NOTES 5.2

Chapter 5- Genetics
Lesson 2 - Understanding Inheritance

What controls traits?

Mendel concluded that two factors control each trait. One factor comes from the egg cell and one factor comes from the sperm cell. What are these factors? How are they passed from parents to offspring?

Inside each cell is a nucleus that has threadlike structures called chromosomes. Chromosomes contain genetic information that controls traits. What Mendel called "factors" are parts of chromosomes. Each cell in an offspring contains chromosomes from both parents. These chromosomes exist in pairs-one chromosome from each parent.

Each chromosome can have information about hundreds or thousands of traits located within your **genes**.

Q: What is a gene?
A: a segment of DNA on a chromosome that controls a specific trait

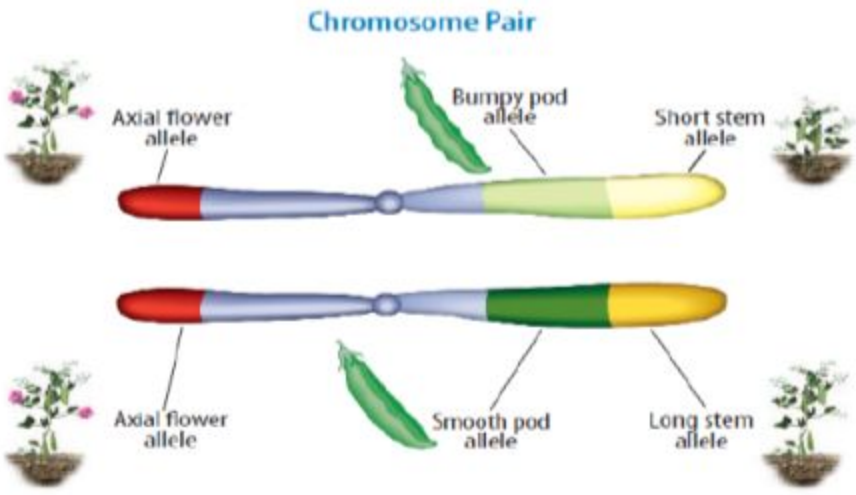
Ex. a gene of a pea plant might have information about flower color

An offspring inherits two genes (factors) for each trait, one from each parent called **alleles**. The genes can be the same or different, such as purple or white for pea flower color.

Q: What are alleles?
A: different forms of a gene

Ex. pea plants can have two purple alleles, two white alleles, or one of each allele

These factors are known as **genes** which can appear in different forms called **alleles**, **Chromosomes** are made up of many **genes** joined together that control specific **traits**.



A trait controlled by a recessive allele will ONLY show up if the organism DOES NOT have the dominant allele.

In pea plants, the allele for tall stems is dominant over the allele for short stems.

Therefore, only pea plants that inherit 2 recessive alleles for short stems will be short.

Okay, so is there a better way to write about alleles without having to use so many words?

YES! Scientists use letters to represent alleles where a –

dominant allele is an UPPERCASE letter

recessive allele is a lowercase letter

Ex. tall (T) vs. short (t)

Therefore, if a plant inherits –

- 2 dominant alleles for tall stems → TT
- 2 recessive alleles for short stems → tt

} purebred

- 1 dominant allele for tall stems & 1 recessive allele for short stems → Tt

} hybrid

In 1866, Mendel presented his results after years of study. Unfortunately, many scientists did not understand the importance of Mendel's work and it was forgotten for nearly 34 years!

2 useful terms that geneticists use to describe organisms are –

phenotype & genotype

Q: What is phenotype?
A: an organism's physical appearance or its visible traits

Ex. black fur, tall height

Q: What is genotype?
A: an organism's genetic makeup or allele combinations

Ex. BB, bb, Bb

Q: If a pea plant's genotype is Tt, what is its phenotype?

A: tall plant

Geneticists use 2 additional terms to describe an organism's genotype –

1. **homozygous**

Q: What is homozygous?
A: having 2 **identical** (sized) alleles of a gene

Ex. **TT, bb** (also known as a **purebred**)

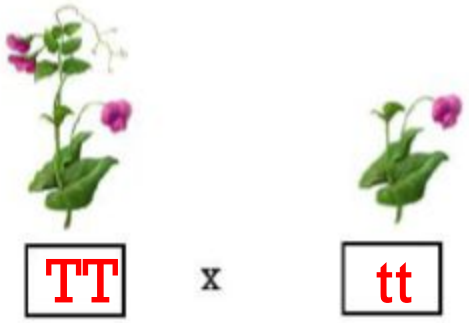
But what happens if you inherit 1 allele for each trait?

2. **heterozygous**

Q: What is heterozygous?
A: having 2 **different** (sized) alleles of a gene

Ex. **Tt, Bb** (also known as a **hybrid**)

Let's review **Mendel's Results -**



TT x tt

Tt

1 allele for tall stem &
1 allele for short stem

Add some images about Mendel & his contributions to Genetics!