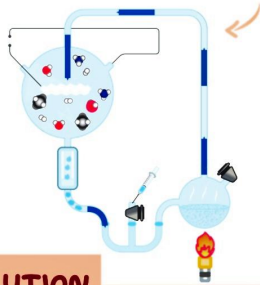


## EVIDENCES FOR EVOLUTION

- **Palaeontological Evidences:-** Fossils are connecting links for study of evolution. Archaeopteryx.
- **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. Human hand, whale flippers, Bat's wing & cheetah's foot.  
Analogous Organs:- Similar in function but different in origin. Shows convergent evolution: common function: e.g. 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.

## 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)



## EVOLUTION

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

# EVOLUTION



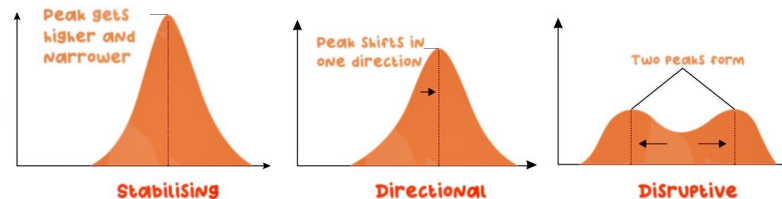
## BIOLOGICAL EVOLUTION

### LAMARCKISM

- 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)

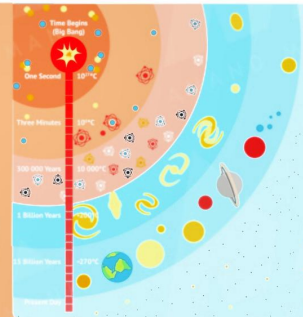
### DARWINISM

- Survival of the fittest
- Natural Selection works in 3 ways - (i) Stabilising, (ii) Directional, (iii) Disruptive



## ORIGIN OF LIFE

- Life appeared around 4 billion years ago.
- Universe originated by Big-Bang theory.
- Panspermia theory- Life came from dead & decaying matter.
- 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)



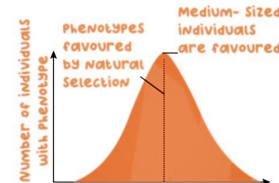
## MECHANISM OF EVOLUTION

### Hugo de Vries

- Mutation causes evolution
- Mutations are random & directionless.
- Mutation cause Speciation (Saltation)
- Saltation - Sudden & large mutational change from one generation to next.

### Darwin

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



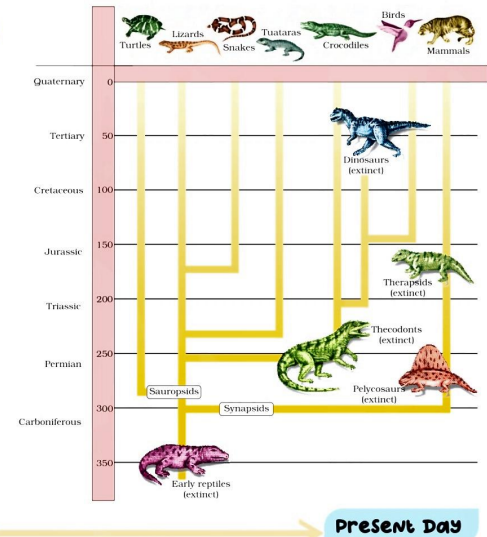
## HARDY - WEINBERG PRINCIPLE

- 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
- Founder effect - loss of genetic variation when a new population is established by a very small number of individuals of the large population.

## BRIEF ACCOUNT OF EVOLUTION

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

## GEOLOGICAL TIMELINE



## ORIGIN AND EVOLUTION OF MAN

- Dryopithecus & Ramapithecus appeared around 15 million years ago. They are ape-like.
- Neanderthal man appeared around 1,00,000 - 40,000 years ago.
- Homo sapiens evolved around 75,000 - 10,000 years ago

