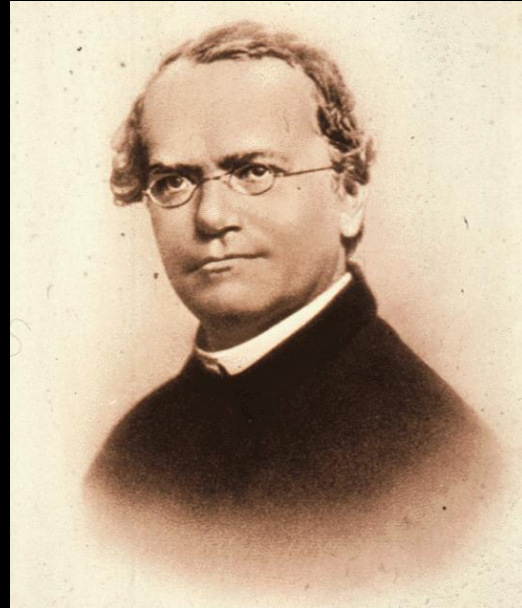


The Work of Gregor Mendel



Gregor Mendel, 1822-1884

And why we look the way we do



Gregor Mendel was a priest in what is now the Czech Republic. He was a high school science teacher and keeper of the monastery garden.

His curiosity about heredity led him to do numerous experiments on pea plants. His results and conclusions written in 1865 are the foundation of modern genetics.



Truman State University. Noncommercial, educational use only.



Mendel's monastery today.

Mendel's garden.

- Mendel's experiments led him to make conclusions about genetics that are still used today and form the foundation of modern genetics.

- One reason his findings are so remarkable is that so little was known then about reproduction at the cellular level. Mendel didn't know about:

1. Genes

2. Chromosomes (people had seen them but didn't know they were involved in heredity.)

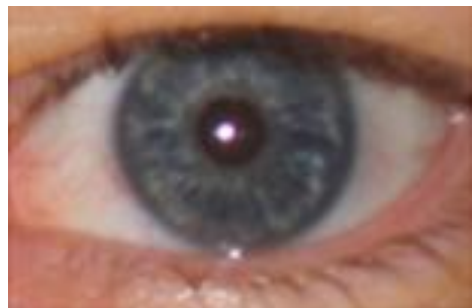
3. Meiosis (no one knew how gametes form)

4. DNA



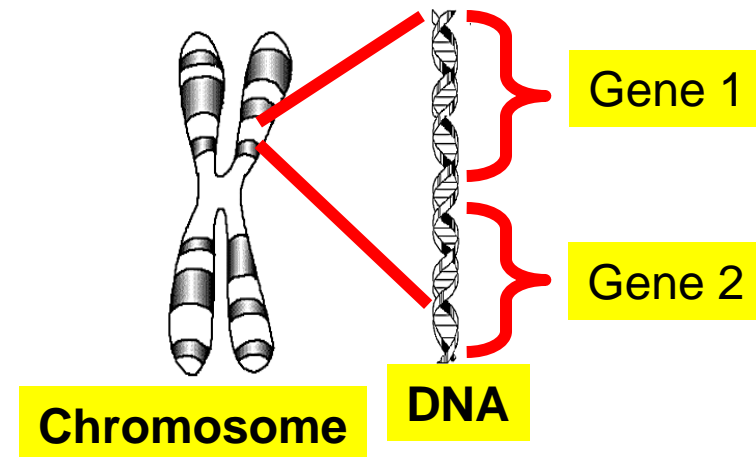
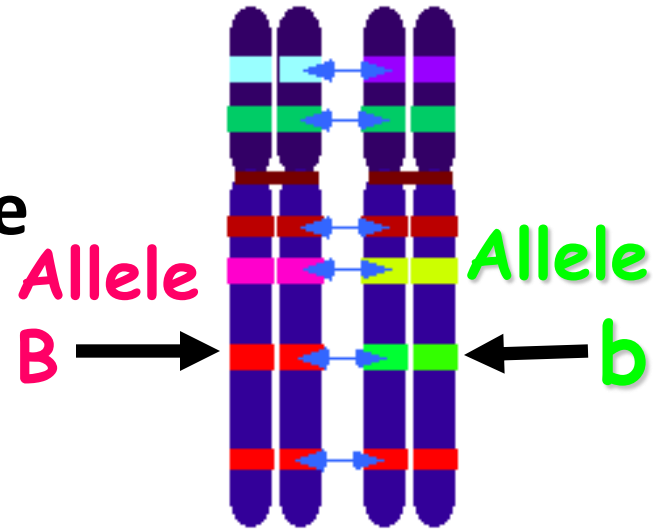
What did Mendel find?

- He discovered different laws and rules that explain factors affecting heredity.
- **Heredity:** how traits are passed on.
- **Traits:** characteristics
 - Example: blue eyes, brown hair, or cleft chin



Rule of Unit Factors

- ... states that each organism has two alleles for each trait (located on homologous chromosomes).
- **Alleles:** different forms of the same gene
 - Example: B = brown eyes; b = blue eyes
- **Gene:** a sequence of DNA bases that specify the order of amino acids in a protein.
 - Controls how an organism develops



Rule of Dominance

- The trait that **is observed** in the offspring is the **dominant trait** (**uppercase**)

– Example: B = brown eyes

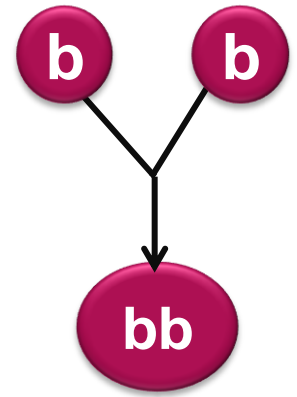


- The trait that **disappears** in the offspring is the **recessive trait** (**lowercase**)

– Example: b = blue eyes



- **Genotype**: the combination of alleles an organism has.
 - Example: bb, BB, or Bb
 - A *blue eyed* person's **genotype is bb.**
 - A brown-eyed person's genotype could be BB or Bb.



→ Why doesn't someone with genotype Bb have BLUE eyes?

- **Phenotype**: physical appearance OR what the traits look like.
 - Example: Ms. Mitchell's **phenotype for hair color is brown hair.**

→ What is YOUR phenotype for hair color?

→ What is YOUR phenotype for eye color?

- **Homozygous**: Both alleles for a trait are the same.

- Example: bb or BB

- **Heterozygous**: The organism's alleles for a trait are different.

- Example: Bb or Aa

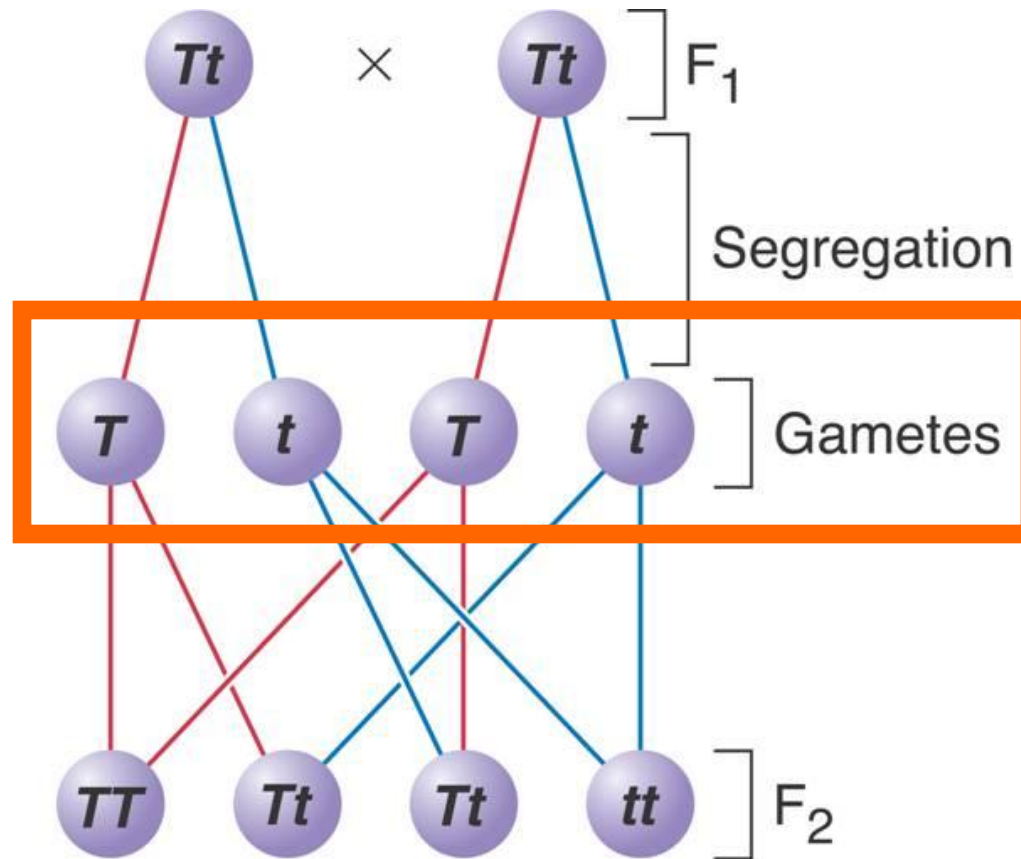
→ Use any letter to come up with an example of a homozygous genotype.

→ Use any letter to come up with an example of a heterozygous genotype.

Law of Segregation

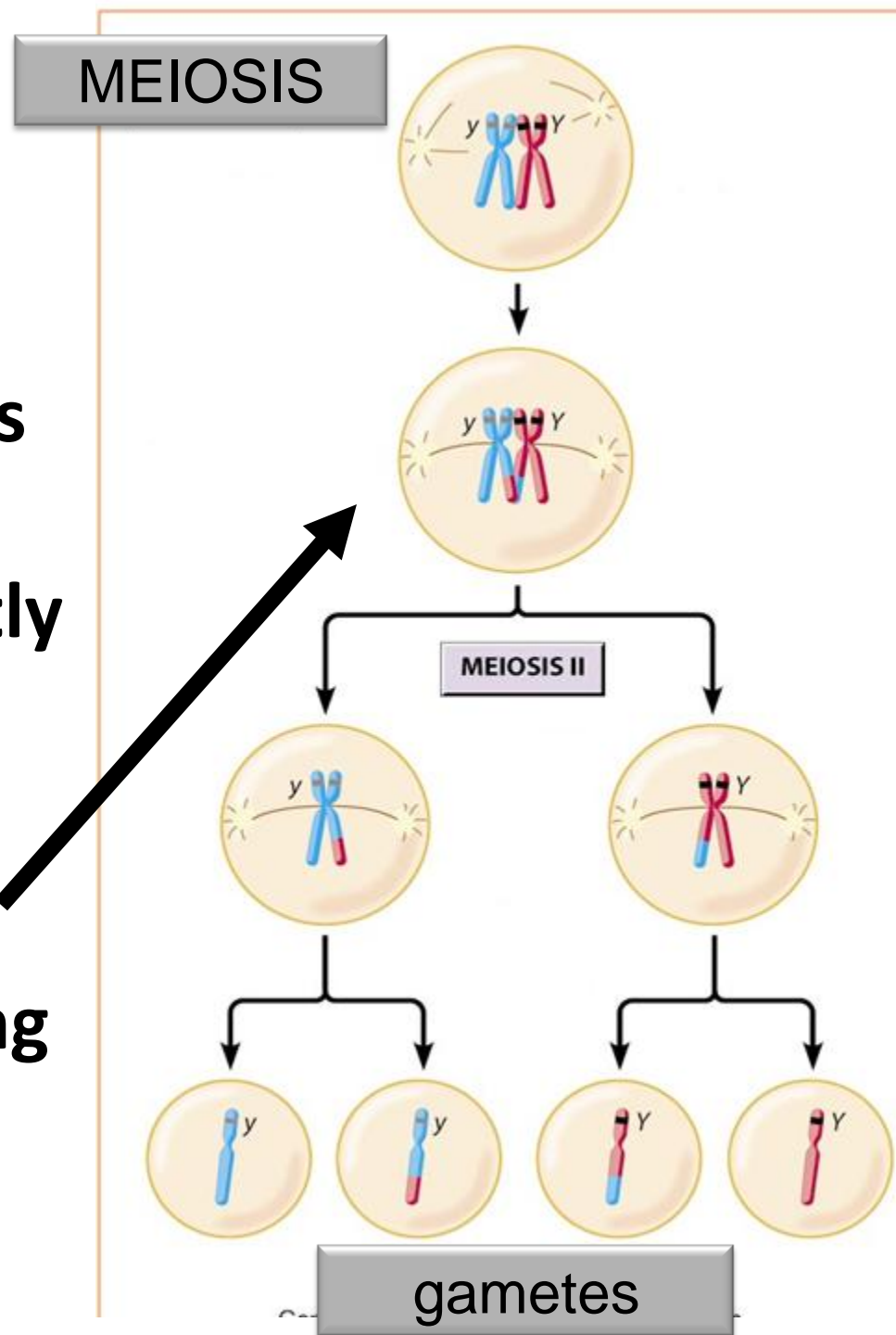
The Law of Segregation states that the two alleles for a trait **must separate** when gametes are formed.

- A parent randomly passes only one allele for each trait in each gamete to each offspring
- Fertilization: when two gametes (1 from each parent) join together to form a new organism.



Law of Independent Assortment

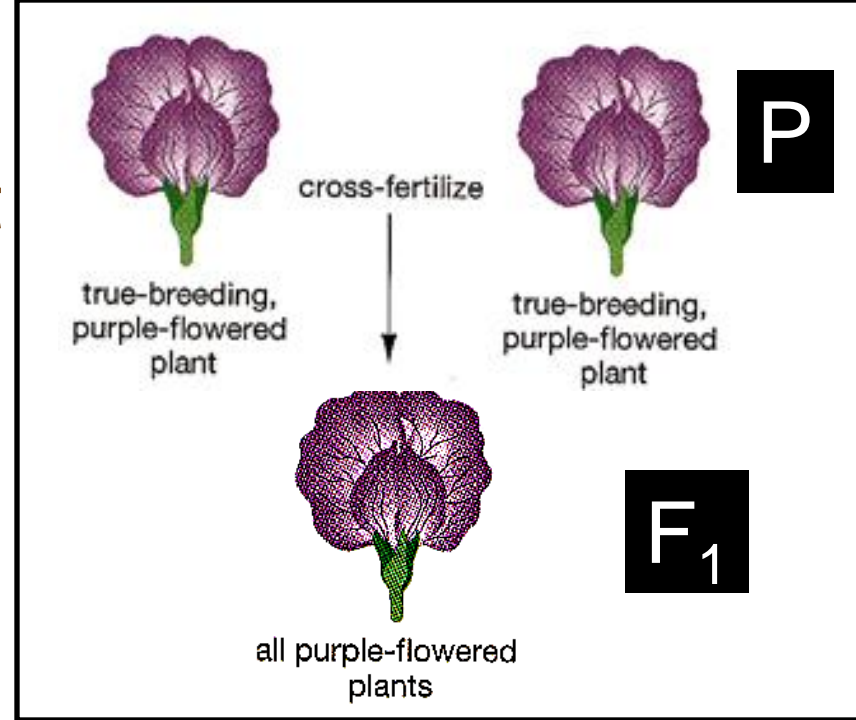
- ... states that the genes for different traits are inherited independently of each other.
 - Genes for different traits can segregate independently during the formation of gametes (meiosis).



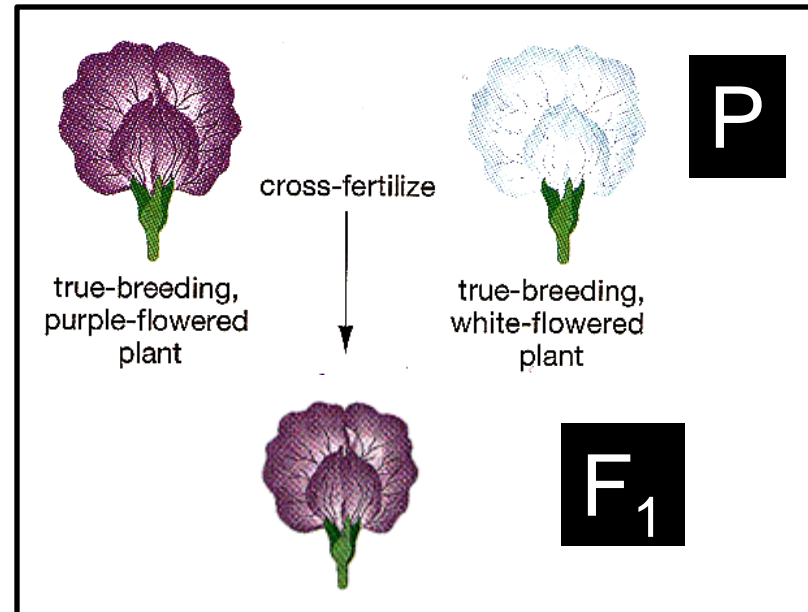
Review Questions

- How many **alleles** are there for each trait?
 - 2 alleles
- What is an **allele**?
 - different forms of the same gene
- How many **alleles** does a parent pass on to **each offspring** for **each trait**?
 - 1 allele for each trait for each offspring

- **Purebreeding (pure):** offspring that are the result of mating between genetically similar kinds of parents.
 - the opposite of hybrid.



- **Hybrids:** offspring that are the result of mating between 2 genetically different kinds of parents.
 - the opposite of purebreed



P = parents **F₁** = 1st generation