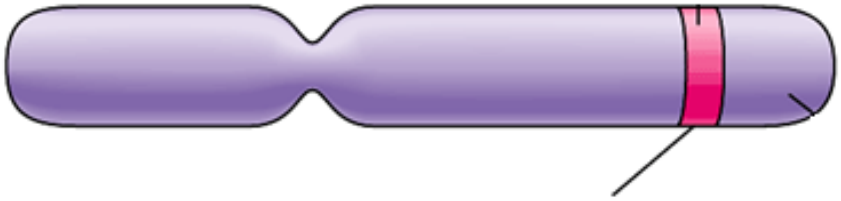
- Inheritance = something you get from relatives.
- <u>Heredity</u>
  - Transmission of genetic characters from parents to offspring.
- You inherit your DNA from your parents. It is passed down to you.
- Do you look like your parents?

Traits

- DNA contains codes for <u>traits</u>.
- <u>Traits</u>
  - A characteristic that varies from one to another.
- Traits include things such as:
  - Hair color
  - Eye color
  - Height



Genes

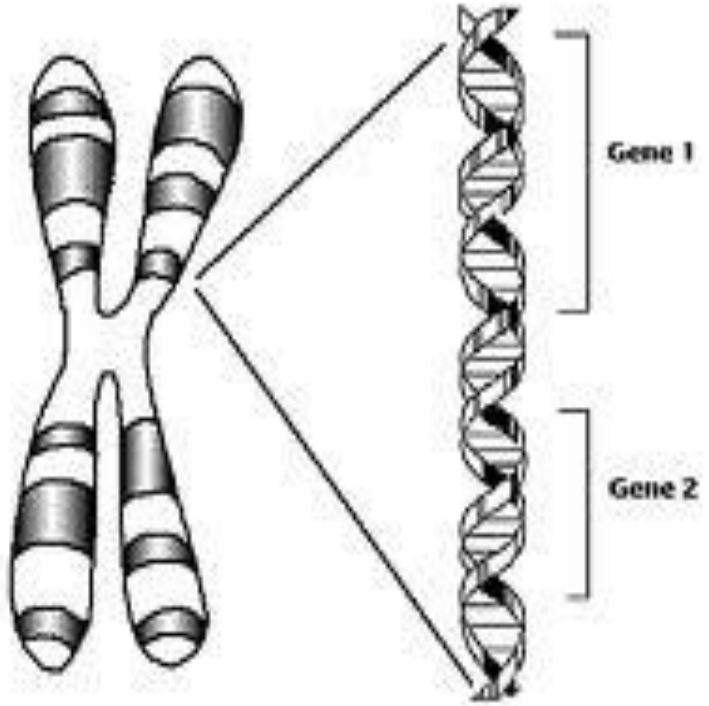


Location of the flower color gene

- Each trait has a gene.

- Gene
  - Sequence of DNA that codes for a particular trait.

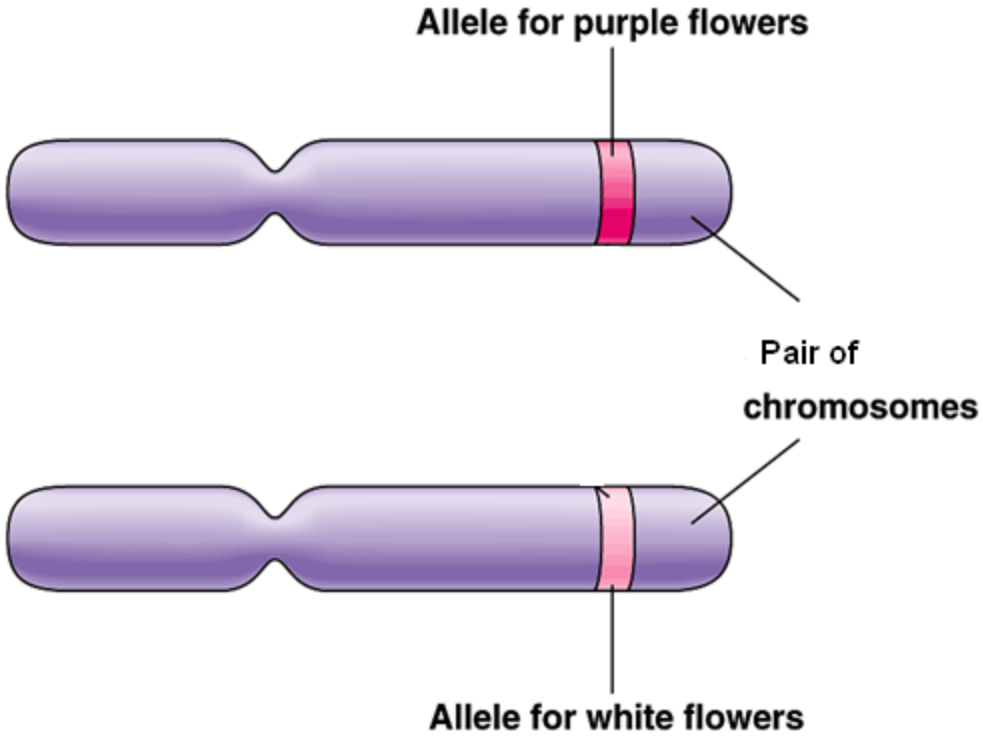
- A gene is the location of the genetic information for a trait.



Genes

Allele

- A gene can code for several variations of a particular trait.



- For example, hair can be blonde or brown.
- <u>Allele</u>
  - One of a number of different forms of a gene.

Trait – Gene - Allele

Trait	Gene	Allele
Height		Short Or Tall

The Trait is the characteristic.

The Gene is the location of the DNA on a chromosome that codes for that trait.

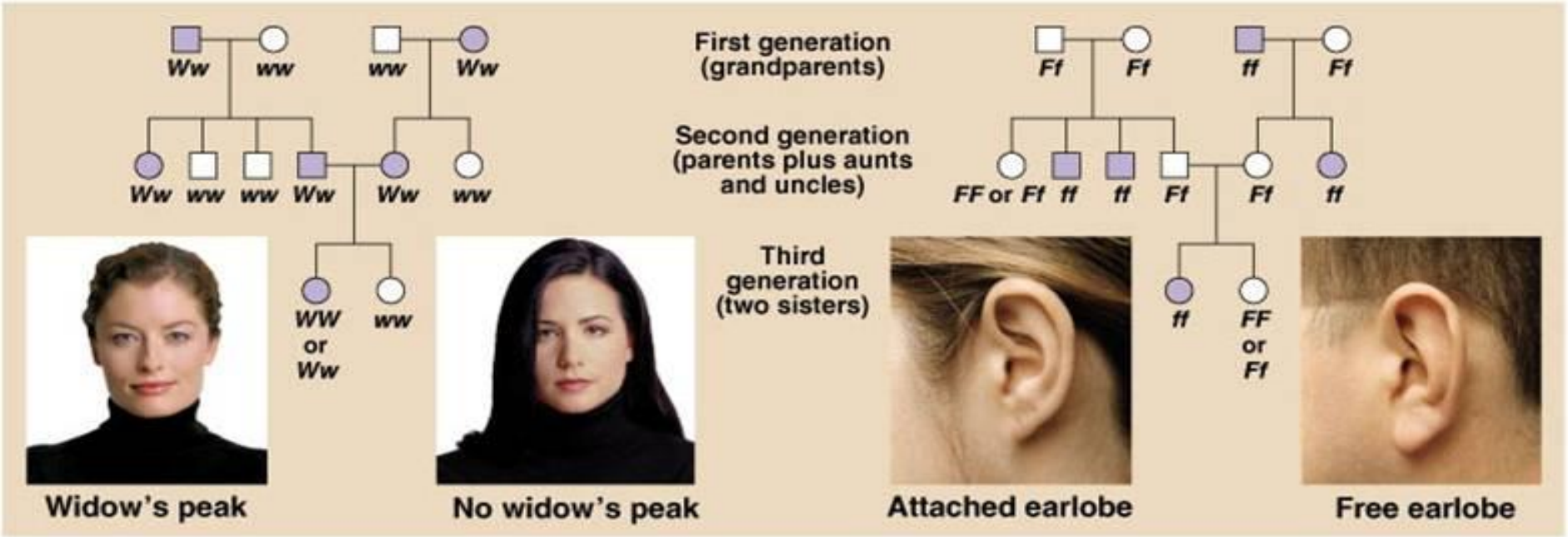
An Allele is a gene for a specific type of that trait.

GENETICS

Sexual Reproduction & Dominant / Recessive Traits

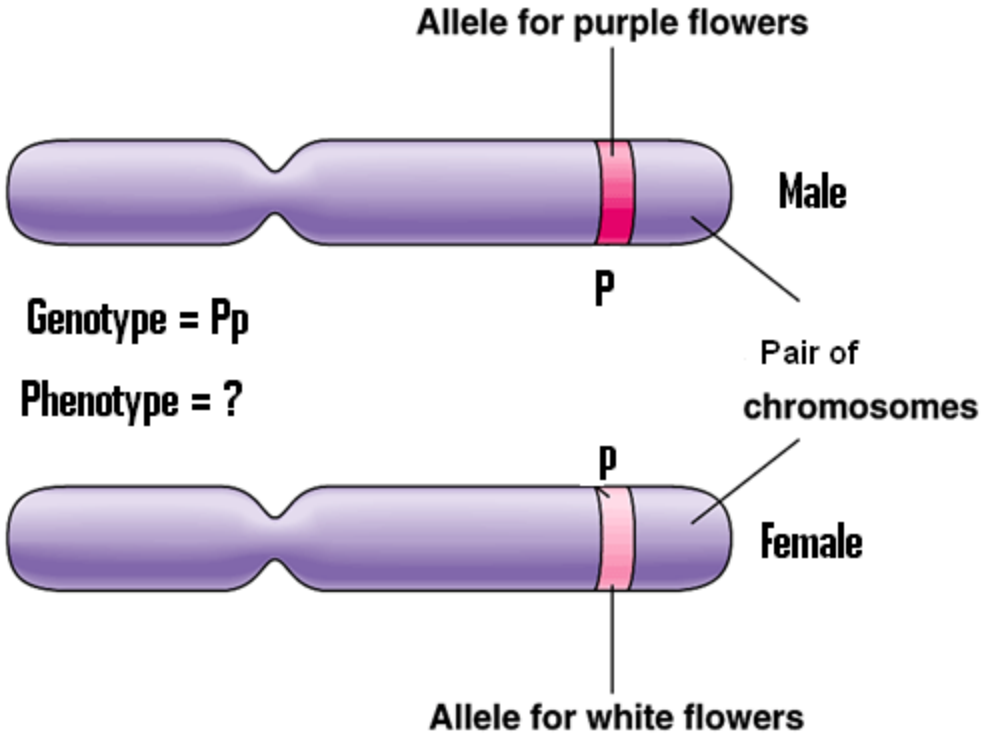
Traits

- Trait
  - A characteristic that varies from one to another.
- We have already discovered that traits can either be Dominant or Recessive.
- What is the difference?



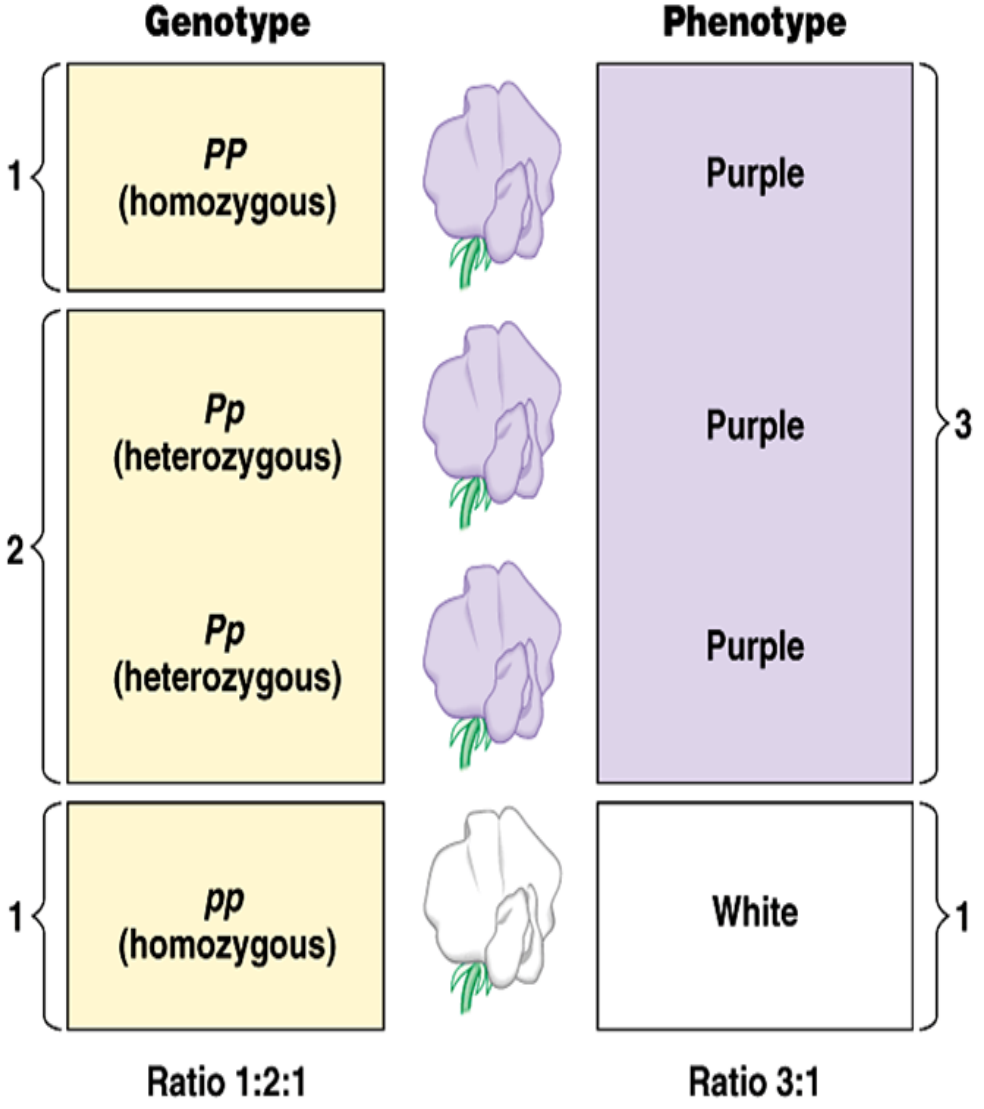
Dominant Traits

- A Dominant trait is a trait that covers up the recessive trait.
- A Dominant trait will always be expressed IF it is present.
- Dominant traits are represented by Capital Letters.



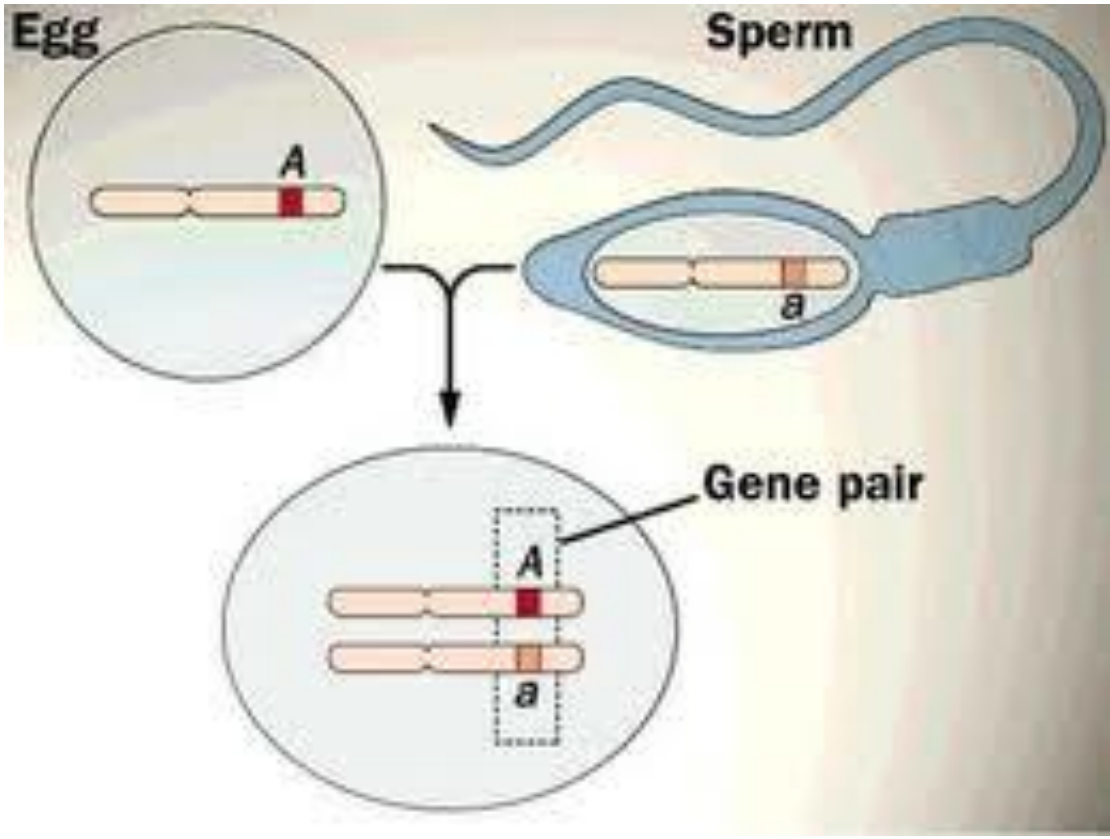
Recessive Traits

- A Recessive trait is one that gets covered by the dominant trait.
- The Recessive trait is represented by a lower-case letter.
- The only time a recessive trait is expressed is when it is paired with a second recessive trait.



Sexual Reproduction

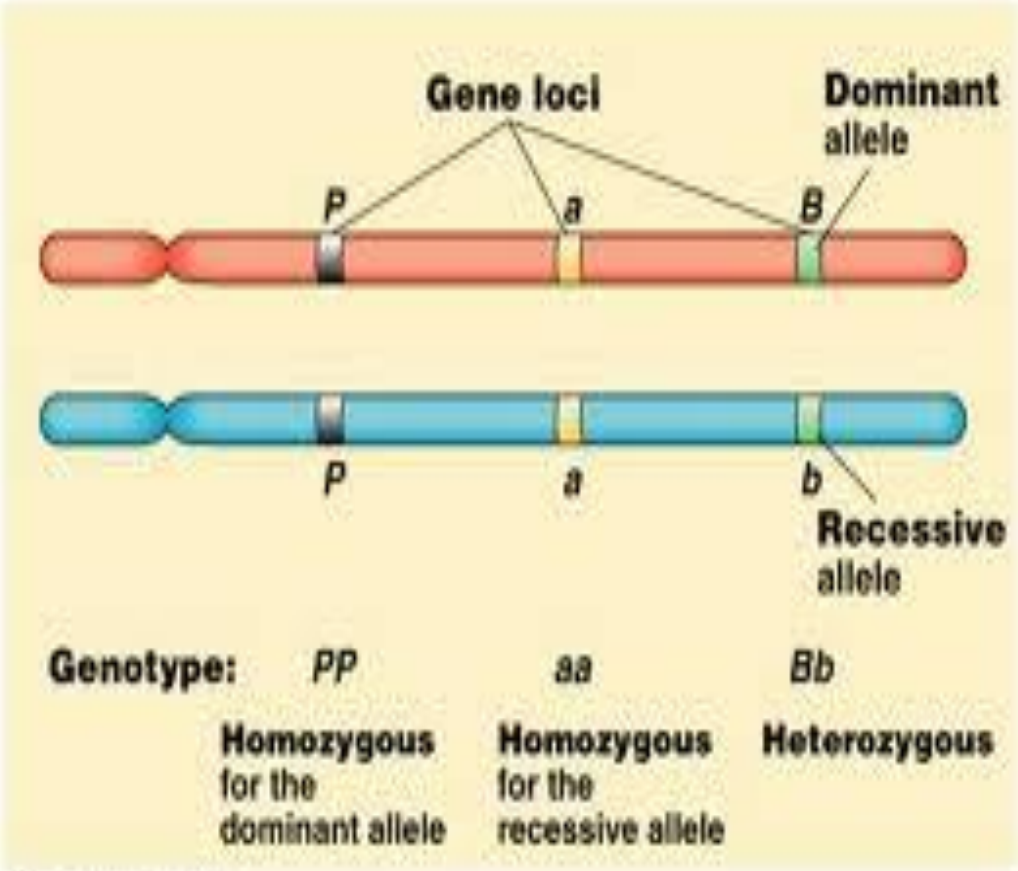
- In sexual reproduction, the offspring gets half its' genetic information from the male and half from the female.



- The offspring gets one allele from the female and one allele from the male.

Trait Expression

- Each organism will carry two alleles for the same trait.
- If there is a Dominant allele present, it is expressed.
- Only if there are two Recessive alleles present, will the recessive trait be expressed.

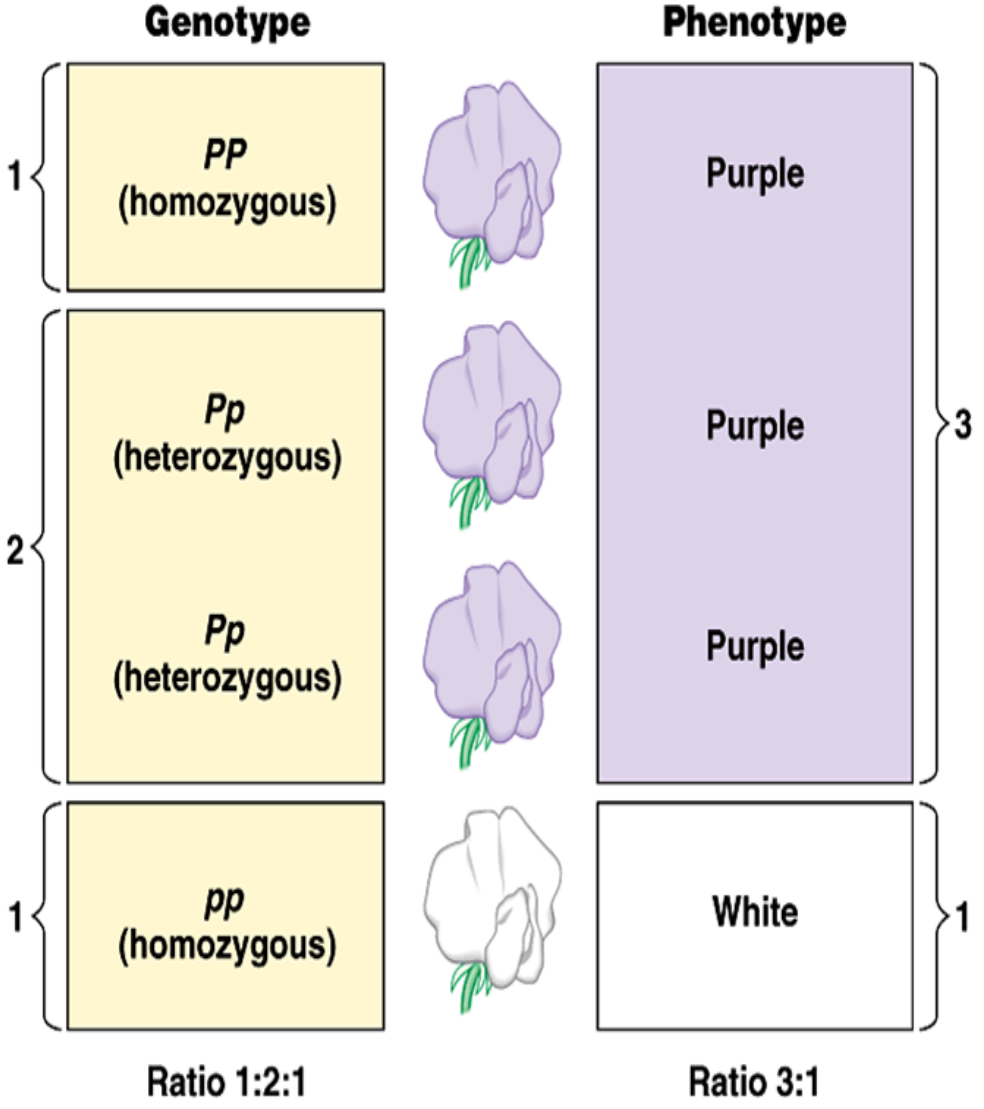


GENETICS

Phenotype & Genotype / Heterozygous & Homozygous

Genotype vs Phenotype

- Genotype
  - The genetic make-up of the organism
  - Gene 1 = Tt
    Gene 2 = AA
    Gene 3 = bb
    etc
- Phenotype
  - The physical expression of the genotype.
  - Physical appearance.



Heterozygous vs Homozygous

- Homozygous
  - Homo = same
  - A genotype that contains two alleles that are the same.
  - TT, bb, AA, hh
- Heterozygous
  - Hetero = different
  - A genotype that contains two alleles that are different.
  - Tt, Bb, Aa, Hh