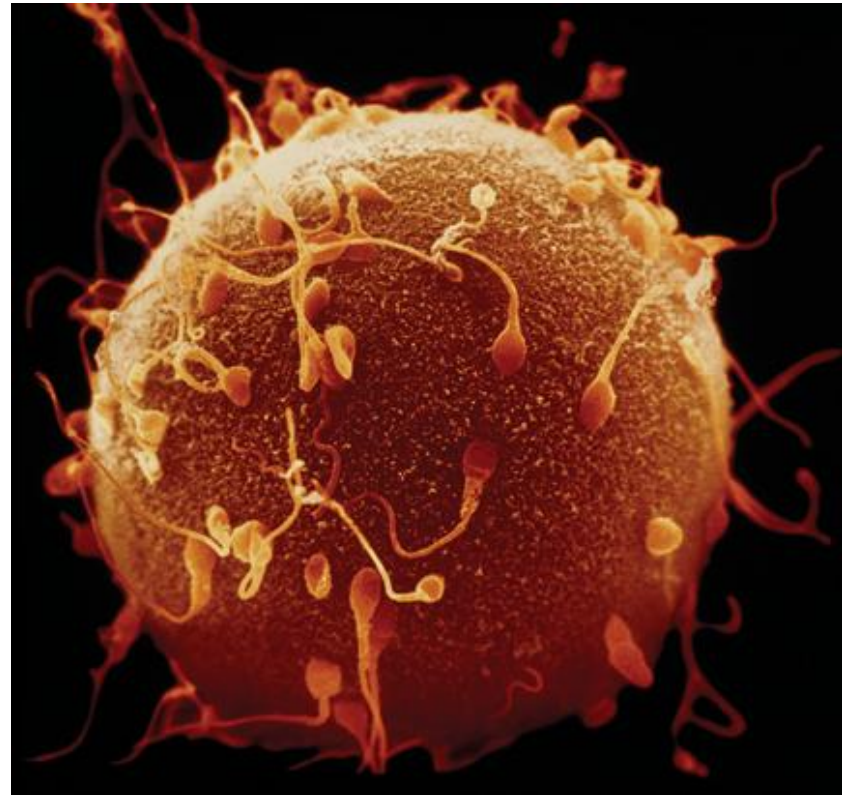


6.4 Traits, Genes, and Alleles

KEY CONCEPT

Relationship between genes & proteins:

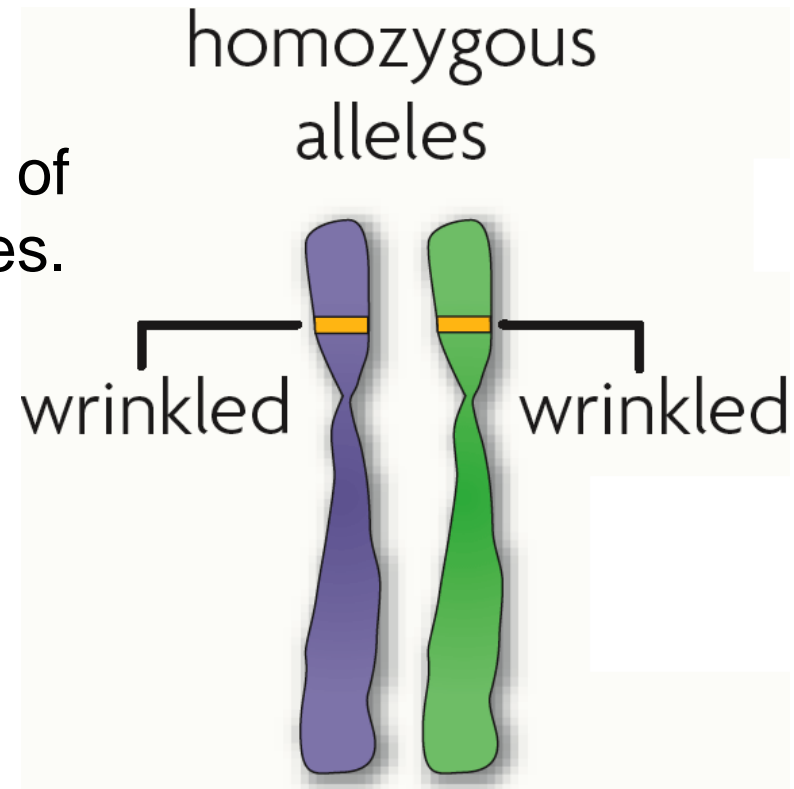
- Genes encode proteins that produce a diverse range of traits.



6.4 Traits, Genes, and Alleles

▶ The same gene can have many versions.

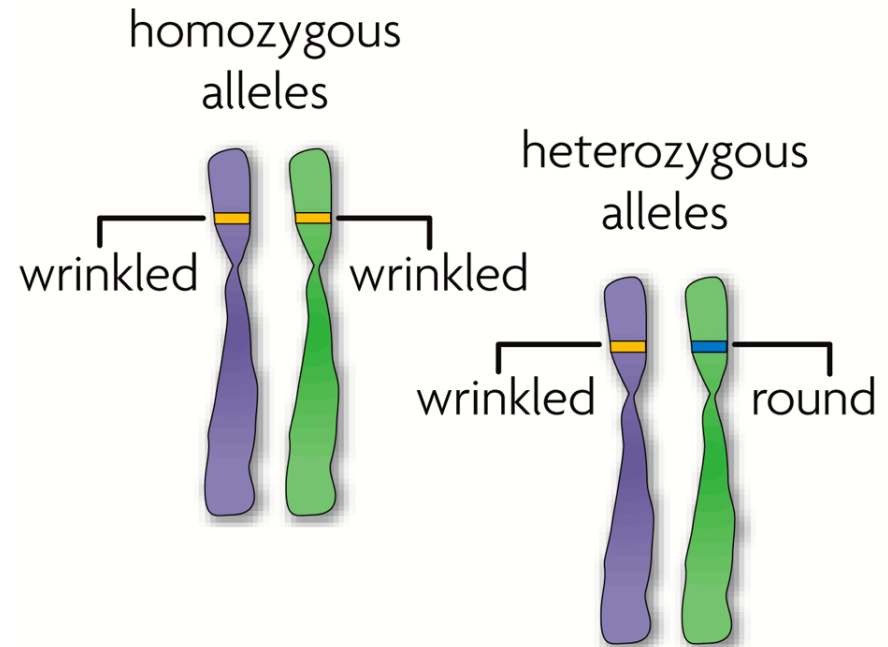
- A **gene** is a piece of DNA that directs a cell to make a certain protein.
- Each gene has a locus, a specific position on a pair of homologous chromosomes.



6.4 Traits, Genes, and Alleles

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

Homozygous alleles are identical to each other.

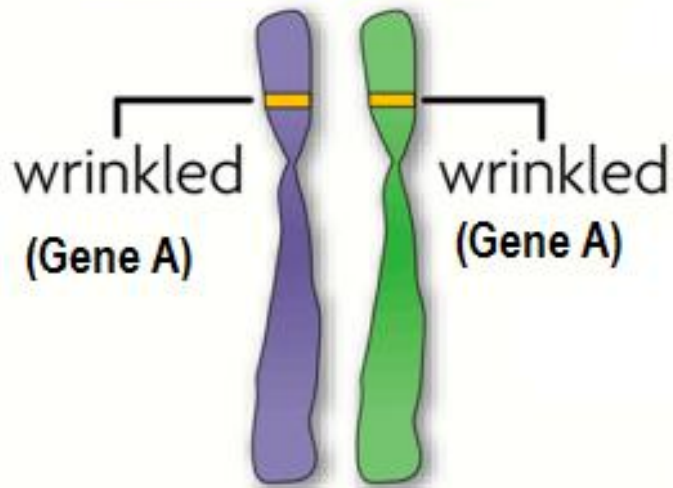


Heterozygous alleles are different from each other.

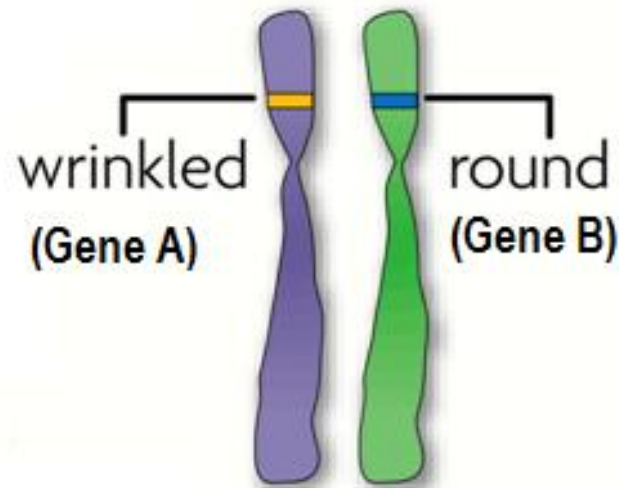
6.4 Traits, Genes, and Alleles

- **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.

Homozygous alleles



Heterozygous alleles



6.4 Traits, Genes, and Alleles

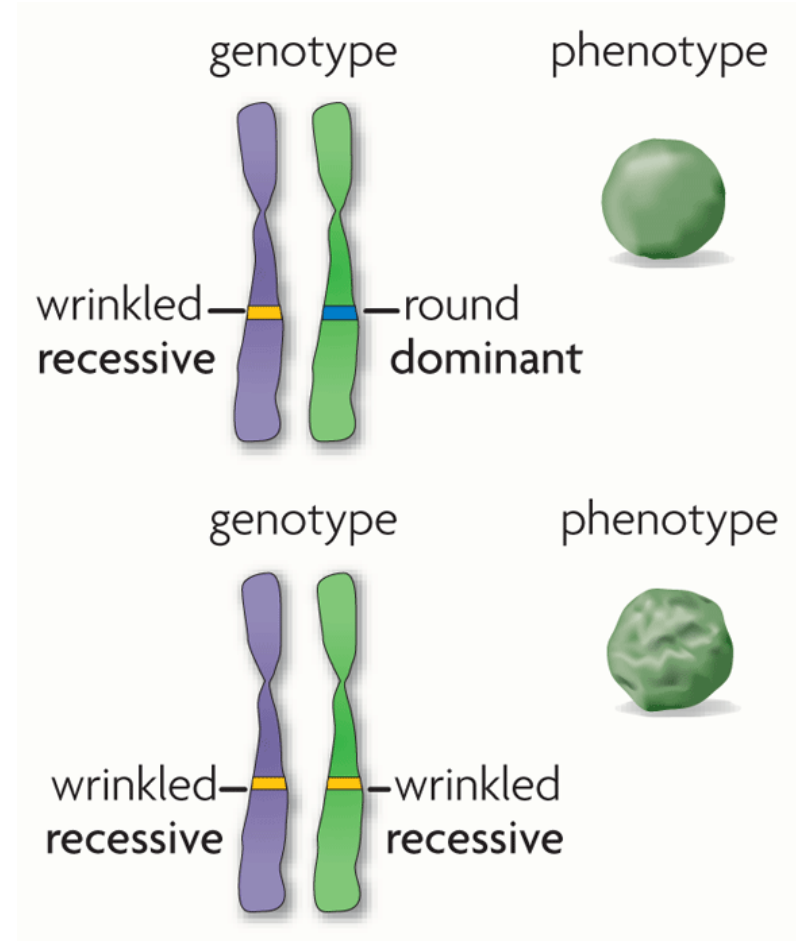
- ▶ **Genes influence the development of traits.**
 - All of an organism's genetic material is called the **genome**.



- A **genotype** refers to the makeup of a specific set of genes.
- A **phenotype** is the physical expression of a trait.

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.
 - Dominant alleles are represented by uppercase letters; recessive alleles by lowercase letters.



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.

