CONCEPT: MENDEL AND THE PRINCIPLES OF INHERITANCE

Alleles

● **Alleles** are _____ of a human gene

□ Alleles can be classified as homozygous or heterozygous

- **Homozygous** alleles are two identical variants

- **Heterozygous** alleles are two different variants

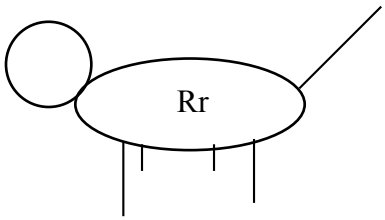
□ Alleles can be classified as dominant or recessive

- **Dominant** alleles will always be phenotypically (physical appearance) expressed if they're present

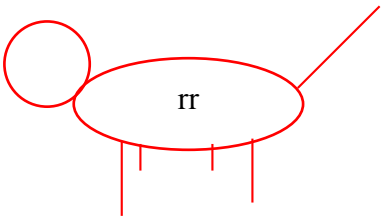
- **Recessive** alleles will only be phenotypically expressed if a dominant allele is absent

EXAMPLE:

Dominant
Heterozygous



Recessive
Homozygous



● Mendel studied allele and gene inheritance by mating _____ plants and observing their offspring

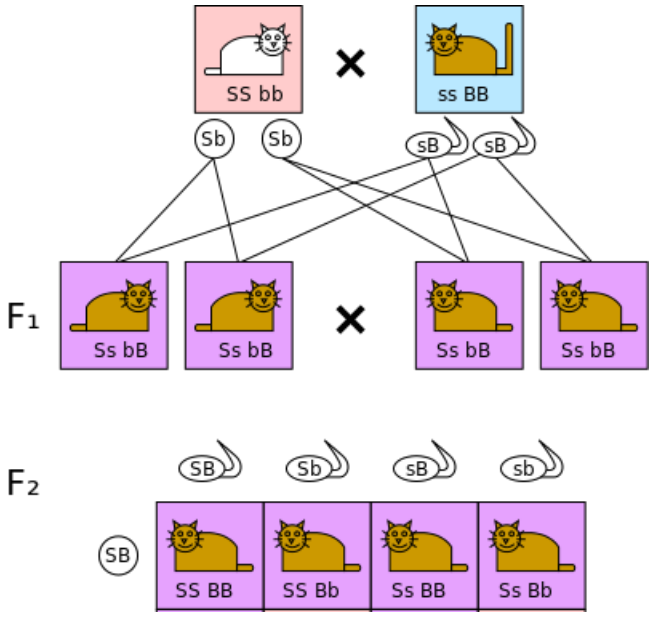
□ **P_1 Generation** is the parental plants

□ **F_1 Generation** is the offspring created by the parental plants

□ **F_2 Generation** is the offspring created from the F_1 generation

- **Backcrossing** is when the F_1 offspring are crossed (mated) with the P_1 generation (their parents)

EXAMPLE:


SS bb
ss BB
Sb
Sb
sB
sB
F1
Ss bB
Ss bB
Ss bB
Ss bB
F2
SB
Sb
sB
sb
SB
SS BB
SS Bb
Ss BB
Ss Bb

Mendel's Laws

● Mendel studies of pea plants discovered two important laws regarding _____

□ **Law of segregation** states that the two alleles for a single gene separate during gamete formation

- Upon fertilization two alleles unite at random (so you get one random allele from each parent)

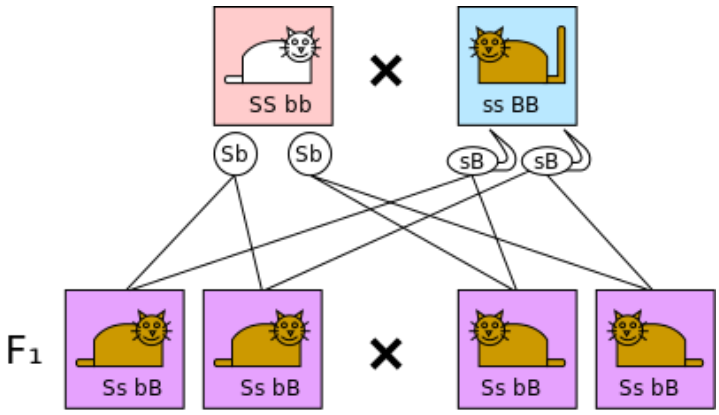
□ **Law of independent assortment** states that alleles of different genes are passed independently of each other

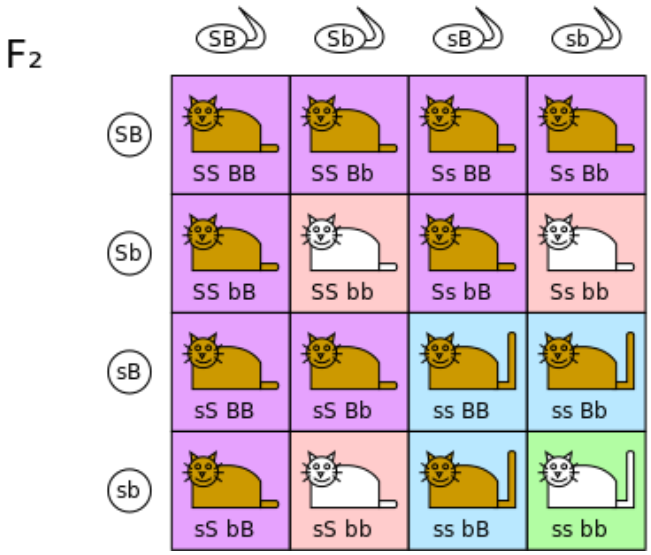
- Ex: Two pea genes (color/shape), aren't inherited together

- **Monohybrid cross** looks at inheritance of one trait

- **Dihybrid cross** looks at inheritance of two or more unrelated traits

EXAMPLE: Dihybrid cross looking at cat color and cat tail length





● Law of independent assortment is a bit more _____

□ Genes on the same chromosome can also segregate independently

- *Crossing over* can result in genes on the same chromosome being passed independently of each other

□ Crossing over can only independently pass genes that are far away

- Genes that are close to each other on a chromosome are inherited together

□ **Genetic linkage** measures how frequently genes are co-inherited to determine their distance on a chromosome

- **Linkage group** is a group of genes on the same chromosome that are inherited together

EXAMPLE:

Linkage Group

Less likely to be co-inherited

More likely to be co-inherited

PRACTICE:

1. Which of the following of Mendel's laws states that two alleles for a single gene separate during gamete formation?
    a. Law of independent assortment
    b. Law of segregation

2. Which of the following generations is created from mating the parental generation?
    a. P
    b. F_1
    c. F_2
    d. F_3

3. True or False: Genes closer together on a chromosome are more likely to be inherited together?
    a. True
    b. False