

Learning Targets

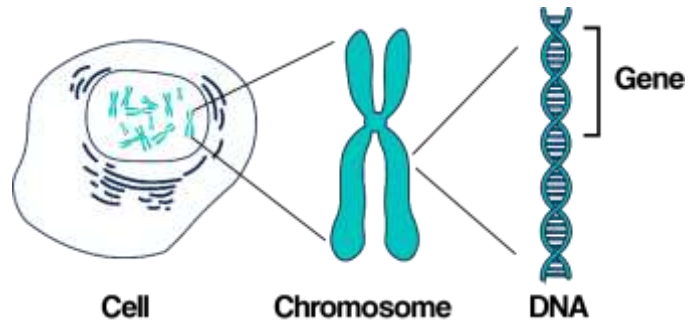
- Use basic genetics vocabulary (genotype, phenotype, heterozygous, etc.)
- Describe Mendel’s experiments and his laws.
- Use Punnett squares for basic monohybrid crosses.

What is genetics?

The study of how traits are inherited through the interaction of genes.

What is a gene?

- The material that controls the traits that are expressed in an organism.
- Genes come in pairs and offspring inherit one copy of each gene from each parent.

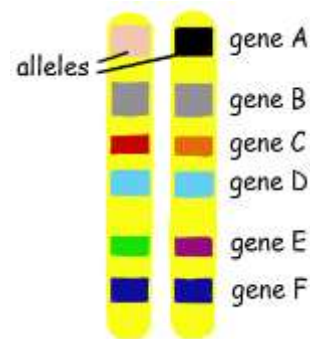


What is heredity?

The passing of traits from parent to offspring

What is a trait?

- Ways of looking, thinking, or being
- Types of traits
 - Dominant (Topic 1)
 - Recessive (Topic 1)
 - Polygenic (Topic 2)
 - Sex-linked (Topic 2)
 - Autosomal (Topic 3)



What is an allele?

Different forms of a trait that a gene may have

What is a dominant trait?

- A trait that covers over, or dominates, another form of that trait
- Trait that always shows up, even when only one of the two alleles is in the dominant form
- Shown by a capital letter

What is a recessive trait?

- A trait that is covered over, or dominated, by another form of that trait and seems to disappear
- Hidden when the other copy of the gene contains the dominant allele
- Shows up only when there is no dominant allele present
- Shown with a lowercase letter

What is a phenotype?

- Outward physical appearance and behavior of an organism
- Example: Eye color → Brown, blue, dark brown, green, hazel, etc.

What is a genotype?

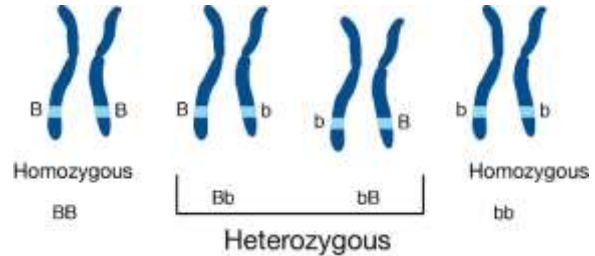
- The genetic makeup of an organism
- Example: Eye color. Dominant eye color allele (D), recessive eye color allele (d)
- Identified as one of two compositions: homozygous or heterozygous

What does homozygous mean?

- Both alleles (forms of the gene) are the same
- When offspring inherit two dominant genes, (one dominant gene from each parent) they are said to be homozygous dominant
- When offspring inherit two recessive genes, (one recessive gene from each parent) they are said to be homozygous recessive

What does heterozygous mean?

- When alleles occur in different forms
- When offspring inherit one dominant gene and one recessive gene, they are said to be heterozygous
- Since the dominant gene will be expressed, they are said to be heterozygous dominant



Polygenic Inheritance

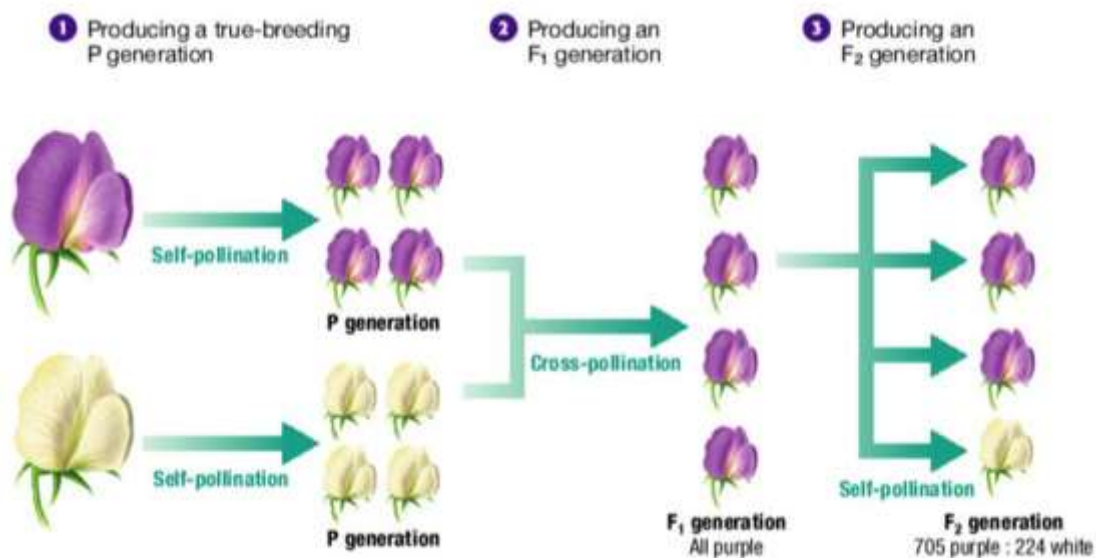
- Not every trait is controlled by a single gene with two alleles
- Genes can be spread across different locations on chromosomes
- This produces many different combinations and mixes
- Example: Eye color, skin color, hair color

Why did Mendel use pea plants in his experiment?

- Peas have a wide variety of observable traits (flower color, flower position, seed color, seed shape, pod shape, pod color, stem length)
- Short generation times with large number of offspring from each mating
- Easy to control mating between the plants

Gregor Mendel – Father of Genetics

- Worked on pea plants to discover the fundamental laws of inheritance
- Deduced that genes come in pairs and are inherited as distinct units, one from each parent.
- Tracked the segregation of parental genes and their appearance in the offspring as dominant or recessive traits.
- Recognized mathematical patterns of inheritance from one generation to the next.



Unit 7: Genetics

Topic 1: Mendelian Genetics

Mendel's Laws of Heredity

1. The Law of Dominance
2. The Law of Segregation
3. The Law of Independent Assortment

Law of Dominance

- Alleles can be either dominant or recessive.
- An organism with alternate forms of a gene will always express the form that is dominant.

Law of Segregation

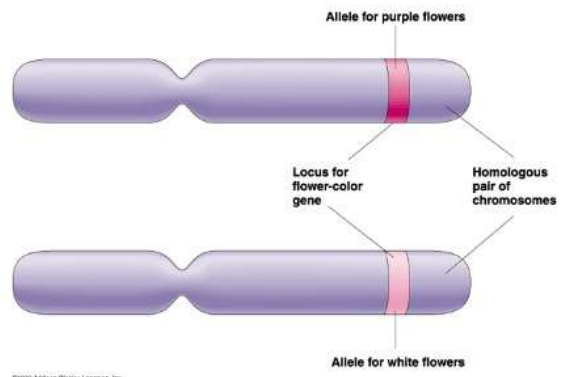
- Each inherited trait is defined by a gene pair.
- Parental genes are randomly separated to the sex cells so that sex cells contain only one gene of the pair.
- Offspring therefore inherit one genetic allele from each parent when sex cells unite in fertilization.

Law of Independent Assortment

- Genes for different traits are sorted separately from one another.
- The inheritance of one trait is not dependent on the inheritance of another.

What is a Punnett square?

- A tool to predict the probability of certain traits in offspring that shows the different ways alleles can combine
- A way to show phenotype & genotype
- A chart that shows all the possible combinations of alleles that can result when genes are crossed
- Letters stand for dominant and recessive alleles
- An uppercase letter stands for a dominant allele
- A lowercase letter stands for recessive alleles



Parental Genotypes		♂	
		D	d
♀	D	DD	Dd
	d	Dd	dd

D = Dominant Allele
d = Recessive Allele

