

Mendel's Principle of Dominance or Recessiveness



The Father of Genetics



- *Mendel & The Gene Idea*



It All Began with Mendel (FYI)

- Gregor Mendel was born in 1822.
- Called the “Father of Genetics”
- Late 1800 chromosomes and the process of meiosis were unknown.
- Mendel’s work was considered obscure and unimportant until 1900
- Walter Sutton proposed the Chromosome Theory and people began to listen to his ideas.
- Chromosome Theory – specific genes are located on specific chromosomes

Three Conclusions to His Research

1. Principle of Dominance and Recessiveness

One allele in a pair may mask the effect of the other

2. Principle of Segregation

The two alleles for a characteristic separate during the formation of eggs and sperm

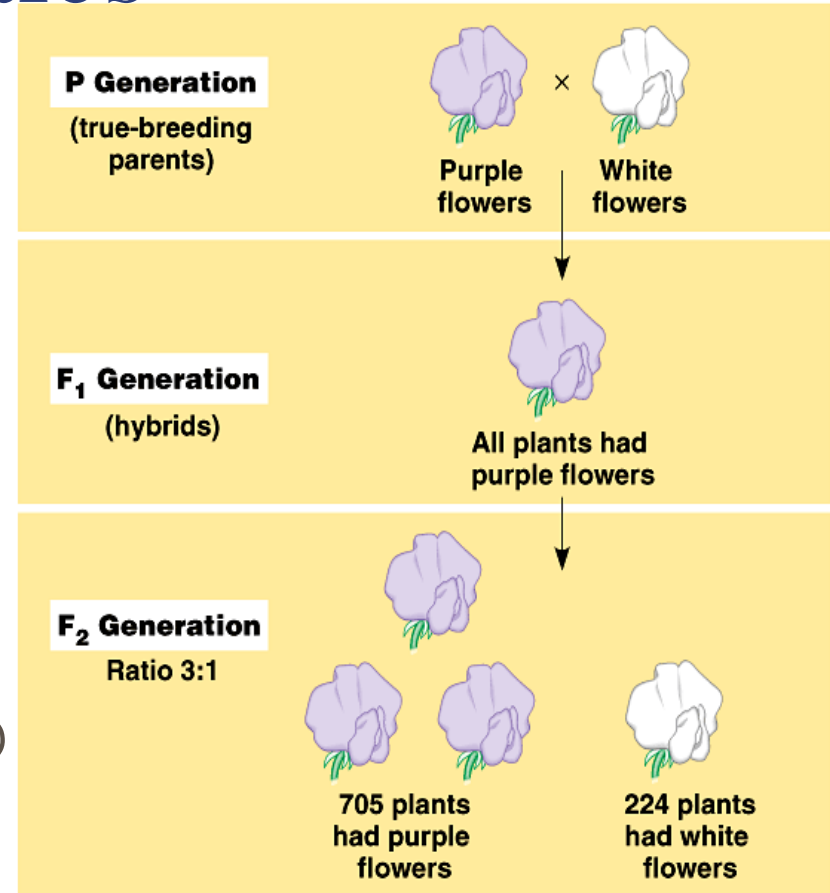
3. Principle of Independent Assortment

The alleles for different characteristics are distributed to reproductive cells independently.



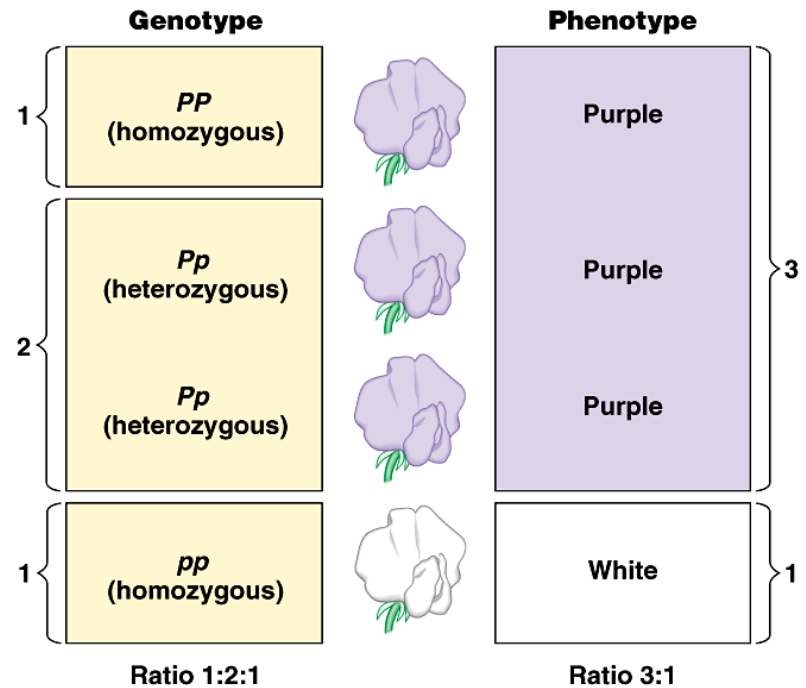
Mendelian genetics

- **Character**
(heritable feature, i.e., fur color)
- **Trait**
(variant for a character, i.e., brown)
- **True-bred**
(all offspring of same variety)
- **Hybridization**
(crossing of 2 different true-breeds)
- **P generation** (parents)
- **F₁ generation** (first filial generation)
- **F₂ generation** (second filial generation)



Genetic vocabulary.....

- **Punnett square:**
- **Gene:** point on a chromosome that controls the trait
- **Allele:** an alternate form of a gene **A or a**
- **Homozygous:** identical alleles for a character **AA or aa**
- **Heterozygous:** different alleles for a gene **Aa**
- **Phenotype:** physical traits
- **Genotype:** genetic makeup
- **Testcross:** breeding of a recessive homozygote X dominant phenotype (but unknown genotype)




Copyright © Pearson Education, Inc., publishing as Benjamin Cummings.

How can the Chances of an Offspring's Traits be Determined?


- BY USING A PUNNETT SQUARE
- Get out your Guinea Pig Dihybrid Cross
- I will call up students to fill in one square on the example dihybrid cross on the board until we complete the problem.

DIHYBRID CROSS Name _____

A cross (or mating) between two organisms where two genes are studied is called a dihybrid cross. The genes are located on separate chromosomes, so the traits themselves are unlinked.

Parents (P)  $BBLL \times bbll$

Gametes BL, BL, bL, bL bl, bl, Bl, Bl

Offspring (F1)  $BbLl \times BbLl$

Female Gametes

	BL	Bl	bL	bl
BL				
Bl				
bL				
bl				

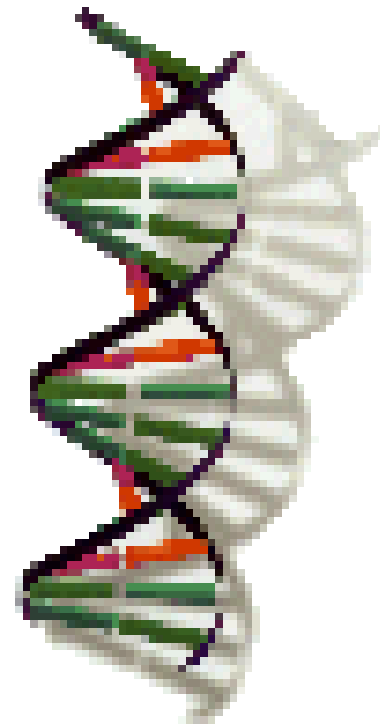
Fit out the genotypes of each of the offspring to determine how many of each type of offspring are produced.

Phenotypic ratio - How many out of 16 are:

Black, short	Black, long	White, short	White, long

What about 2 Traits?

- $BbLl \times BbLl$
- The Gametes contain one of each of the alleles. (BL).
- Each of the offspring contain four alleles exactly like the parents.(BbLl).
- Notice the number of possible offspring has increased.
- The phenotypic ratio is 9:3:3:1

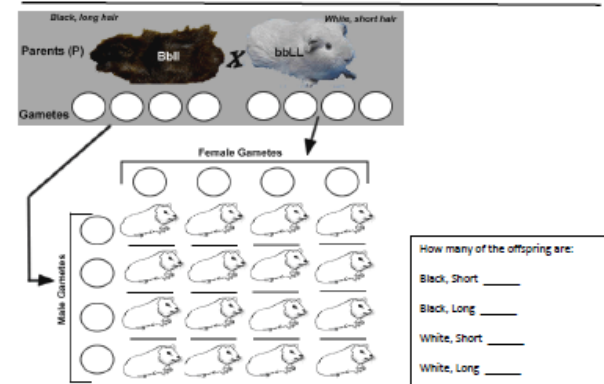
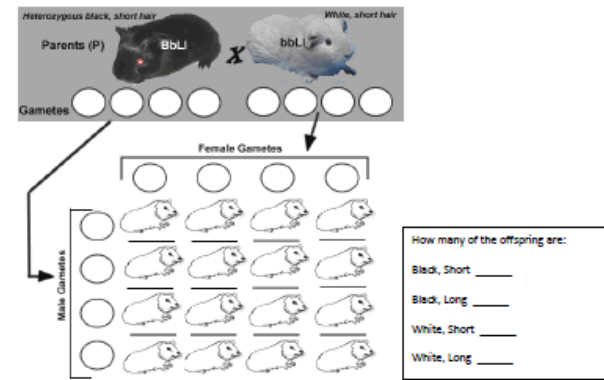


BbLl x BbLl

	BL	Bl	bL	bl
BL	BBLL	BBLl	BbLL	BbLl
Bl	BBLl	BBll	BbLl	Bbll
bL	BbLL	BbLl	bbLL	bbLl
bl	BbLl	Bbll	bbLl	bbll

Now on your own...

- Work the Dihybrid Crosses on your own.





Summary...

- Summarize Mendel's conclusions about inheritance.