**Mendel’s Breeding Experiments**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lived in the 1800’s in Austria. Mendel did breeding experiments with the garden pea plant. Mendel was the first person to develop rules that accurately predict the patterns of \_\_\_\_\_\_\_\_\_ in pea plants.
* **\_\_\_\_\_\_\_\_\_\_\_\_** - is the science of heredity and the mechanism by which traits are passed from parents to offspring.
* **\_\_\_\_\_\_\_\_\_\_** – is how traits are inherited from one generation to the next.
* Modern genetics is based on Mendel’s explanations for the patterns of heredity in garden pea plants.
  + Define the term cross
  + Purple and white mean what?

**Features of Pea Plants**

* The garden pea plant is a good subject for studying heredity because:

**Contrasting Traits**

* **Physical features** that are inherited are called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* A **\_\_\_\_\_\_\_\_\_\_\_** is one of several **possible forms of a character**.
* Mendel wanted to see what would happen when he crossed individuals that have **different traits**. In such a cross, the offspring that result are called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Self-Pollination**

* In garden pea plants each flower contains both male and female \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* This arrangement allows the plant to \_\_\_\_\_ \_\_\_\_\_\_\_. Pea plants can also reproduce through cross-pollination. Involving \_\_\_\_\_\_\_\_\_\_\_ plants.
* Mendel removed the male part of the flowers to make sure they did not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Easy to Grow**

* Small plant that needs little care and matures quickly.
* Also each plant produces **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* Q: why is it important to have many results in an experiment…
* A: So that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can be compared for each type of cross.
  + Recall that collecting repeated data is an important scientific method. The more data you have and the more results that are the same the more accurate your experiment is!

**Mendel’s First Experiment**

* A **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** cross is a cross that is done to study one pair of contrasting traits.
* Mendel’s first experiments used monohybrid crosses and were carried out in three steps.
* A **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is a group of offspring from a given group of parents.
* Mendel’s First Experiment: Draw, label and explain

Step 1:

Step 2:

Step 3

**Ratio’s in Mendel’s Results**

* All of Mendel’s F1 plants expressed the same trait for a given character. **The contrasting trait had \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!** But when the F1 plants were allowed to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, **the missing trait reappeared in some of the \_\_\_\_\_ plants.**
* F2 ratio 3:1. For each of the seven characters that Mendel studied, he found a similar 3:1 ratio of contrasting traits in the F2 generation.

**Mendel’s Theory**

* Mendelian theory of heredity, form the foundation of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* Mendelian theory explains **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ patterns of inheritance.**
* In these patterns, two of several versions of a gene combine and result in one of several possibilities.

**Alternate Versions of Genes**

* Before Mendel’s experiments, many people thought that the trait of offspring were always a **\_\_\_\_\_\_\_\_\_\_\_** of the traits from parents.
* This would mean that a tall **plant** crossed with a **short** plant would make a **\_\_\_\_\_\_\_\_\_\_** plant. Today scientist know that different versions of genes. Each **version** of a **gene** is called an **\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* Q: If Height is the character/Gene what are the alleles?
* A:

**One allele from each parent**

* Mendel also noticed that traits can come from either parent. The reason is related to **\_\_\_\_\_\_\_\_\_\_\_**.
* When \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form, each pair of alleles is \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Only **\_\_\_\_\_\_\_\_\_\_** of the pair is passed on to **offspring**.

**Dominant and Recessive Alleles.**

* In Mendel’s experiments **one trait** always seemed **to \_\_\_\_\_\_** over the **other trait.** Only one was **fully \_\_\_\_\_\_\_\_\_\_\_\_\_\_** as a trait. The other allele had no effect on the organism’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form.
* In this case, the **expressed** allele is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* The allele that is not **expressed** when the dominant allele is present is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

**Other findings from Mendel’s Work**

* Random \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of alleles
* Genotype \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ phenotype

**Random Segregation of Alleles**

* Chromosome pairs split up **\_\_\_\_\_\_\_\_\_\_\_\_**, either one of a pair of **\_\_\_\_\_\_\_\_\_\_\_\_\_** chromosomes might end up in any one **gamete**. As **only chance decides** which alleles will be passed on through gametes.
* In modern terms, the law of segregation holds that when an organism produces gametes, each pair of alleles is separated and **each gamete has an \_\_\_\_\_\_\_\_\_\_ chance of receiving either one of the alleles**.

**Mendel’s Findings in Modern Terms**

* Although Mendel did not use the term allele, he used a code of letters to represent the function of alleles. A dominant allele is shown as a \_\_\_\_\_\_\_\_\_\_\_\_ letter.

**Genotype and Phenotype**

* Offspring do not show a trait for every allele that they receive. Instead \_\_\_\_\_\_\_\_\_\_\_\_\_ of alleles determine traits.
* The set of alleles that an individual has far a character is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The trait that results from a set of alleles is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Genotype determines \_\_\_\_\_\_\_\_\_\_\_\_.

**Homozygous and Heterozygous**

* If an individual has two of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ alleles of a certain gene the individual is \_\_\_\_\_\_zygous.
* If an individual has two \_\_\_\_\_\_\_\_\_\_\_ alleles of a certain gene the individual is \_\_\_\_\_\_\_\_\_\_zygous.
* Genes \_\_\_\_\_\_\_\_\_\_\_\_ on chromosomes: Genes are said to be \_\_\_\_\_\_\_\_ when they are close together on chromosomes. They will rarely be separated because they are too close to each other.

**Modeling Mendel’s Laws**

* Farmers, gardeners, animal keepers and biologists need to make predictions when they try to breed organisms that have desired characteristics.

**Using Punnett Squares**

* A punnett square is a model that predicts the likely outcomes of a genetic cross.
* A punnett square shows all of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that could result from a given cross.

**Analyzing Monohybrid Crosses**

* Recall that this cross involves parents who each have a trait that contrasts with the trait of the other parent
* The parents may be homozygous or heterozygous.

**Using Probability**

* A punnett square shows the possible outcomes of a cross but it can also be used to calculate the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of each outcome.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the likelihood that a specific event will occur. Probability formulas can be used to predict the probabilities that specific alleles will be passed on to offspring.

**Using a Pedigree**

* A Simple way to model inheritance is to use a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (a family history that shows how a trait is inherited over several generations).
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is a disease or disorder that can be inherited.
  + **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** have alleles for disorders but do not show symptoms. They can pass on the disorder though.

**Pedigree** - A pedigree can help answer questions about three aspects of inheritance:

1. \_\_\_\_\_\_-linked Gene

* A sex-linked gene is located on a sex chromosome either an \_\_\_\_\_\_\_ or \_\_\_\_ chromosome.
* \_\_\_\_\_\_\_\_ are located on the \_\_\_\_\_\_ chromosomes because it’s longer and contains more.
* A recessive allele is not expressed in the female unless she has \_\_\_\_\_\_\_\_\_ the traits.
* It is however expressed in the \_\_\_\_\_\_\_\_ because he only has that trait. Y is always recessive!
* Traits that are not expressed \_\_\_\_\_\_\_\_\_ in both sexes are sex-linked.

1. Heterozygosity –
2. Dominance

Beyond Medelian Heredity : Read Chapter 11.3 & take notes on these Important concepts:

* + - Polygenic Inheritance
    - Incomplete dominance
    - Multiple alleles
    - Codominance

**Environmental Affects**

* Phenotype can be affected by conditions in the environment such as nutrients and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_ in humans can affect height which is partially hereditary.
* Temperature affects pigments depending on time of year in the Arctic Fox.