

Part III (A) Zoology  
Evidences in favour of Organic evolution

The theory of organic evolution is explained on the basis of various concept such as

↳ Evidences from Morphology and Comparative Anatomy  
Morphological studies of various organs constructed on a basic plan, that these are

(1) Homology and ~~analogy~~ <sup>homology</sup> organs

Homology is the similarities between organs of different animals based on common ancestry or common embryonic origin. Thus homology organs have common origin, structure but perform different functions

Ex: (a) The flipper of seal, wings of bat, forelimb of a mole, front leg of horse, arm of man.

- (b) Homology in brain structure.
- (c) Homology in structure of heart.
- (d) Homology in invertebrates

(2) Analogy & analogy structure.

The analogy organs have almost similar appearance and perform the same function, but ~~they~~ develop in totally different groups on totally different plan.

Thus analogy means structure having different origin and structure, but perform similar functions.

Ex: (a) wings of Insects, Birds & Bat.

- (b) Fins of fishes and flippers of sea whale

(3) Adaptive radiation

The concept of Adaptive radiation also provide strong evidence in support of the theory of organic evolution.

The adaptive radiation is exhibited by the limb structure in mammals.

(4) Vestigial organs or Vestiges

The Vestigial organs are defined as useless remnants of structure or organs which are large and functional in ancestor. These are often undressed, degenerate and non functional.



Ex:

- (i) Vermiform appendix in man.
- (ii) Muscles of external ear
- (iii) Nictitating membrane or Plica semilunaris.
- (iv) The wisdom teeth or third pair of molars

## ② Evidences from Embryology

Haeckel formulated the Recapitulation theory or Biogenetic Law. A/c to this ontogeny recapitulates phylogeny.

Starting ontogeny is the life history of the individual from ovum and phylogeny is the series of adult ancestors of the individuals which must have incurred in the evolution of the group of this individuals.

It means that an individual during its development briefly its ancestral history.

- Ex:
- (a) Homology in early development.
  - (b) Recapitulation in human embryo.
  - (c) Homology in the embryo.

## ③ Evidences from Paleontology

Paleontology is the study of fossils. Study of fossils reveals the existence of life in past and illustrate the course of evolution of plants and animals. Study of fossils leaves no ground to doubt that species arose from previously existing different ones or that the evolution has occurred in nature and is continuing.

## ④ Evidences from Taxonomy

The science of classification of animal is called Taxonomy. It is fact that animals could be graded in order of increasing complexity is an evidence of evolution.

The natural system of classification is based upon similarities and such similarities of structure could be only due to an origin from common ancestors.



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⑤ Evidences from Biochemistry  
The most convincing evidence of descent from a common ancestor comes from the similarities in the biochemical composition and physiological activities of organisms.

(a) Protoplasm - The protoplasm is organized into structural units, the cells, which are building blocks forming tissues of both animals & plants.

(b) Chromosomes  
The chromosomes have fairly constant chemical composition in the living animals being composed of DNA & proteins.

The chemical composition of DNA is basically the same in all living being except for differences in the sequence of nitrogenous bases.

The degree of similarities between the DNA of two species can be estimated by the pairing property of DNA strands. The greater is the degree of pairing in DNA strands of species, the closer is the similarities in genetic messages contained in the DNA of two species.

(c) Genetic code -

It is surprising to note that the same genetic code having triplet code is found from viruses to man.

⑥ Evidences from Geographical Distribution (Biogeography)

Distribution of animals and plants in space on earth surface constitutes another convincing evidence of evolution.

⑦ Evidences from Genetics

The final line of evidence for evolution is drawn from genetics, the science of heredity. It has been established now that genes are quite constant and are inherited unchanged generation after generation. But genes undergo changes producing mutations and variations. These changed genes determine the character in different directions than the original.