

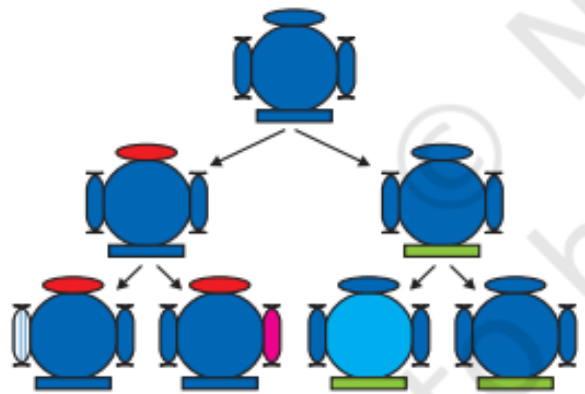
Chapter 8: Heredity

◆ What is Heredity?

📖 Heredity:

The process by which traits and characteristics are passed from one generation to the next.

During reproduction, offspring receive traits from parents. These traits may be similar but also have variations. These variations help species adapt and survive in changing environments.



📷 Fig. 8.1 – Shows how subtle differences increase over generations, even in asexual reproduction.

◆ 8.1 Accumulation of Variation During Reproduction

📖 Variation:

The differences in traits between individuals of the same species.

- In asexual reproduction, variations are minor – due to slight DNA copying errors.
- In sexual reproduction, variations are more – because offspring get DNA from two parents.

🧠 Important:

Variations can improve survival. For example, bacteria resistant to heat will survive better during a heat wave.

◆ 8.2 Heredity

📖 Traits:

Observable features like eye color, height, etc., passed from parents to offspring.

Inherited traits:

Traits passed from parents to children via genes.

Example: Earlobe shape – attached or free

Activity 8.1:

Observe classmates' earlobes. Compare them with their parents' earlobes.

✓ Conclusion: Suggests earlobe type is inherited.

◆ 8.2.2 Mendel's Rules of Inheritance

Gregor Johann Mendel studied inheritance using pea plants. He studied visible traits like:

- Seed shape (round or wrinkled)
- Plant height (tall or short)

Mendel's Experiment:

- Crossed tall plant × short plant → All F1 plants were tall.
- Self-crossed F1 plants → F2 generation had tall and short plants in 3:1 ratio.

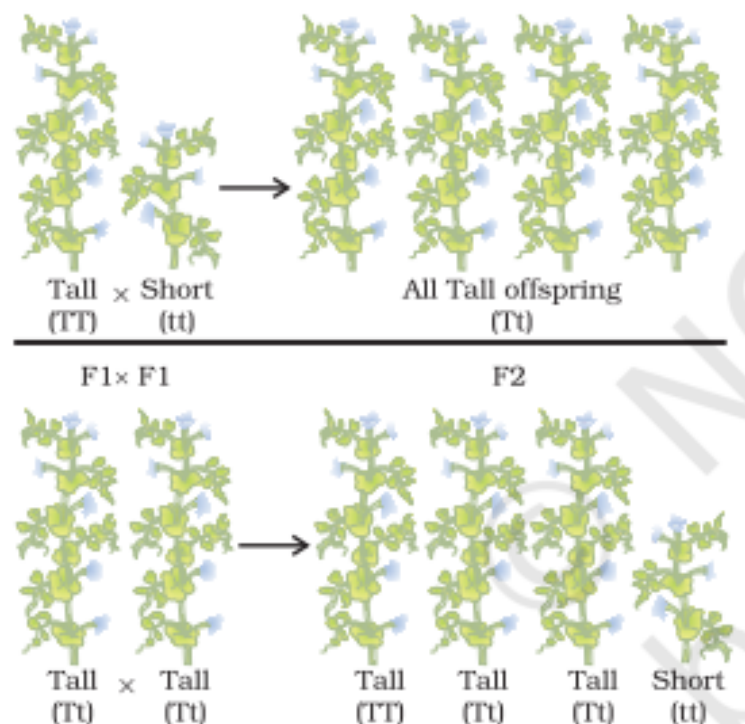


 Fig. 8.3 – Shows inheritance of height

Dominant Trait:

The trait that appears in F1 generation (e.g., tall – T)

Recessive Trait:

The trait that is hidden in F1 but reappears in F2 (e.g., short – t)

🧠 TT and Tt = tall plants, tt = short plant

🔧 Activity 8.2:

Use a Punnett square to find the ratio of TT, Tt, and tt in F₂ generation.

✅ Ratio = 1 TT : 2 Tt : 1 tt

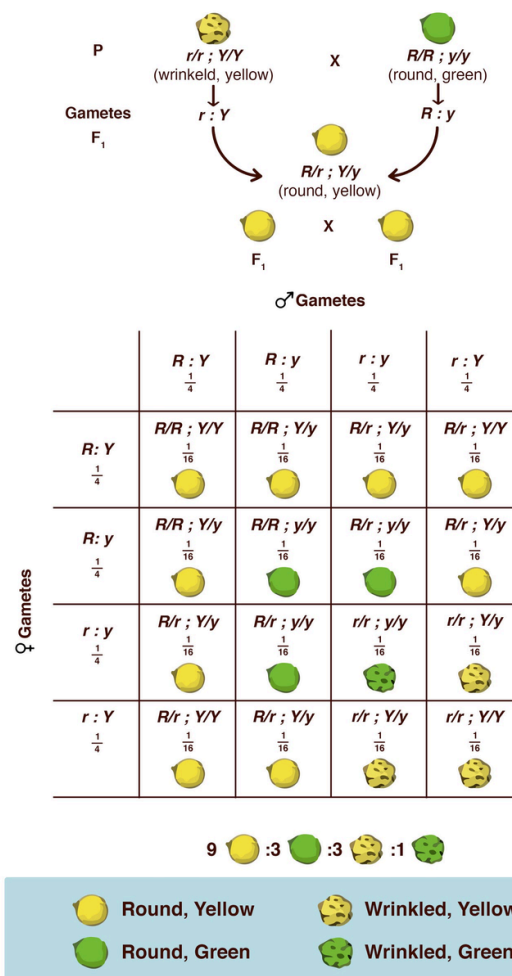
◆ 8.2.2 (b) Inheritance of Two Traits

Mendel also studied two traits together, e.g., seed shape and color.

- Crossed: Round yellow (RRYY) × Wrinkled green (rryy)
- F₁: All round yellow
- F₂: Gave combinations like round yellow, wrinkled green, round green, etc.

📖 Law of Independent Assortment:

Traits are inherited independently of each other.



📷 Fig. 8.5 – Demonstrates inheritance of two traits

◆ 8.2.3 How Traits Get Expressed?

📖 Gene:

A section of DNA that codes for a protein.

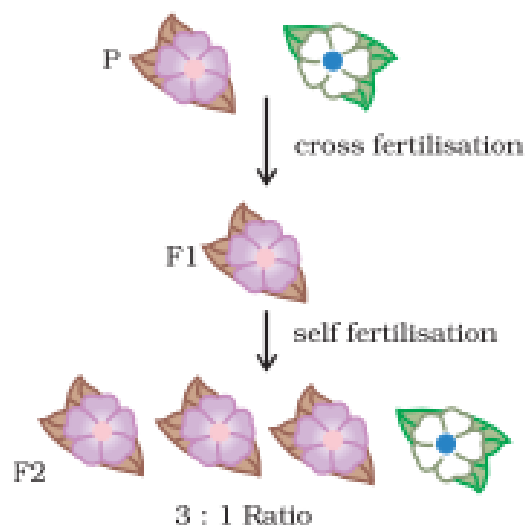
Example:

- Gene → Enzyme → Hormone → Trait
- If enzyme is efficient, plant grows tall. If not, it stays short.

📖 Chromosome:

Thread-like structure made of DNA. Humans have 23 pairs (46 total).

- Each parent gives one set of chromosomes.
- Germ cells have only one set (23), so that when sperm and egg fuse → 46 chromosomes restored.



📷 Fig. 8.4 – Shows gene expression and inheritance mechanism

◆ 8.2.4 Sex Determination in Humans

📖 Sex is determined by chromosomes inherited from parents.

- Females: XX chromosomes
- Males: XY chromosomes

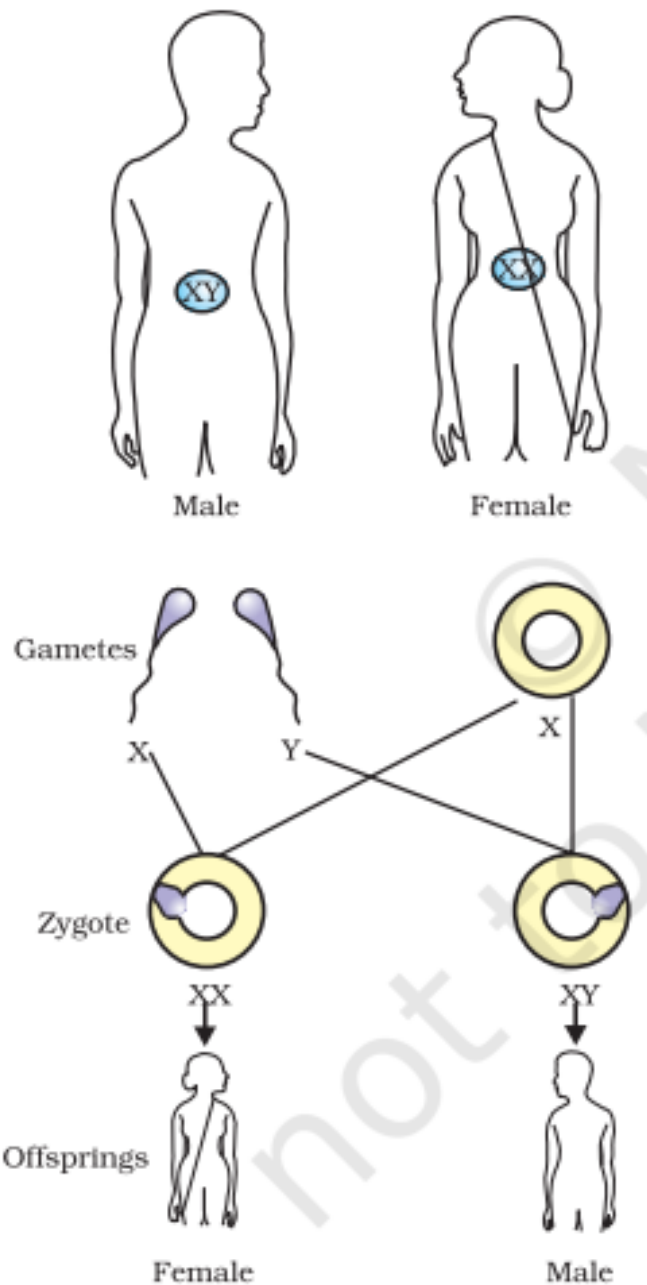


Fig. 8.6 – Inheritance of X and Y chromosomes

Important:

- Mother always gives X.
- Father gives either X or Y.
- If child gets X from father → Girl (XX)
- If child gets Y from father → Boy (XY)

So, the sex of the child is determined by the father.

Summary of Key Points:

- Variations are passed during reproduction and are necessary for evolution.
- In sexual reproduction, offspring inherit two copies of each gene – one from each parent.
- Dominant traits mask the presence of recessive traits.

- Traits are inherited independently (Law of Independent Assortment).
- Genes code for proteins which determine traits.
- Sex is genetically determined in humans – by X and Y chromosomes.