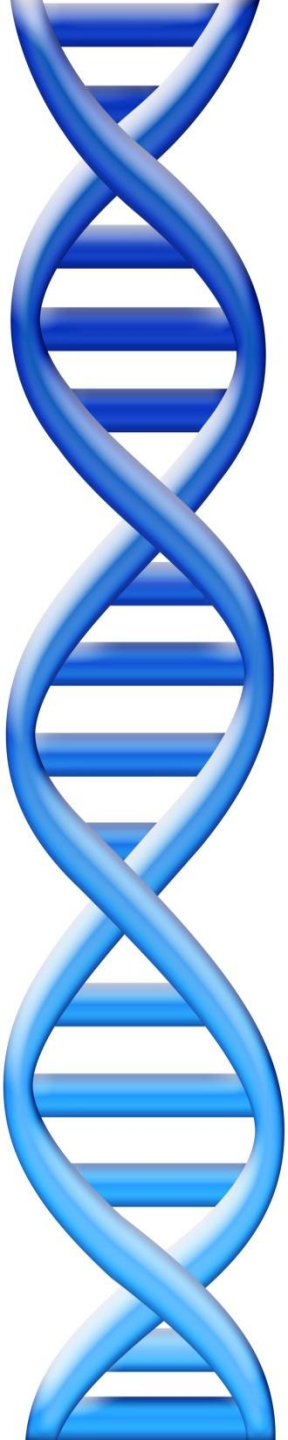


Mendelian Genetics

Honors Biology
Facilitator- Mr. Lee
Room 320





Objectives

- ▶ **Distinguish between dominant and recessive genes**
- ▶ **State two laws of heredity that were developed from Mendel's work**
- ▶ **Explain the difference between an allele and a gene**

Gregor Mendel















- ▶ He was an Austrian monk
- ▶ He conducted research on pea plant heredity



Gregor Mendel...

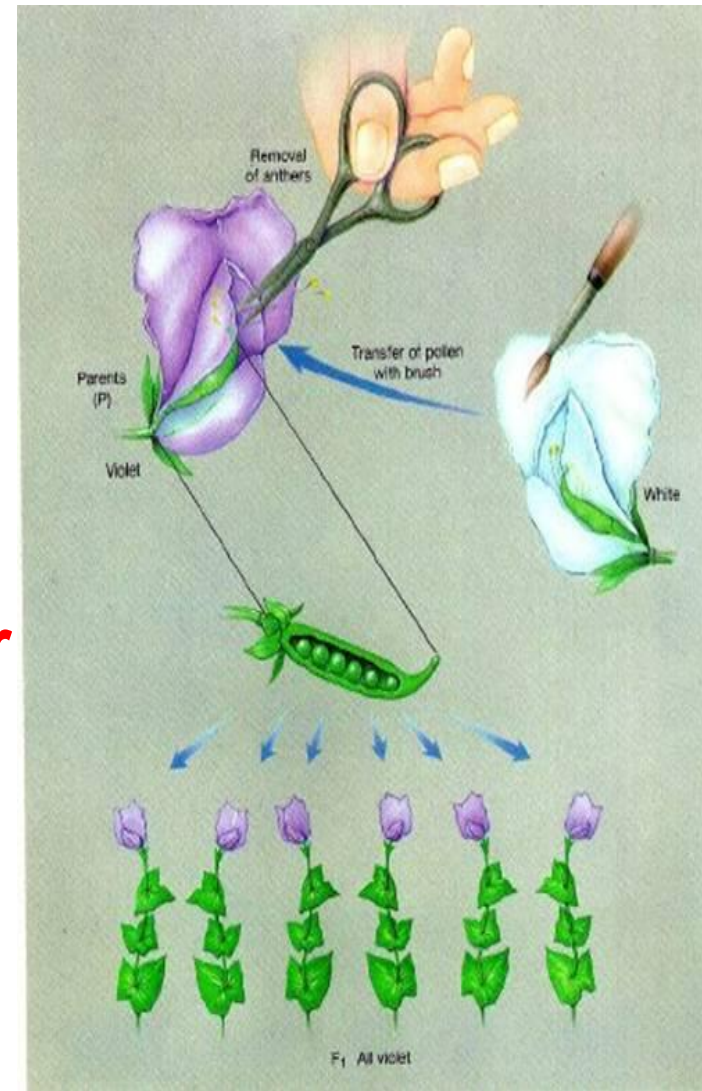
▶ Mendel observed seven characteristics of pea plants, each with two traits:

- ▶ **Seed texture** (smooth or wrinkled)
- ▶ **Seed color** (yellow or green)
- ▶ **Pod appearance** (inflated or constricted)
- ▶ **Pod color** (green or yellow)
- ▶ **Flower color** (purple or white)
- ▶ **Flower position** (axial or terminal)
- ▶ **Plant height** (long or short stems)

Trait	Phenotypes	
Seed shape	 Round	 Wrinkled
True Breeding - crossed to itself produces only itself		
Seed color	 Yellow	 Green
Pod shape	 Inflated	 Constricted
Pod color	 Green	 Yellow
Flower color	 Purple	 White
Flower and pod position	 Axial (on stem)	 Terminal (at tip)
Stem length	 Tall	 Dwarf

Mendel's Experiments

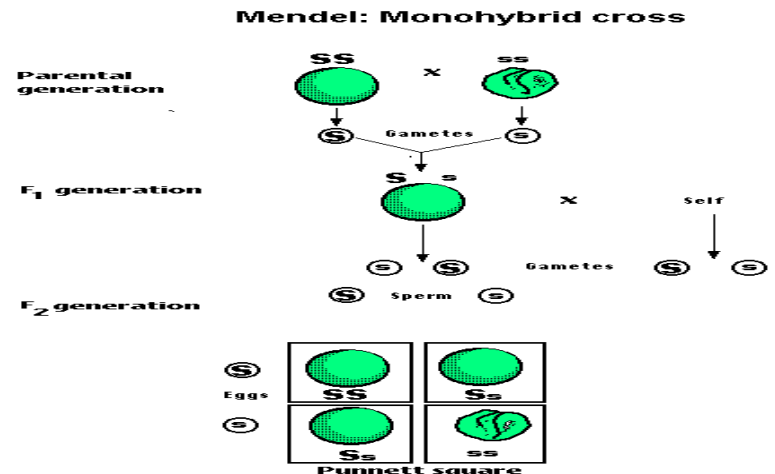
- ▶ He controlled how the plants were pollinated
 - ▶ He removed the anthers from the flowers and manually transferred them to the stigmas of other flowers
- ▶ Mendel started with plants that were pure for each trait (14 strains)
- ▶ He called each beginning pure strain the parental generation (P_1 generation)

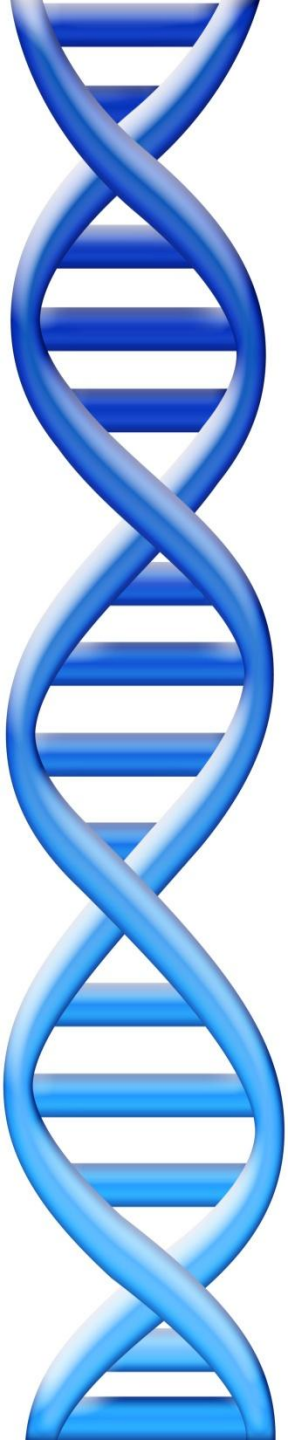


Mendel's Experiments...

- ▶ Next, he cross-pollinated the strains
- ▶ He recorded the number of each type of offspring produced by each P_1 plant
- ▶ He called these the filial generation (F_1 generation)
- ▶ The offspring of the F_1 generation he called F_2 generation

• Mendel performed hundreds of crosses and recorded the results



















Mendel's Conclusions

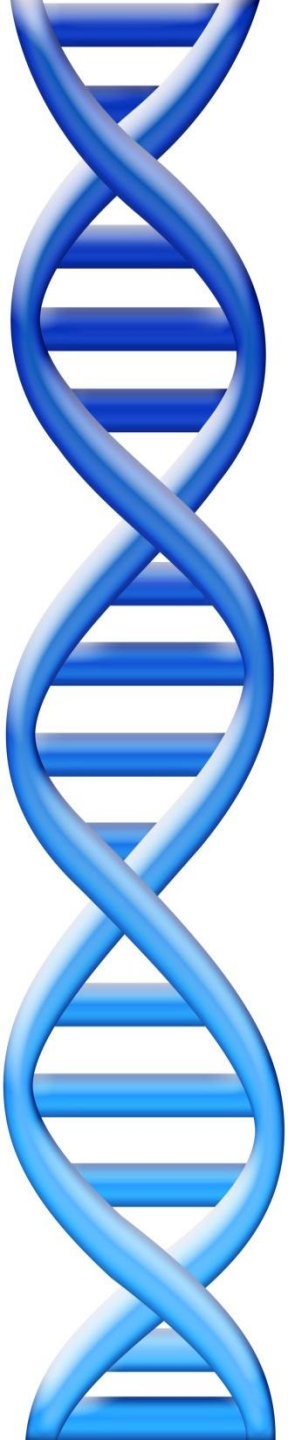
- ▶ Mendel hypothesized that there were *factors* that controlled the characteristics of the plants
- ▶ He concluded that each trait was inherited by a separate factor
- ▶ Since there were two forms of each trait he knew there a pair of factors for each trait
- ▶ We call “factors” Alleles

Mendel's Conclusions...

- ▶ Mendel hypothesized that the trait appearing in the F_1 generation was dominant
- ▶ The recessive trait began to show up in the F_2 generation in about a 3:1 ratio

Table 14.1 The Results of Mendel's F_1 Crosses for Seven Characters in Pea Plants [true breeding: itself = itself]

Character	Dominant Trait	×	Recessive Trait	F_2 Generation Dominant:Recessive	Ratio
Flower color	Purple 	×	White 	705:224	3.15:1
Flower position	Axial 	×	Terminal 	651:207	3.14:1
Seed color	Yellow 	×	Green 	6022:2001	3.01:1
Seed shape	Round 	×	Wrinkled 	5474:1850	2.96:1
Pod shape	Inflated 	×	Constricted 	882:299	2.95:1
Pod color	Green 	×	Yellow 	428:152	2.82:1
Stem length	Tall 	×	Dwarf 	787:277	2.84:1

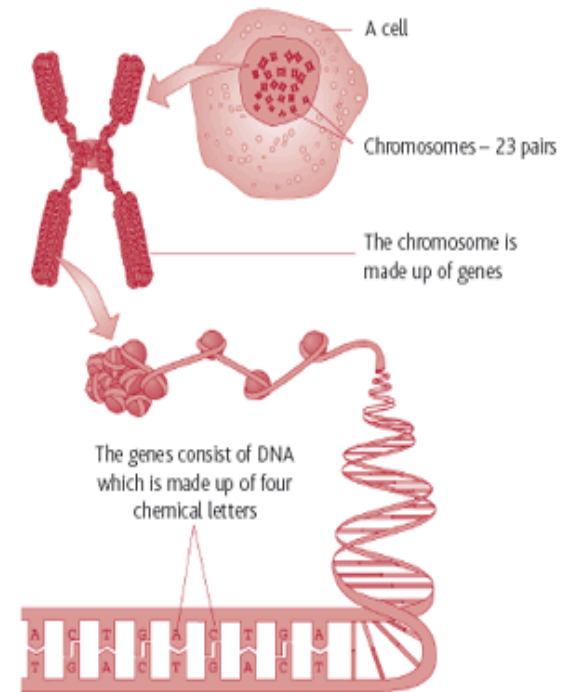


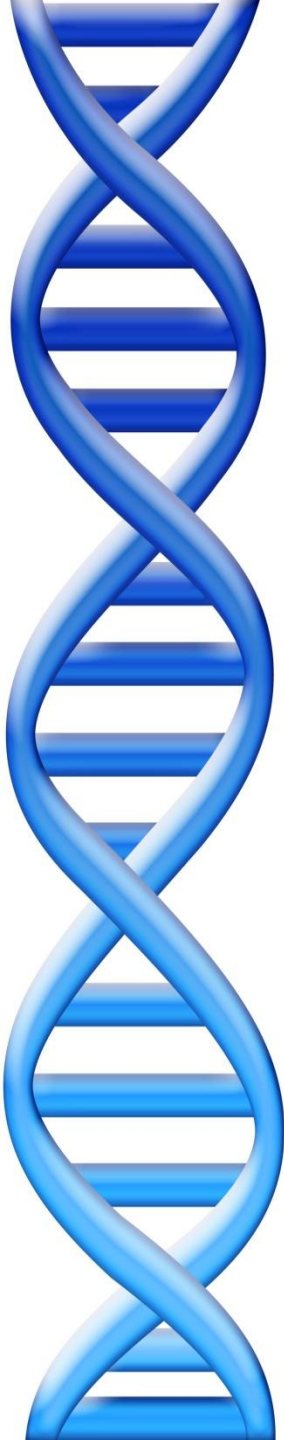
Mendel's Laws

- ▶ **Law of Segregation-** a pair of factors is segregated, or separated, during the formation of gametes
- ▶ **Law of Independent Assortment-** the factors for different characteristics are distributed to gametes independently

Chromosomes and Genes

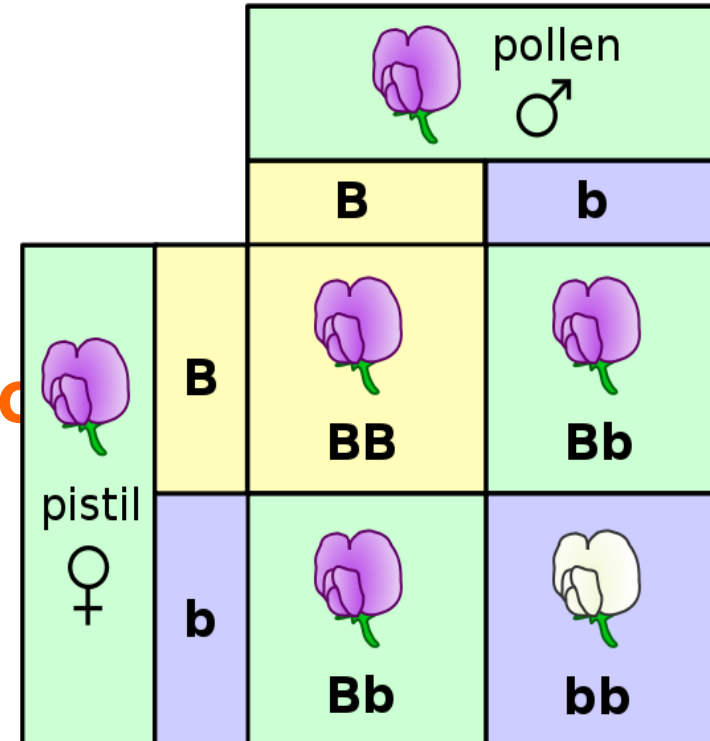
- ▶ **Molecular genetics is the study of structure and function of chromosomes and genes**
- ▶ **A gene is the segment of DNA on a chromosomes that controls a specific heredity trait**
- ▶ **Both chromosomes and genes occur in pairs**

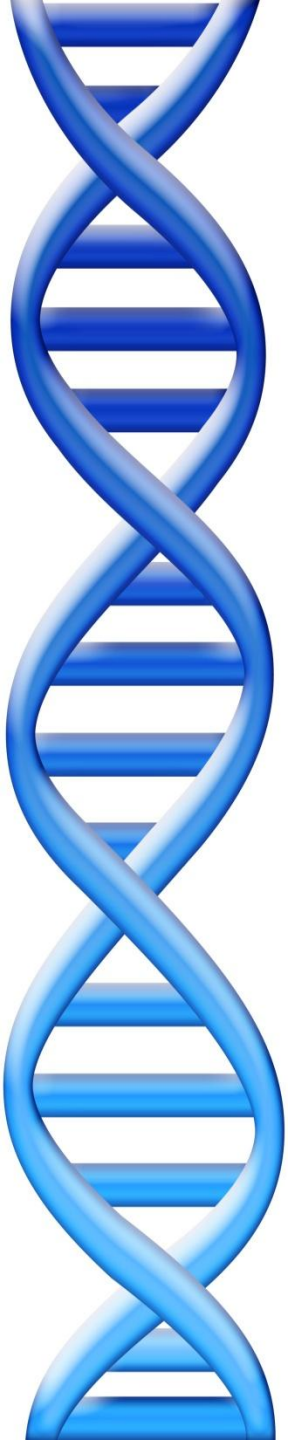




Chromosomes and Genes...

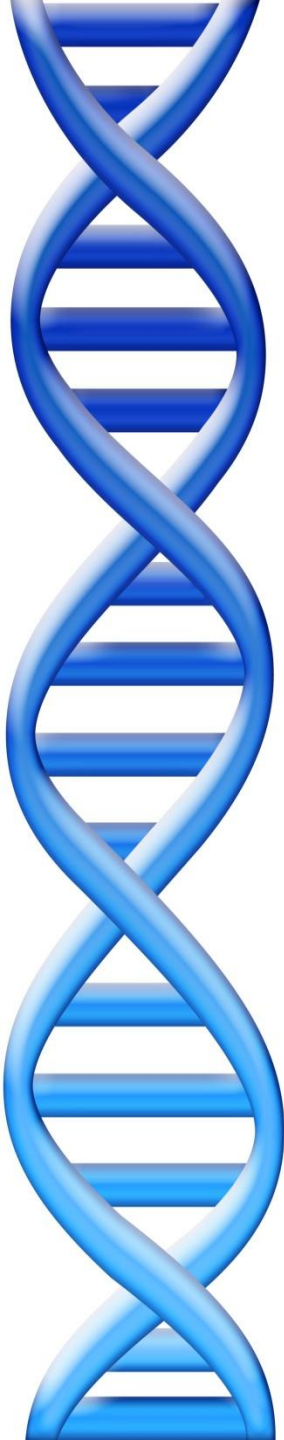
- ▶ Each of the several alternative forms of a gene is called an allele
 - ▶ **Letters are used to represent alleles**
 - ▶ **Capital letters for dominant traits**
 - ▶ **Lower case letters for recessive traits**





Review

- ▶ **Distinguish between dominant and recessive genes**
 - ▶ **Dominant genes mask, or dominate the other factor for a specific characteristic**
 - ▶ **Recessive genes have no observable effect on an organisms appearance when it is paired with a trait controlled by a dominant factor**



Review...

- ▶ **State two laws of heredity that were developed from Mendel's work**
 - ▶ **Law of Segregation**
 - ▶ **Law of Independent Assortment**
- ▶ **Explain the difference between an allele and a gene**
 - ▶ **A gene is the segment of DNA on a chromosome that controls a specific heredity trait**
 - ▶ **Each of the several alternative forms of a gene is called an allele**



Learn Long
Live Long

