Introduction to Genetics

Chapter 11

The Work of Gregor Mendel

Genetics

- The scientific study of heredity.

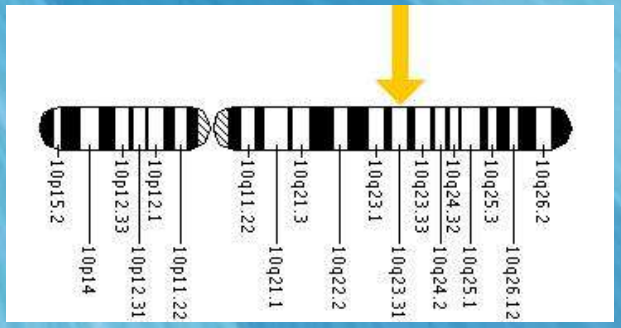
Vocabulary to Know

- Trait: a specific characteristic varying among individuals

ex: eye color

- Gene: a portion of DNA determining a trait; found on the chromosomes

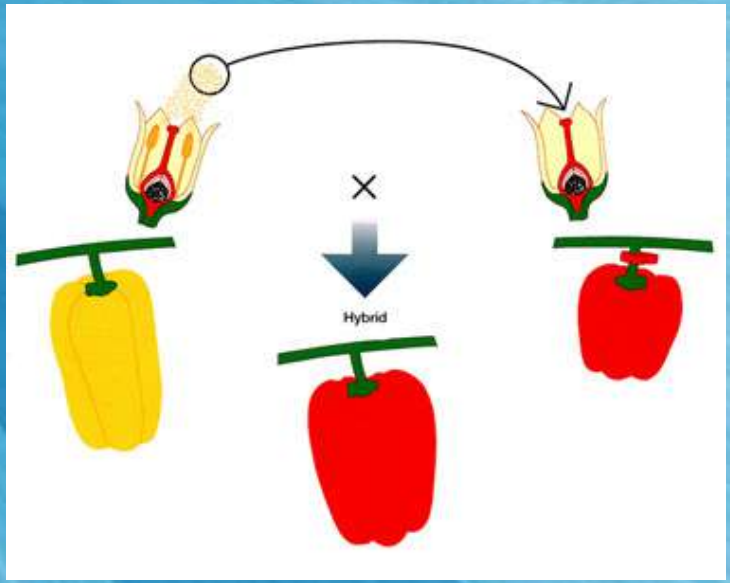
ex: the gene for eye color



Vocabulary (continued)

- Hybrid: the offspring of two parents with different traits

- Gametes: reproductive cells (aka: sex cells; sperm & egg)



Allele: the form of a gene

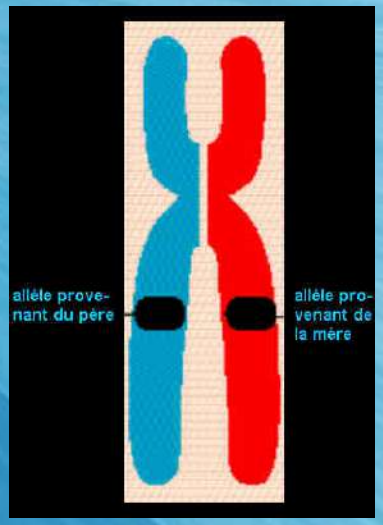
- Allele: the different forms of a gene

* Represented by a letter.

ex: Widow's Peak = W

* Organisms have two alleles for each trait, one inherited from the mother and one from the father.

ex: WW



Forms of Alleles

Dominant Allele: trait will be expressed with only one copy present

* Represented with capital letters.

ex: W (Widow's peak)

Recessive Allele: trait will only be expressed when no dominant alleles are present

* Represented with lower case letters.

ex: w (No widow's peak)

Gregor Mendel

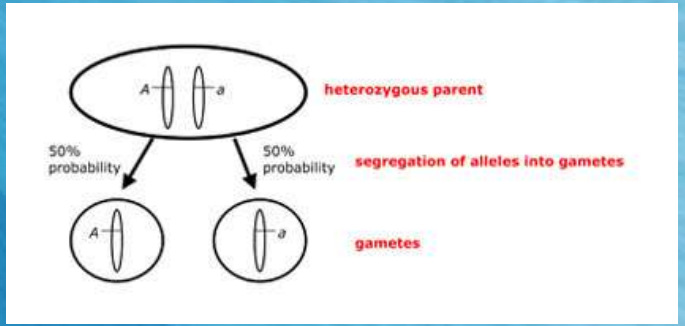
- Considered the father of genetics.
- Mid-1800s
- Monk who experimented with pea plants in the monastery garden.

Mendel's Conclusions

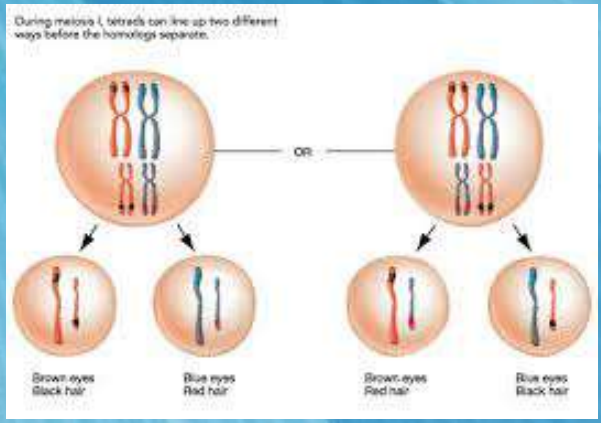
1. Inheritance is determined by factors passed from one generation to the next.
2. Principle of dominance: Some alleles are dominant and others are recessive.

Mendel's Conclusions

3. Segregation: A gamete carries only one copy of each gene.



4. Principle of independent assortment: Genes for different traits segregate independently from one another.



Applying Mendel's Principles

Allele Combinations

- Homozygous: both alleles are the same

ex: WW or ww

- Heterozygous: alleles are different

ex: Ww (capital letter is always 1st!)

- Genotype: the actual allele combination; what the genes say

ex: WW, Ww, ww

- Phenotype: the trait observed

ex: Widow's Peak

Punnett Squares

- Used to predict the genotypes of offspring when the genotypes of both parents is known.

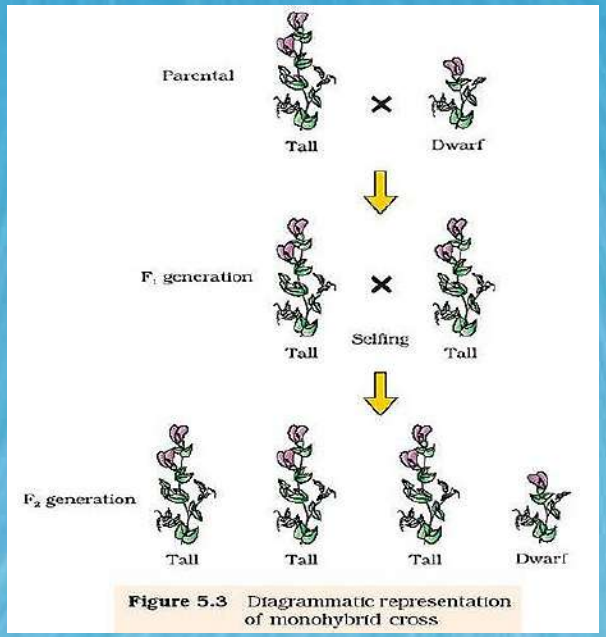
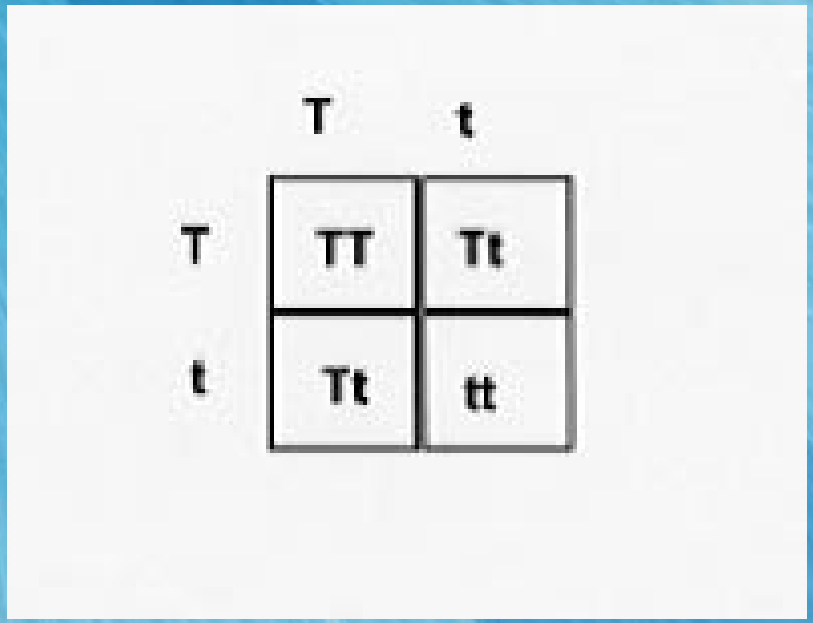


Figure 5.3 Diagrammatic representation of monohybrid cross



Other Patterns of Inheritance

Incomplete Dominance

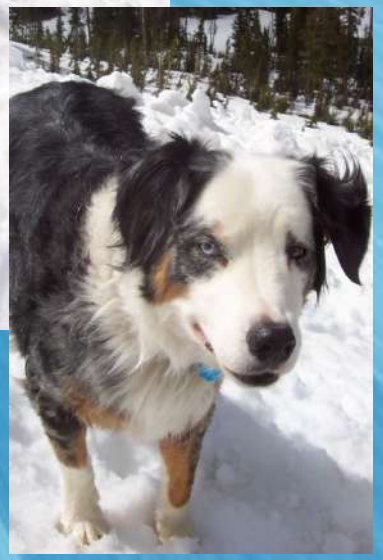
- The heterozygous phenotype (Ww) is somewhere between both homozygous phenotypes (WW & ww).

- Ex: pink flowers

Codominance

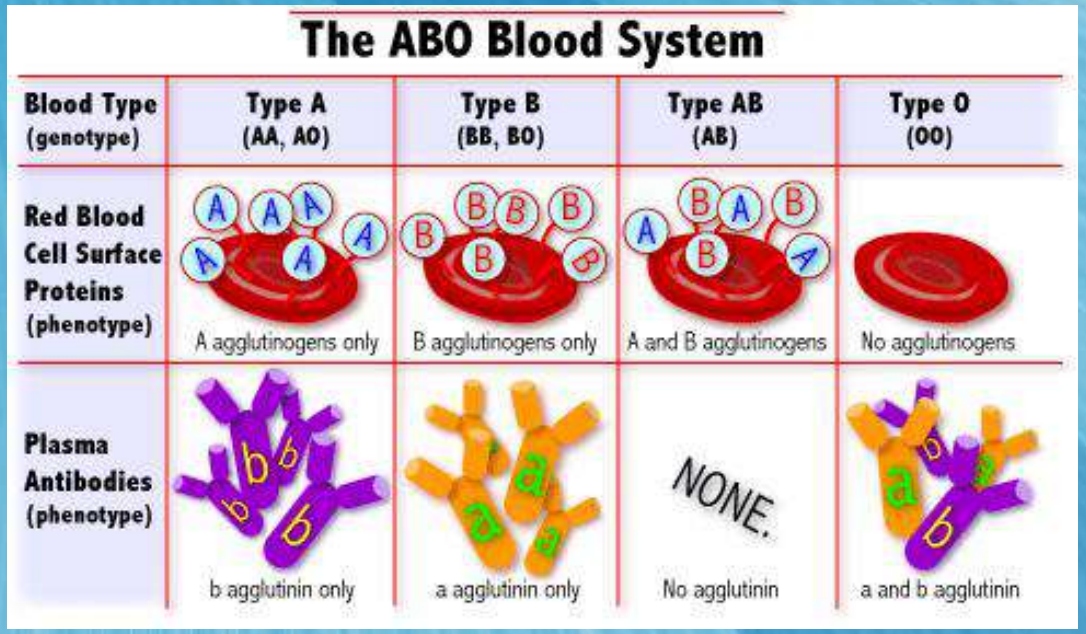
- Both alleles contribute to the phenotype; neither allele is dominant .

- Ex: roan cattle



Multiple Alleles

- More than two allele possibilities.
- Ex: blood type



Polygenic Traits

- Traits controlled by more than one gene.
- Ex: skin color