

CONCEPT MAP

Origin of Life

Origin of universe

Big Bang theory

According to this theory of Abbe Lemaitre universe was formed by a big bang (thermonuclear expansion) of a dense entity about 15 billion years ago.

Nebular hypothesis

It was proposed by Kant-Leplace according to which earth originated about 4.5 - 5 billion years ago from a gaseous cloud called solar nebula.

Theories for origin of life

- Theory of special creation : Life on earth was created by god.
- Cosmozoic theory : Life on earth came in form of spores from outer space.
- Theory of abiogenesis : Life originates from non-living matter.
- Theory of biogenesis : Life comes from pre-existing life.
- Theory of chemical evolution of life : Complex organic compounds are synthesised from simple inorganic molecules.

Evolution

(Latin *evolvere*-to unroll) A slow gradual, continuous and irreversible change, through which present day complex forms have evolved from the pre-existing simpler forms.

Evidences of evolution

Palaeontological

Palaeontology is the study of fossils (preserved remains of dead organisms). It provides most direct and reliable evidences of evolution.

Connecting links

Connecting links are living organisms with characteristics intermediate between two groups, e.g., *Archaeopteryx* (link between birds and reptiles).

Morphological and anatomical

Comparative studies of morphology, anatomy, homology of organisms provide evolutionary proofs, e.g., homologous organs, vestigial organs etc.

Embryological

Comparative study of embryonic development of various organisms shows various similarities indicating evolution (Biogenetic law of Haeckel)

Molecular and physiological

Similarities in various physiological processes, cellular structure, biochemistry, genetic composition, etc. also provide evolutionary evidences, e.g., blood plasma proteins.

Theories of evolution

Darwin's theory

It says that variations occur in organisms and useful among them are selected by nature (i.e., natural selection) and get accumulated in the organism. This leads to evolution.

Mutation theory

This theory put forward by Hugo de Vries says that evolution is a discontinuous, saltatory process that occurs due to sudden inheritable variations (mutations).

Modern synthetic theory

According to it five factors : genetic variations, heredity, natural selection, reproductive isolation and speciation lead to evolution.

Mechanism of evolution

Evolution starts with generation of variations. Variations in a population may occur by mutations, genetic drift, gene migration, gene recombination, hybridisation, etc. Out of these, inheritable variations undergo natural selection and the individual with highest survival value in the prevailing environmental conditions survive and evolve.

Human evolution

All human beings present today belong to a single species *Homo sapiens* which have evolved bipedal locomotion, high cranial capacity, opposable thumbs etc. and dominate today's life forms.