Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Gregor Mendel**

* Considered the father of
* Genetics – the study of
* Austrian Monk born 1822
* Worked primarily with pea plants

**Why Did He Use Pea Plants?**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Mendel was able to isolate male and female gametes.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: It was easy to identify traits (characteristics that are inherited)
3. \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_: Pea plants were able to be grown quickly.

**The Pea Plants**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- the joining of male and female sex cells to produce a new cell (embryo)
* Pea plants are normally self-pollinating
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - sperm cells in pollen fertilize egg cells on the **same flower**.
* The pea plants that Mendel used were **true-breeding**, meaning that if they were allowed to self-pollinate, they would produce offspring \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ex. All tall plants produced only tall plants, all short plants produced only short plants.

* Mendel wanted to produce seeds by joining the sex cells of two different plants.
* To do this, he had to prevent the plant from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* He accomplished this by cutting the pollen-bearing male parts off of one flower, and then dusting the pollen from another plant onto the flower. This was called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Cross-Pollination produces seeds that have two different plants as parents.
* This made it possible for Mendel to cross-breed plants with different characteristics, and then study the results!
* Mendel studied 7 different traits of pea plants
* He would cross plants that were true-breeding for two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and observe their offspring.

**Important Vocabulary!**

Trait- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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*Ex. Seed color or plant height.*

Hybrid- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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*Ex. Crossing a pea plant with purple flowers with a plant that has white flowers.*

Mendel concluded that biological inheritance is determined by factors that are passed from one generation to the next. Today, scientists call the chemical factors that determine traits genes.

Gene- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Allele- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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*Ex. The gene for pea plant height comes in two forms: tall and short. Allele for tallness or allele for shortness.*



**The Principle of Dominance**

* Some alleles are **dominant** and some are **recessive.**
* An organism with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ allele for a trait will **always** exhibit that trait.
* An organism with a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ allele for a trait will **ONLY** exhibit that trait *when the dominant allele for that trait is not present.*
* Since the allele for tallness was dominant and the allele for shortness was recessive, when Mendel crossed a true-breeding tall plant with a true-breeding short plant, all of the offspring would be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Laws of Segregation**

**Mendel wondered:** Had the recessive alleles (shortness) disappeared? Or were they still present in the F1 plants somewhere?

**To answer this question**, he allowed the F1 hybrid plants to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to form another generation of offspring (F2).

The results of the F1 cross were remarkable! The recessive trait of shortness had reappeared in the F2 generation!

* Roughly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the offspring in the F2 generation had the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ trait. Mendel repeated the experiment with the other traits, and the same patterns held true!

**Why did This Happen? Segregation Explained!**

* The answer is in **meiosis**!
* During gamete formation, alleles segregate from each other when the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ separate in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of Meiosis.
* Remember that Meiosis produces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells – leaving the gametes with only a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ copy of each gene.
* The alleles are paired up again – randomly – when the egg and sperm unite during fertilization!

