Evolution

Evolution Latin word means unfolding

Father Suarez(1548-1613) was one of the advocates of Creati-onsim

Carolus Linnaeus (1707-1778) a Swedish Botanist who wrote number of books describing nature and is best known for his great scientific work on taxonomy.

George Buffon(1749-1788) was the first to implement the geological time scale and developed the idea that living beings evolved constantly

Evidences of Evolution

Evidence from Biogeography,di-stribution of different species on the earth

Evidence from Paleontology, extinct forms of life which are studied through fossils,Example Archaeopteryx

Archaeopteryx,a fossil bird being discovered in 1861 in Bavaria, Germany

Estimated that Archaeopteryx lived around 150 million years ago

Mixed features of birds as well as reptiles Just like birds it has a beak,wings,a tail and body covered with feathers

Like reptiles,it showed teeth,-fingers and claws in fore limbs,-vertebrae in tail and keel less sternum.

Evidences of Evolution (cont)

Evidence from Comparative anatomy (Homology), organs similar in structure but differ in function are termed as Homologous organs

Examples of homologous organs are,Arm of man,flippers of dolphin, forelimb of a horse and wings of bat

They differ in function as per requirements of the habitat and other features.This termed as Divergent evolution

Organs with similar in function but differ in their anatomical features known as analogous organs

Examples of Analogous organs like wings of an insect,bat and birds both are involved in flying however they have no anatomical resemblances

Analogous organs show different ancestry.this termed as convergent evolution

Evidence from molecular biology, example genetic code

Evolution of Eukaryotes from prokaryotes

Prokaryotes may have arisen more than 1.5 billion years ago.

Two different hypotheses regrading the evolution of eukaryotic cells

1.Membrane invagination theory 2.Endosymbiotic theory

Endosymbiotic theory was suggested by Lynn Margolis.

Evolution of Eukaryotes from prokaryotes (cont)

The endosymbiotic theory seems more powerful in dealing with the evolution of Eukaryotes since both mitochondria and chloroplast have following similar features like prokaryotes 1.Circular DNA molecules 2.Ribosomes 3.Metabolism 4.Binary fission way of reprod-uction

Lamarckism

Jean Baptiste de Lamarck a french biologist(1744-1829) was one of the proponent idea of evolution

His theroy is known as lamarckism or Inheritance of acquired characters

He discussed his theory of evolution in his book Philos-ophie Zoologique in French in 1809

1.Use & disuse of the organs

2.Inheritance of Acquired Characters

Lamarck's theory of acquired characters was criticized especially by August Weismann and Cuvier on its genetic basis while on the other hand Charles Lyell and August strongly supported & promoted the ideology of Lamarack

Darwinism

Charles Darwin (1809-1882),an English biologist,a geologist and a naturalist is well known for his contribution on evolution.

He was much interested in studying nature as got admitted to the Christ College Cambridge in 1828.

In 1831,he decided to go on a five years trip on a ship H.M.S Beagle heading towards South America.

His voyage on HMS Beagle started in December 1831 from Plymouth, England.

During his studies, Darwin collected a variety of bird specimen, particularly finches of the Galapagos Island.

Even though the Darwin's journey ended in 1836,he felt himself in uncomfortable position to put forward his theory of evolution until 1842.

Darwin's theory of evolution is based upon following 2 key points 1. Descent with modifi-cation 2. Natural selection and adaptation

Role of Scientists in Evolution

Charles Lyell: Great geologist of his time.His theory of uniformit-arianism inspired Darwin.Lyell was friend of Captain Robert FitzRoy who piloted the HMS beagle when Darwin sailed to the Galapagos islands and South America.FitzRoy introduced Darwin to Lyell's ideas and Darwin studied the geological theories as they sailed.

Role of Scientists in Evolution (cont)

James Hutton: Famous geologist by whom Darwin was inspired.Actual idea of fossilization was put forwarded by Hutton before Lyell.

Thomas R.Malthus: an Economist and one of the persons who fascinated Darwin with his theory on Human population.

Alfred Russell Wallace: contemporaries of Charles Darwin.He collaborated with Darwin on the theory of evolution.The 2 pooled their data to present the idea jointly to the Linnaean Society of London in 1858.

Wallace was the person who motivated Darwin to publish the book "On the Origin of species" in 1859.

Neo Darwinism

Darwin's theory of Natural selection was out forwarded in 1859,the same time when Gregor John Mendel was formulating his Laws of inheritance during 1856-63 which remained neglected about 3 decades until rediscovered at the turn of 20th century.

Population Genetics: Branch of biology that deals with the process of origin of variations and their inheritance.

Hardy-Weinberg Theorem

It is the principle being proposed collectively in 1908 by an English mathematician,Godfrey Hardy & a German Physician,Wilhelm Weinberg.

To demonstrate mathematically the gene frequencies of different alleles in a given population.

Hardy-Weinberg Equation, $p^2+2pq+q^2=1$

Factors affecting Hardy-Weinberg Theorem:1.Mutation 2.Selection 3.Non-random mating 4.Gene flow

Genetic Drift

Changes in allelic frequency in a population from generation to generation.

There are 2 types of genetic drift

1.Bottleneck effect 2.Founder effect

Speciation & it's mechanism

Biological process of formation of new species of living organisms.

Different ways for speciation process,Viz.Sympatric speciation, Allopatric speciation,Peripatric speciation & Parapatric speciation