Human Evolution

Evolution

- Evolution can be defined as the formation of more complex organisms from pre-existing simpler organisms over a certain period. It is a slow but progressive, natural, sequential development or transformation of animals and plants from ancestors of different forms and functions.
- Variations and heredity are the two basic factors of evolution. The selection of variants by environment factors forms the basis of evolutionary processes.

Theories of Evolution: Two modern theories have been put forward to explain the mode of evolution.

* Theory of Lamarckism

As per the theory of inheritance of acquired traits, changes in the structure or function of an organ acquired during an individual's lifetime in response to environmental changes are passed on to offspring and accumulate gradually over time.

The theory of Lamarckism was revived with new facts which led to the theory of Neo-Lamarckism which stated that the acquired characters which become incorporated in the germplasm are heritable and accumulate generation after generation resulting in the origin of new species.

Vestigial Organs.

- Vestigial organs, also known as non-functional organs, are reduced or rudimentary organs that don't serve a purpose in the body. They help us learn about the history of evolution and the continuity of life.
- Unlike monkeys, humans do not have tails, but they do possess a rudimentary tail bone.
  Wisdom teeth typically emerge b/w the ages of 17 and 20 and are rarely utilized for chewing food.
- The vermiform appendix is a function-less organ in humans but is helpful for ruminants for digesting cellulose.
- The pinna, a vestigial organ, acts a passage from the auditory canal to the eardrum. However it is underdeveloped in humans.

Darwin theory of Natural Selection.

- All organisms have the capacity to reproduce at a very high rate.
- The overproduction of oreganisms results in competition among

- The overproduction of organisms results in competition among individuals within the population for resources such as food and space.
- Only organisms that are well-adapted to the changing environment are able to survive.
- Organisms which are unfit are eliminated and ultimately die.
- In the struggle for existence, the organisms which develop new favourable characteristics will survive in the long run. This idea is called survival of the fittest.
- Organisms that survive will pass on favourable traits to their offspring.
- These characters get accumulated and give rise to a new species.

Human Evolution

- The evolution of modern humans is considered one of the most significant developments in evolutionary history. Human evolution has been examined through methods including excavation, carbon dating, fossil analysis and DNA sequencing to trace evolutionary relationships.
- A vast diversity has always been observed with respect to the human body and its feature.
- The research indicates that early Homo sapiens originated in Africa Approximately one hundred thousand years ago, some of our

ancestors migrated out of africa, while others remained. Therefore, regardless of our current geographic location, all human species are ultimately descendants of africans origins. The earli-est human fossils include the Australopithecus genus, followed by Homo habilis, H. erectus, H. heidelbergenesis, and eventually modern Homo sapiens.

- About 25-30 millions years ago, ape-human or hominoid stock started descending from the trees and gradually become ground dwellers who evolved into apes and men.
- Subsequent separation of ape and human ancestors is regarded to begin about 5 million years ago which lead to the evolution of Pongidae (apes) and Hominidae (men).

Ramapithecus:

- Approximately 10-15 millions years ago, the earliest fossil resembling humans was discovered in Africa and Asia.
- They were capable of walking erect on their feet, had small canines and had a short face and small brain.

Australopithecus afarensis

- They appeared in South Africa and had common traits to both human and ape features.

- He was about 1.5 metres tall and was mainly a terrestrial creature with bipedal locomotion.
- His cranial capacity was 500 cubic centimetres.

Australopithecus africanus.

- They appeared 2.5 millions years ago in Africa.
- He had a low forhead, protruding face, lack of chin and low brain capacity (350-450 cubic centimetres).

Homo habilis.

He lived in Africa 2 million year ago and was about 1.5 to 1.8 metres tall.

His cranial cavity, or brain volume, ranged from 650 to 800 cubic centimetres, larger than that of Austral opithecus.

Homo erectus

- Around 1.7 million years ago, they evolved from Homo habilis or Australopithecus. Fossils of these individuals have been discovered in Java, Peking, Heidelberg and europe.
- He stood approximately 5.5 feet tall and had a bowl-shaped pelvis. His foot had a pronounced arch to support body weight, and the ability to grasp with the foot was completely lost.

- The size of the cranial cavity ranged from 750 to 1100 cc.

Homo neanderthalensis.

- These early men arose 1,00,000 years ago and flourished in Europe and Asia but become extinct about 25,000 years ago.
- They possessed a flat cranium, a sloping forehead, protruding jaws, strong mandibles, and lacked a chin.
- They demonstrated intelligence, were skilled hunters, utilized animal skin for clothing and practised the burial of the deceased.

Homo sapiens fossilis (Cro-magnon man: Early Modern Man)

- These fossils found approximately 50,000 years ago, were discovered from caves in the northwest Italy and rock shelter caves in France.
- The Cro-Magnon man was 1.8 metres tall with a sturdy body and less hair. The cranial capacity was about 1650cc.

Homo sapiens sapiens (Modern Man)

- The living modern men have evolved from the Cro-Magnon man about 25,000 years ago.
- They had undergone minor morphological changes such

as thinning of skull bones and slight reduction in cranial capacity (1300-1600 cc)