

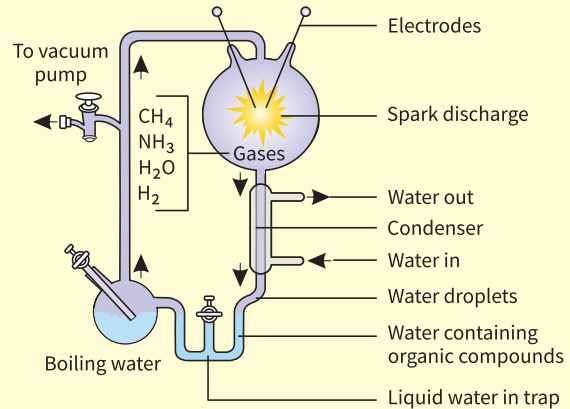
## ORIGIN OF LIFE

- Life appeared around 4 billion years ago.
- Universe originated by Big- Bang theory.
- Panspermia theory**- Units of life called spores were transferred to different planets including earth.
- Theory of Abiogenesis** - Life came from dead & decaying organisms.
- Theory of Biogenesis** - Life came from pre-existing life forms.
- Theory of Chemical Evolution** - by Oparin & Haldane ; life came from inorganic & organic molecules ( Pre- biotic soup)

## EVOLUTION

Process of change in the characteristics of the biological species over the period of time.

### UREY - MILLER EXPERIMENT



- Proves theory of chemical evolution.
- Created primitive Earth environment- (high temperature, reducing atmosphere,  $\text{CH}_4$ ,  $\text{NH}_3$ ,  $\text{H}_2\text{O}$ ,  $\text{H}_2$ )
- Electric discharge given at  $800^\circ\text{C}$  to form amino acids (alanine, glycine, aspartic acid)

# 6. EVOLUTION

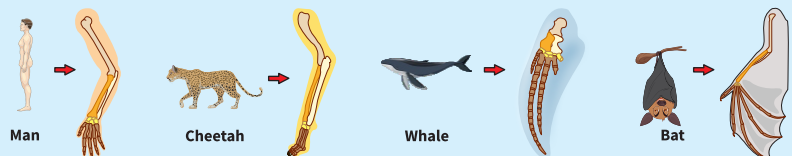
## ADAPTIVE RADIATION



The evolution of different species in a given geographical area starting from a point and radiating to other areas of geography (habitats).

## EVIDENCES FOR EVOLUTION

- Palaeontological Evidences**:- Fossils are connecting links for study of evolution.
- Embryological Evidence**:- Proposed by Ernst Haeckel. Similarities in embryo development are studied.
- Bio – chemical Evidences**:- Similarities in proteins & genes are studied
- Natural selection**:- Evidence of selection by nature can be seen in case study of the Industrial Revolution in England during the 1850s. Studies on two moths – White winged (*Biston betularia*) & melanised moths (*Biston carbonaria*).
- Morphological & Anatomical Evidences**:- Explained through Homologous & Analogous organs.  
**Homologous organs**:- Similar in structure & origin but function is different ; shows divergent evolution ; common ancestry; e.g fore limbs of Human, whale, Bat & cheetah.



**Analogous Organs**:- Similar in function but different in origin shows convergent evolution; common function; eg : wings of birds & wings of insects.

- Biogeographical Evidence**:- Adaptive radiation (evolution of species in creative geographical areas. Eg. Darwin finches, Australian Marsupial Radiation & Placental Mammals.

## BIOLOGICAL EVOLUTION

### LAMARCKISM

- Use and disuse theory.
- Theory of Inheritance of Acquired Characters
- Evolution of organs that are used - Giraffe Neck (Evolution by use of organ)
- Disappearance of organs that are not used - Limb of snake (Evolution by disuse of organ).

### DARWINISM

- Theory of Natural selection
- Survival of the fittest

## MECHANISM OF EVOLUTION

### Hugo de Vries

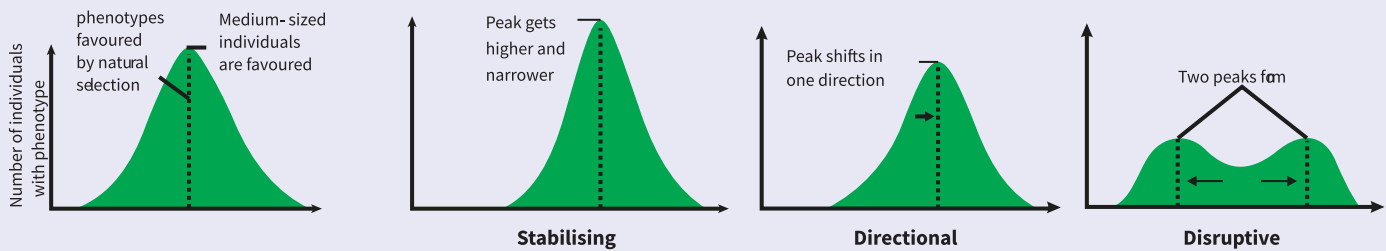
- ✦ Mutation causes evolution
- ✦ Mutations are random & directionless.
- ✦ Mutation cause speciation (saltation)

### Darwin

- ✦ Minor heritable variation causes evolution.
- ✦ Variations are small & directional.
- ✦ Evolution for Darwin was gradual.

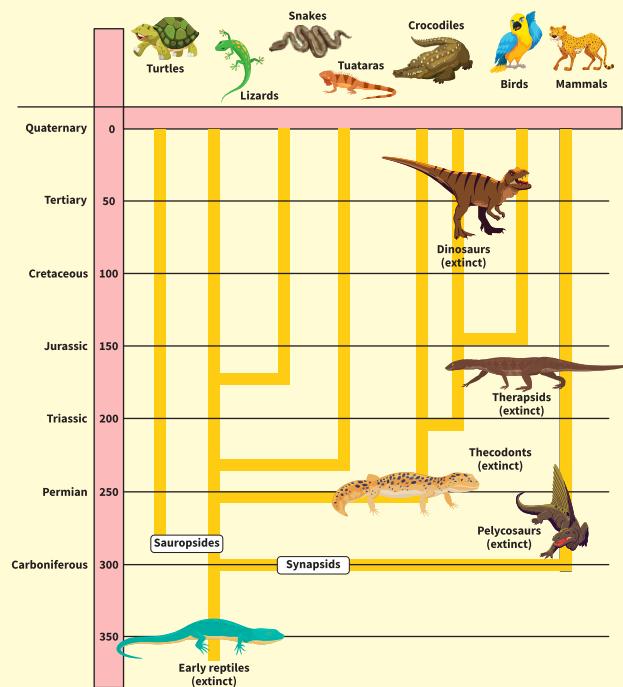
## HARDY – WEINBERG PRINCIPLE

- ✦ Explains that in a given population one can find the frequency of occurrence of alleles of a gene.
- ✦  $p^2 + 2pq + q^2 = 1$   
Where,  $p^2$  = frequency of AA  
 $q^2$  = frequency of aa  
 $2pq$  = frequency of Aa
- ✦ Five factors are known to affect Hardy-Weinberg equilibrium. These are gene migration or gene flow, genetic drift, mutation, genetic recombination and natural selection.
- ✦ Natural selection works in 3 ways -  
(i) Stabilising, (ii) Directional, (iii) Disruptive

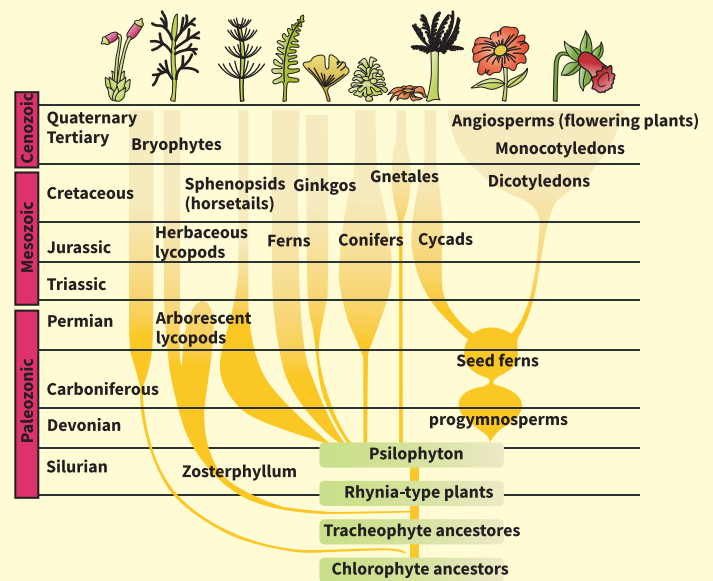


## BRIEF ACCOUNT OF EVOLUTION

First cellular form of life appeared around 2000 million years ago on Earth.



Geological Timeline in Animals



Geological Timeline in Plants

## ORIGIN AND EVOLUTION OF MAN

- ✦ Dryopithecus & Ramapithecus appeared around 15 million years ago. They are ape-like.
- ✦ Australopithecines probably lived in East African grasslands. .
- ✦ Homo habilis had brain capacities were between 650-800cc.
- ✦ Homo erectus had a large brain around 900cc. Neanderthal man appeared around 1,00,000 – 40,000 years ago.
- ✦ Homo sapiens sapiens evolved around 75,000 – 10,000 years ago.

