5.1
Mendel and His Peas

Heredity - passing of genetic traits from parent to offspring

Example:
having same eye, hair, or skin color as a parent.

▲ Who was Gregor Mendel?
- Born in Austria
- perfomed his research ~~at~~ a monastery
- 21 when entered the monastery
- discovered the principles of heredity while studyin pea plants.

Unraveling the mystery:
- first generation and second generation mean parents and offspring

- male and female reproductive structures are found in self-pollinating plants.

- True-breeding plants offspring have all the same traits as the parent.

- pea plants can cross-pollinate, meaning one plant is able to fertilize another.
- peas can cross and self pollinate.

▼ Name two ways plants can cross-pollinate?

① WIND ② INSECTS

- Pea plants ability to be able to both cross pollinate and self-pollinate was a key factor in Mendel's work.
- This allowed Mendel to grow true-breeding plants allowing him to mix different traits to check results.

- in a population a characteristic is a feature that has different forms.
  - traits are different forms of characteristics.

▶ Why was it important for peas to be true breeding?
  - this allowed him to know what to expect when plants self pollinated.

▶ How did Mendel make sure that some plants cross-pollinated?
  - removed one plants anthers to prevent self-pollination and then performed the cross-pollinating himself

- dominant trait - is seen in the first generation.
- first-generation plant - offspring from the first cross.
- recessive trait - seen in the second generation

▶ What were the results when Mendel allowed the first-generation plants to self-pollinate?
  - every 4th plant had white flowers

- a relationship between two different things is shown in a fraction it is considered a ratio.

- Gregor mendel realized that the only explanation for his result was that each trait had two sets of instructions, one from each parent.

▶ How long did it take for mendel's discovery to be recongnized?
  - more than 30 years later

* 5.2 *

Traits and Inheritance

▶ A Great Idea:
- first-generation plants carried the instructions for the dominant trait and the recessive trait.

- These traits with instructions are known as genes.

→ Two forms of a gene, one from each parent are _____.
  - alleles.

→ What is the difference between a gene and an allele?
  - a gene contains the instructions for an inherited trait. The different versions of a gene are called alleles.

* Know vocab *

- When gene pairs are written, the dominant allele has a capital letter.

- Purple flower is dominant = P
  → only one P allele is needed for the plant to have purple flowers.

- A homozygous plant is one with either two dominant or two recessive genes.
  * Heterozygous *
  ⇒ Punnett Squares:

- used to organize possible offspring combinations

Example: pg 121 Fig 2

	P	P
P	Pp	Pp
P	Pp	Pp

(true-breeding)

* all of the offspring for this cross have the same genotype (Pp)

* Dominant allele = P
  - this ensures that all offspring will be purple-flowered

* Recessive allele = p
  - may be passed on to the next generation

Example: pg 122 Fig 3

	P	p
P	PP	Pp
p	pP	pp

(self-pollinating)

* what are some possible offspring genotypes?
  Pp, PP, pp

Pp, pP = exactly the same genotype

- Probability:
  - the mathematical chance that something can happen.
- Genotype Probability:
  - why are the traits that Mendel studied in pea plants easy to predict?
    - there are only two choices for each trait.
- Incomplete Dominance:
  - when each allele has its own degree of influence.

Example: snapdragon

- when you cross a red snapdragon and a white snapdragon the offspring are pink.
  - this happens b/c both alleles of the gene have some degree of influence.

- One Gene, many Traits:
  - one gene can influence more than one trait.

Figure 6

- Many Genes, One Trait:
  - skin color, hair color, and eye color

Importance of Environment

- the environment can influence how you grow.

5.3 Meiosis:

- 2 types of reproduction
  1. asexual (1 parent cell)
  2. sexual (2 parent cells)

- in asexual reproduction cells divide by mitosis.

- parent cells are called sex cells.

- homologus chromosomes are chromosomes that carry the same set of genes

- sex cells differ from other human cells because they have half as many chromosomes

- miosis is the process in which sex cells are made.

- A new cell formation from a sperm cell and an egg cell have 46 chromosomes

- Walter Sutton observed that chromosomes of the eggs and sperm cells are located inside the nucleus.
  - he then proposed that genes were located on chromosomes.

- sex cell division equls two identical copies of the original cell.

Steps of Meiosis:

- Chromosomes look threadlike before meiosis.
- a chromatid is an exact duplicate of a chromosome.
- During meiosis a cell membrane forms around each new cell.

1: Each chromosome makes an exact copy of itself

2: similar chromosomes pair with one another.

3: chromosomes seperate from their partners and move to opposite ends of the cell.

4: the nuclear membrane re-forms, and the cell divides.

5: the chromosomes are NOT copied again between the two cell divisions.

6: the chromosomes line up at the equator of each cell.

7: chromatids pull apart, and the cell divides.

8: four new cells have formed from the original single cell.

- after meiosis each new cell has half the number of chromosomes that were present in the original

MEIOSIS AND MENDEL

- the steps in meiosis explains Mendels results.
- the genes that determine sex are found on the sex chromosomes.
- Females = two X chromosomes
- Males = one X and one Y chromosome
- Because males only have one X chromosome, they are more likely to have a sex-linked disorder.
  Examples: color-blindness
  Hemophilia
- pedigree chart can allow you to trace a trait through generations of a family.