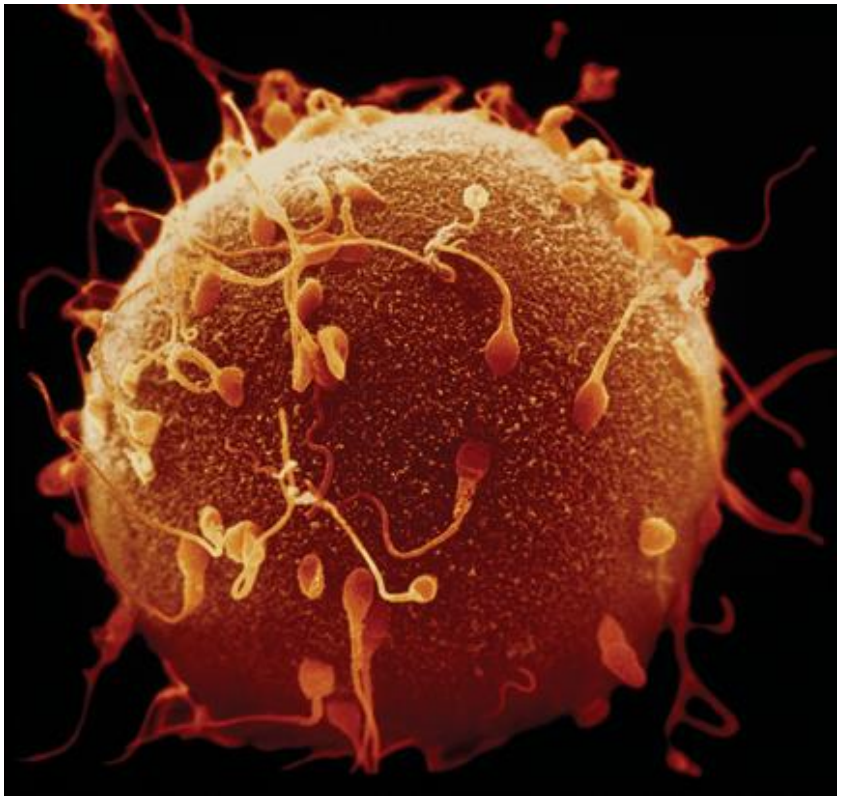
6.4 Traits, Genes, and Alleles

KEY CONCEPT

Relationship between genes & proteins:

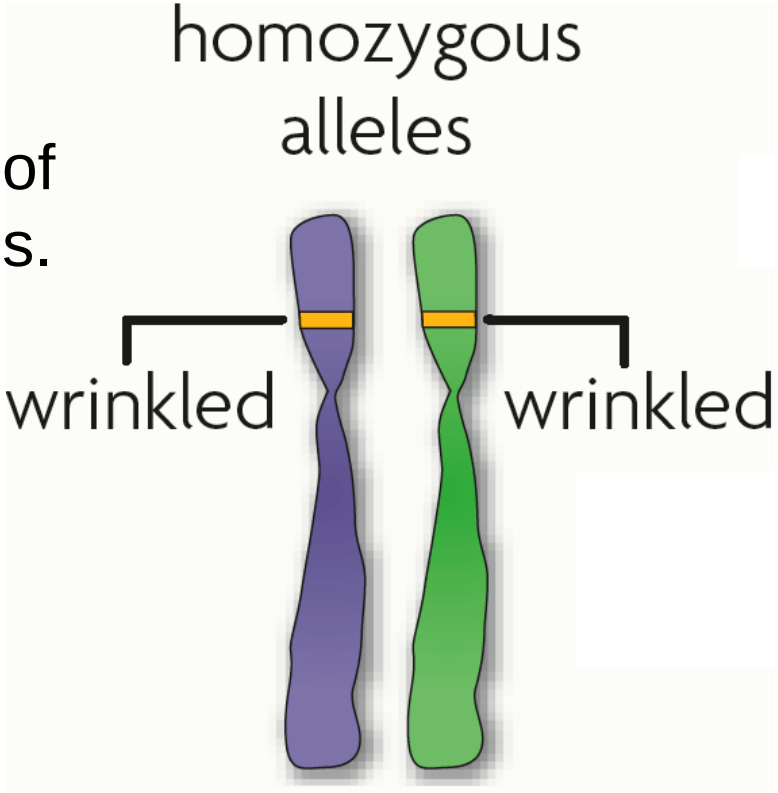
- Genes encode proteins that produce a diverse range of traits.



6.4 Traits, Genes, and Alleles

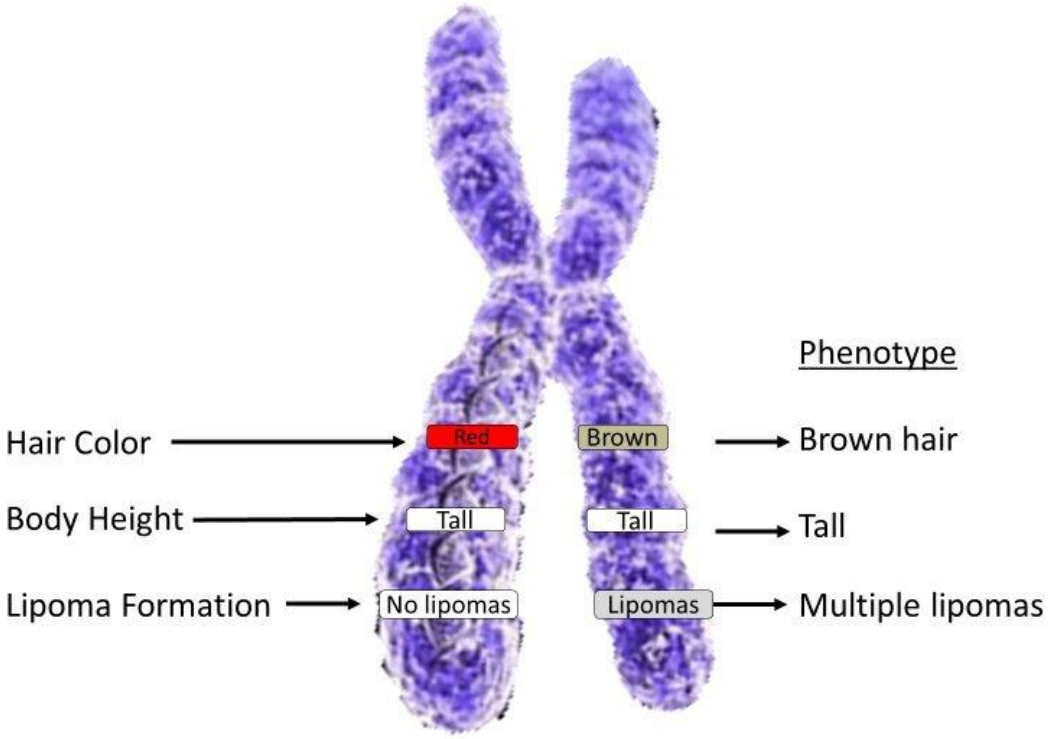
The same gene can have many versions.

- A **gene** is a piece of DNA that directs a cell to make a certain protein.
- Each gene has a locus, a specific position on a pair of homologous chromosomes.



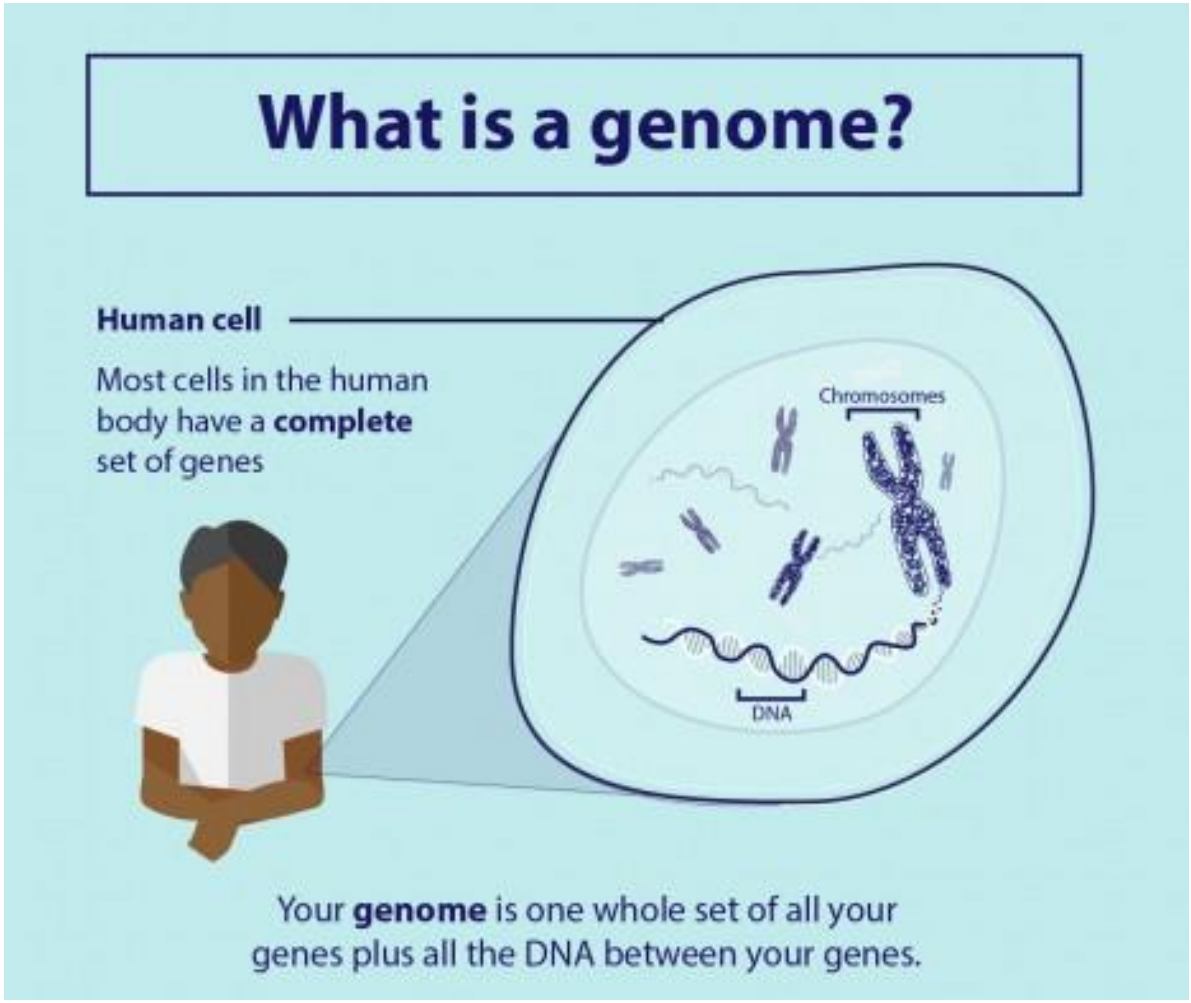
6.4 Traits, Genes, and Alleles

- An **allele** is any alternative form of a gene occurring at a specific locus on a chromosome.
  - There may be many different forms of the same gene in a population;
  - Each individual organism has only 2 forms of that gene, 1 from the mother and 1 from the father



6.4 Traits, Genes, and Alleles

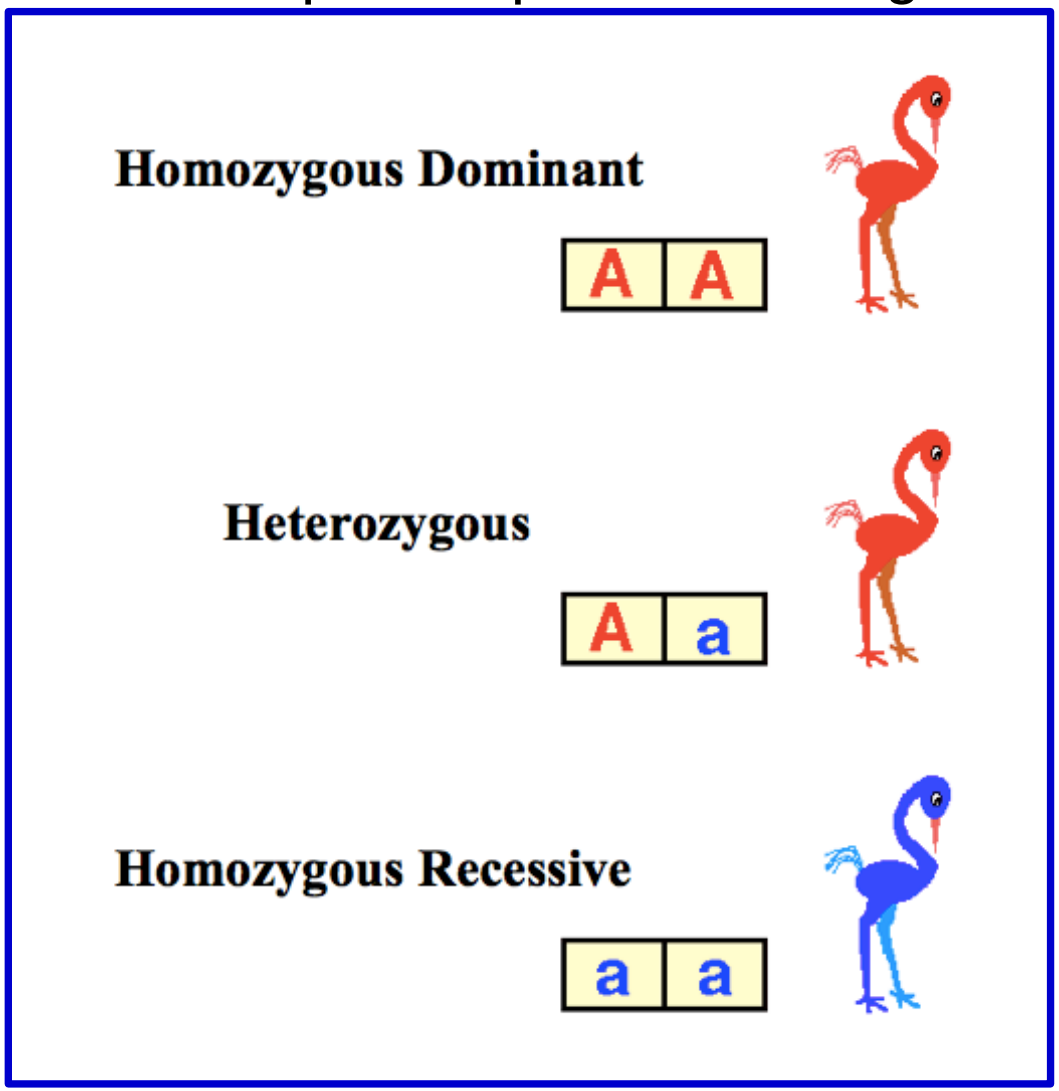
- **Genes influence the development of traits.**
  - **Genome** - All of an organism's genetic material; unique



6.4 Traits, Genes, and Alleles

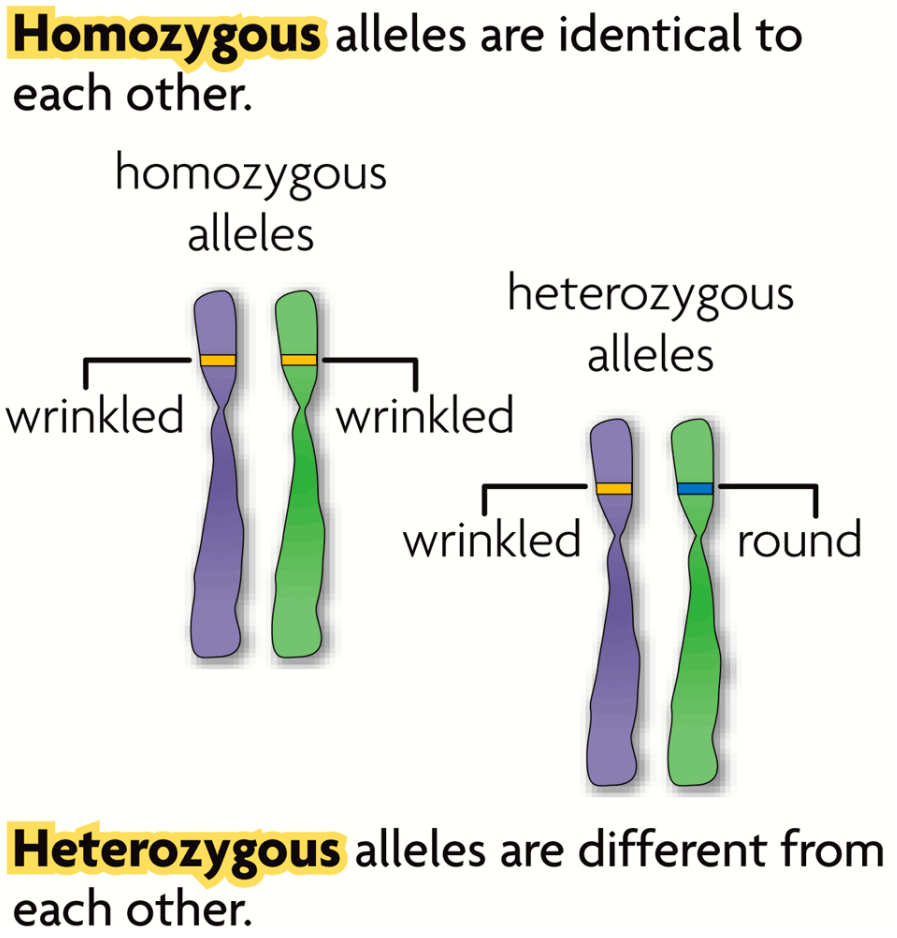
Genes influence the development of traits.

- A **genotype** refers to the makeup of a specific set of genes.
  - May be **homozygous dominant**,
  - **homozygous recessive** or
  - **heterozygous**



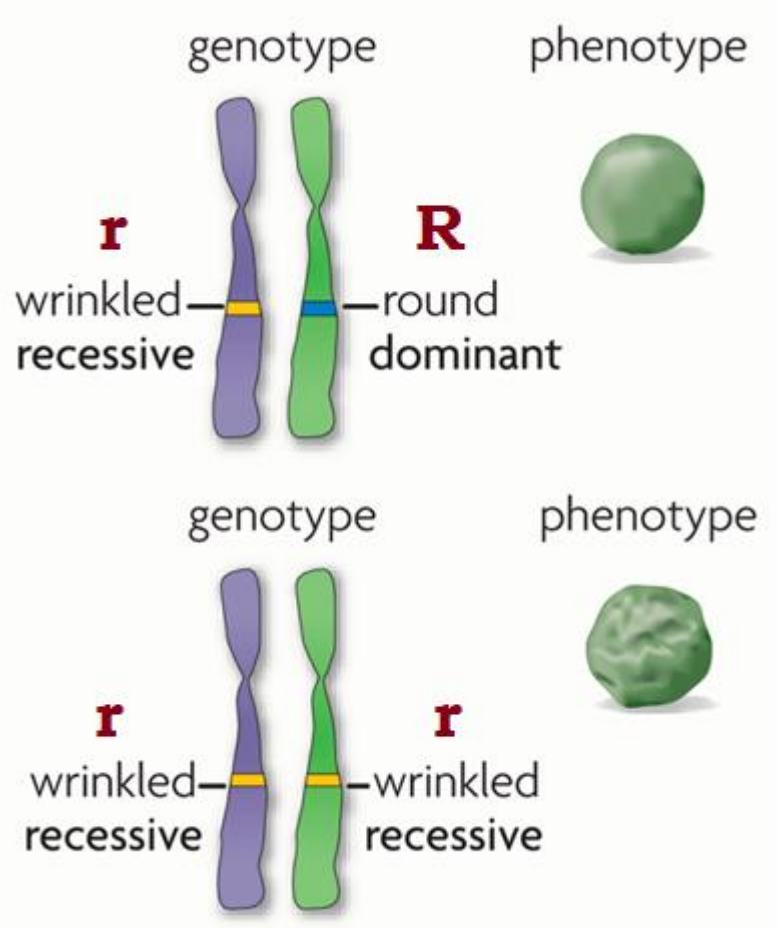
6.4 Traits, Genes, and Alleles

- An **allele** is any alternative form of a gene occurring at a specific locus on a chromosome.
  - **Homozygous** describes two alleles that are the same at a specific locus.
  - **Heterozygous** describes two alleles that are different at a specific locus.



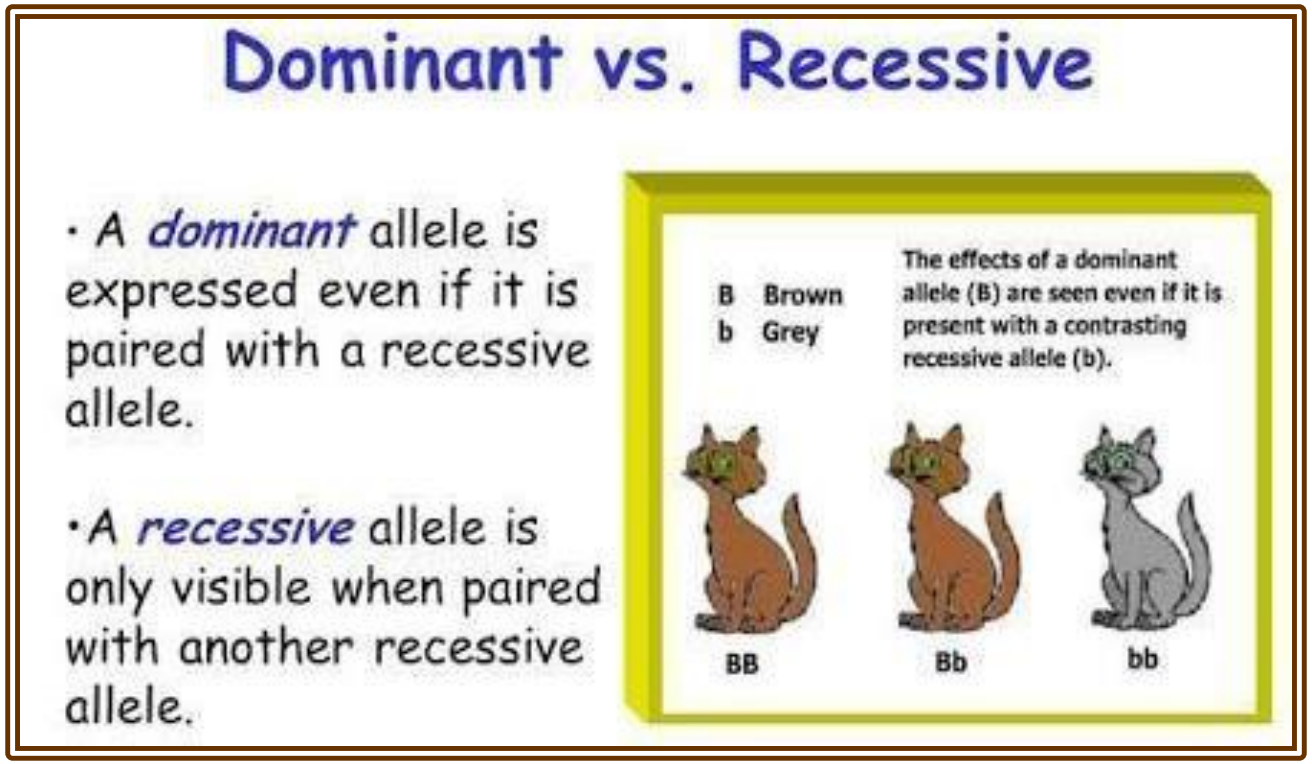
6.4 Traits, Genes, and Alleles

- **SYMBOLS:**
- **Alleles** can be represented using *letters*.
  - Dominant alleles are represented by uppercase letters;
  - Recessive alleles by lowercase letters.



6.4 Traits, Genes, and Alleles

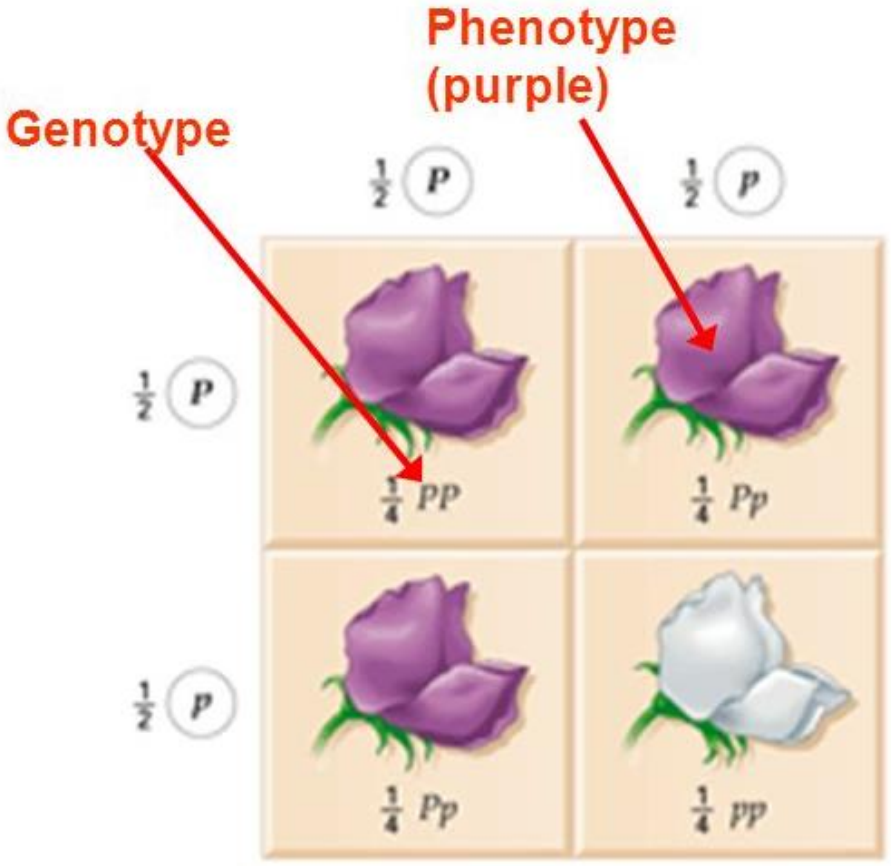
- **Alleles** can be represented using *letters*.
  - A **dominant allele** is expressed as a phenotype when at least one allele is dominant.
  - A **recessive allele** is expressed as a phenotype only when two copies are present.



6.4 Traits, Genes, and Alleles

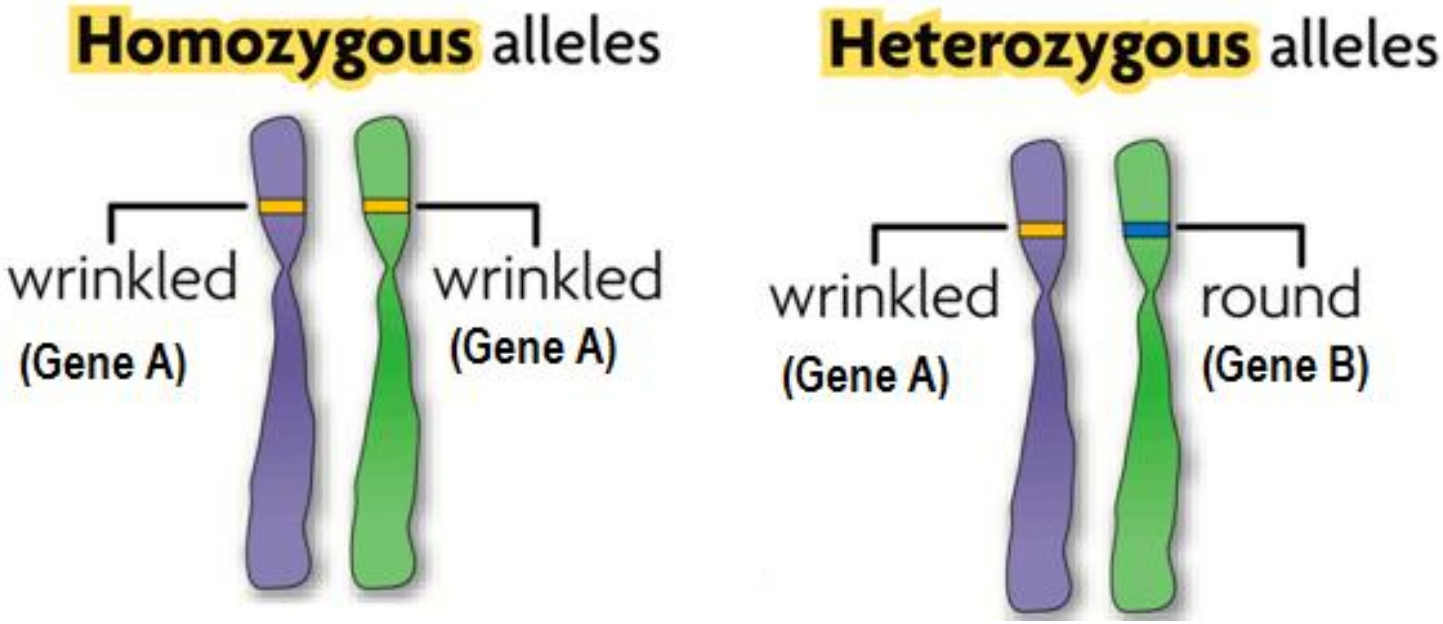
Genes influence the development of traits.

- A **phenotype** is the physical expression of a trait.
- It is influenced by the genotype and environmental factors.



6.4 Traits, Genes, and Alleles

- **Homologous chromosomes** are two chromosomes, one from the mother and one from the father, that have the same length, overall appearance, and **genes**, although the **alleles** may differ.



6.4 Traits, Genes, and Alleles

Fill the table below with missing **genotype**, **phenotype** (dominant or recessive) or **alleles** (TT, Tt, tt.)

Genotype	Phenotype	Alleles
homozygous dominant		
	recessive	
		Tt

6.4 Traits, Genes, and Alleles

- **Table answers:**

Genotype	Phenotype	Alleles
homozygous dominant	dominant	TT
Homozygous recessive	recessive	tt
Heterozygous	dominant	Tt

6.4 Traits, Genes, and Alleles

- Both homozygous dominant and heterozygous genotypes yield a dominant phenotype.
- Most traits occur in a range and do not follow simple dominant-recessive patterns.

FIGURE 4.1 Polydactyly is the condition of having more than the typical number of fingers or toes. The allele for polydactyly is dominant.