

Human Evolution

What is Evolution?

- Evolution is a slow, continuous and natural process through which simple organisms gradually develop into more complex forms over millions of years.
- Early beliefs suggested that organisms were created by supernatural forces and never changed.
- Scientific theories propose that life originated from non-living organic molecules (autogenesis) and later diversified.
- Evolution involves gradual changes caused by environmental shifts, mutations, and natural selection.

Lamarck's Theory – Inheritance of Acquired Characters

- **Jean Baptiste Lamarck** proposed that organisms change themselves to adapt to their environment.
- According to him, **organs that are frequently used become stronger and more developed (use), while unused organs shrink and weaken (disuse)**.
- These acquired changes are passed on to the next generation.
- He used the example of giraffe evolution, stating that repeated stretching of necks led to longer-necked offspring.

Vestigial Organs

- **Vestigial organs are remnants of structures that were functional in ancestors but have lost their original function in modern humans.**
- Examples include wisdom teeth (used by ancestors to chew raw food), vermiform appendix (previously helped digest cellulose), and pinna muscles (used by animals to move ears).
- Their presence provides strong evidence of evolution from earlier forms.

Darwin's Theory – Natural Selection

- **Charles Darwin** proposed that organisms produce more offspring than can survive, leading to competition for limited resources.
- **Variations naturally occur among individuals; some variations provide survival advantages.**
- **Individuals with favourable variations are more likely to survive, reproduce, and pass these traits to offspring.**
- This process of selecting the fittest organisms is called natural selection.

Industrial Melanism – Peppered Moth Example

- Before the Industrial Revolution, light-colored moths blended with lichen-covered trees and survived better.
- After industrial pollution darkened tree trunks and killed lichens, dark-coloured moths were better camouflaged.
- Birds preferentially preyed on visible moths, leading to an increase in dark moth population.
- This is an example of **natural selection driven by environmental changes**.

Human Evolution

- Humans evolved from ape-like ancestors over a period of **15–20 million years.**
- **Environmental changes** such as glaciation forced early primates to move from forests to open land and adapt new ways of survival.
- Fossil records from Africa and Asia provide evidence of progressive changes in skull size, posture, and locomotion.
- Human evolution involves **physical, behavioural, and cultural advancements.**

Major Evolutionary Changes

- **Bipedalism** allowed early humans to walk upright, freeing hands for tool use.
- **Cranial capacity** increased significantly, allowing advanced thinking and problem-solving.
- **Reduction in canine size** indicated a shift from aggressive behaviour and meat-tearing to omnivorous diets.
- **Chin development, flatter face, and reduction of body hair** marked human advancement towards modern appearance.

Ramapithecus

- One of the **earliest known human ancestors**, dating **back 8–14 million years.**
- Fossils mainly include broken jaw bones and teeth.
- Believed to have walked with a **semi-upright posture.**
- Considered **an important link between ape-like ancestors** and later hominids.

Australopithecus

- Found in Africa, lived about **4 million years ago**.
- **Walked almost upright** with a curved vertebral column and **broad pelvis**.
- **Cranial capacity: 450–600 cc**, indicating limited intelligence compared to humans.
- **Canines were small** and human-like; no simian gap was present.

Homo habilis

- Lived **about 2.2 million years ago** and considered the first 'true man'.
- **Cranial capacity: 680–735 cc**, showing improved brain development.
- **Walked more erect** than Australopithecus and used simple tools made of stones.
- **Face was less protruding, and body was covered with hair.**

Homo erectus

- Lived between **1.5 million to 200,000 years ago**.
- **Cranial capacity: 800–1125 cc**, significantly higher than earlier ancestors.
- **First to use fire, cook food, and hunt in groups.**
- **Walked fully upright with longer legs and shorter arms.**

Neanderthals

- Lived in Europe, Asia, and North Africa about **200,000–30,000 years ago.**
- **Height around 160 cm; cranial capacity around 1450 cc.**
- **Had a broad, flat forehead, heavy brow ridges, and almost no chin.**
- **Used simple tools and had burial practices, indicating social behaviour.**

Cro-Magnon Man

- Appeared around **30,000 years ago and closely resembled modern humans.**
- **Cranial capacity: 1450–1600 cc**, larger than today's average human.
- **Created advanced tools, cave paintings, and carvings.**
- **Had a prominent chin, tall height, and straight posture.**

Modern Man (Homo sapiens sapiens)

- Appeared about **11,000 years ago after the last Ice Age.**
- **Possess high intelligence, advanced reasoning, and complex language.**
- **Bipedal with fully erect posture and reduced body hair.**
- **Developed agriculture, settlements, civilizations, and technology.**