

Heredity/Genetics

Heredity involves the transmission of genetic characteristics from generation to generation. Gregor Mendel was an Augustinian friar who gained posthumous fame as the founder of the modern science of genetics. Though farmers had known for centuries that crossbreeding of animals and plants could favor certain desirable traits, Mendel's pea plant experiments conducted established many of the rules of heredity, now referred to as the laws of Mendelian inheritance. Genetics- The scientific study of inheritance.

Inheritance - process in which genetic material is passed from parents to their offspring.

Trait- form of a physical feature

Allele- A variation of a gene's nucleotide sequence (an alternative form of a gene).

Gene - sequence of nucleotides composing a segment of DNA that provides a blueprint for a specific hereditary trait.

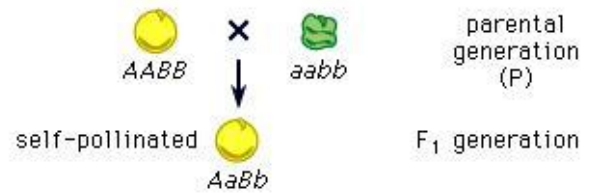
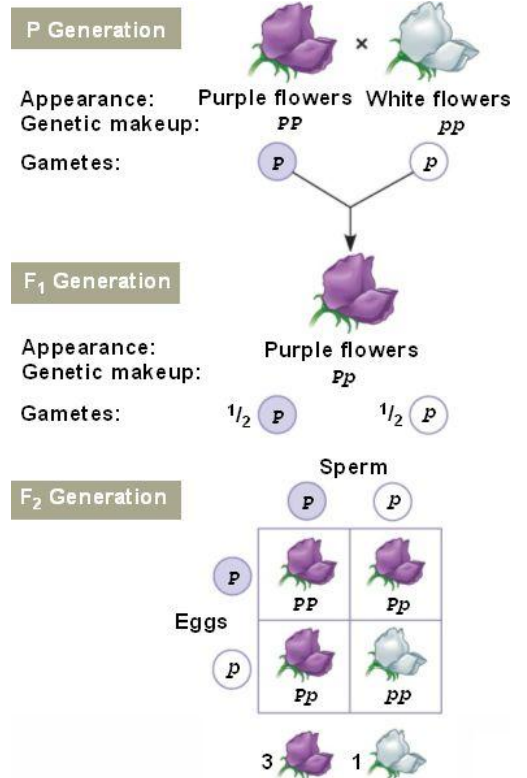
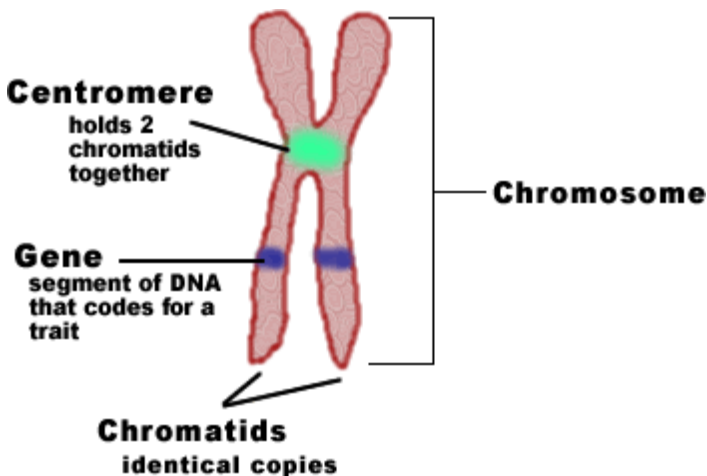
Laws

Law of Segregation- during the production of gametes the two copies of each hereditary factor segregate so that offspring acquire one allele from each parent.

Law of Independent Assortment- allele pairs separate independently during the formation of gametes. This means that traits are transmitted to offspring independently of one another.

Unit of Heredity

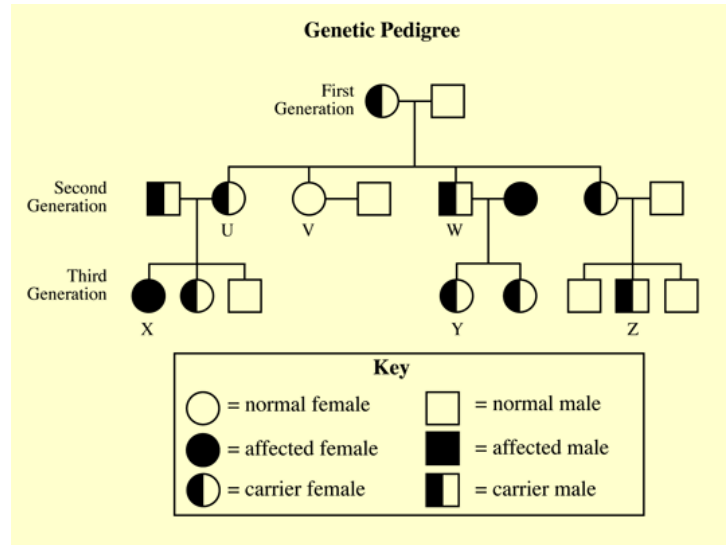
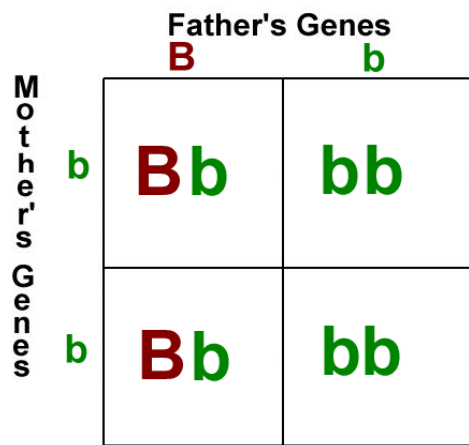
Chromosomes- A single piece of coiled DNA and associated proteins found in linear forms in the nucleus of eukaryotic cells and circular forms in the cytoplasm of prokaryotic cells; contains genes that encode traits. Each species has a characteristic number of chromosomes.



		pollen			
		AB	Ab	aB	ab
ovules	AB	AABB (Yellow Round)	AABb (Yellow Round)	AaBB (Yellow Round)	AaBb (Yellow Round)
	Ab	AABb (Yellow Round)	AAbb (Yellow Wrinkled)	AaBb (Yellow Round)	Aabb (Yellow Wrinkled)
	aB	AaBB (Yellow Round)	AaBb (Yellow Round)	aaBB (Green Round)	aaBb (Green Round)
	ab	AaBb (Yellow Round)	Aabb (Yellow Wrinkled)	aaBb (Green Round)	aabb (Green Wrinkled)

F₂ generation

Predicting and Tracking Heredity



Genotype- genetic composition of an organism with reference to a single trait, a set of traits, or the entire complement of traits of an organism.

Phenotype - observable expression of a genotype.

Heterozygous- (hybrid)-individuals with two different alleles (Aa) Hybrid

Homozygous – (purebred)-individuals with two copies of the same allele.
 homozygous dominant (AA) homozygous recessive (aa)

Modes of Inheritance

Dominant Inheritance- phenotypic effect of one allele is expressed within a homozygous dominant and heterozygous genotype.

Recessive Inheritance- phenotypic effect of one allele is only expressed within a homozygous genotype. In a heterozygous condition with a dominant allele, it is not expressed in the phenotype.

Co-dominance- the phenotypic effect of two alleles in a heterozygous genotype express each phenotype of each allele fully and equally; a phenotype which would not be expressed in any other genotypic combination.

Incomplete Dominance- the phenotypic effect of two alleles in a heterozygous genotype mixes/ blends the parent phenotypes.

Sex-linked Trait - trait associated with a gene that is carried by either the male or female parent (color blindness)

Epistasis- A trait associated with a gene set that acts as a switch. One gene turns a second gene on or off. (Labrador coloration)

Polygenic Inheritance- phenotypic effect of several genes in various genotypic combinations expressed in a wide range of phenotypes

Multiple Alleles- A trait associated with a gene that has more than two alleles. (ABO blood type)

