



# THE SYNTHETIC THEORY OF EVOLUTION

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# WHAT IS THE EVOLUTION

- Evolution is theory that life arose by natural processes at an early stage of the earth's history and that complex organism developed from simple organisms by a process of gradual change.

# DARWIN'S THEORY (DARWINISM)

- Darwin's theory proposes that in struggles the favorable variation will tend to be preserved and unfavorable ones eliminated.
- This will result in adaptation of species to the environment to the point that it will cause the origin of a new species.

# EVOLUTION FACTORS

- Overproduction: each species produces more offspring than will survive to maturity.
- Variation: genetic variation exist between these offsprings.
- Competition: competition occurs between these offsprings for the resources needed for life. i.e: food, space, and habitat.



# SURVIVAL

- Survival of the offsprings with the most favorable combination of genetic characteristics are most likely to survive and reproduce, passing those characteristics onto the next generation. Over time, changes accumulate in the gene pool of population and may cause a new species to evolve.

# THE SYNTHETIC THEORY OF EVOLUTION

- The synthetic theory of evolution is a combination of Darwin's theory and mendelian genetics.
- This theory explains Darwin's observation of variation among offspring in terms of mutation and recombination.

# ORGANIC EVOLUTION

- Organic evolution states that the present complex animals and plants have been produced in the course of ages by a process of gradual change in earlier and simpler form of life.
- According to this view the unicellular organisms were the first to appear in the world. Some of them gave rise to multicellular organisms.

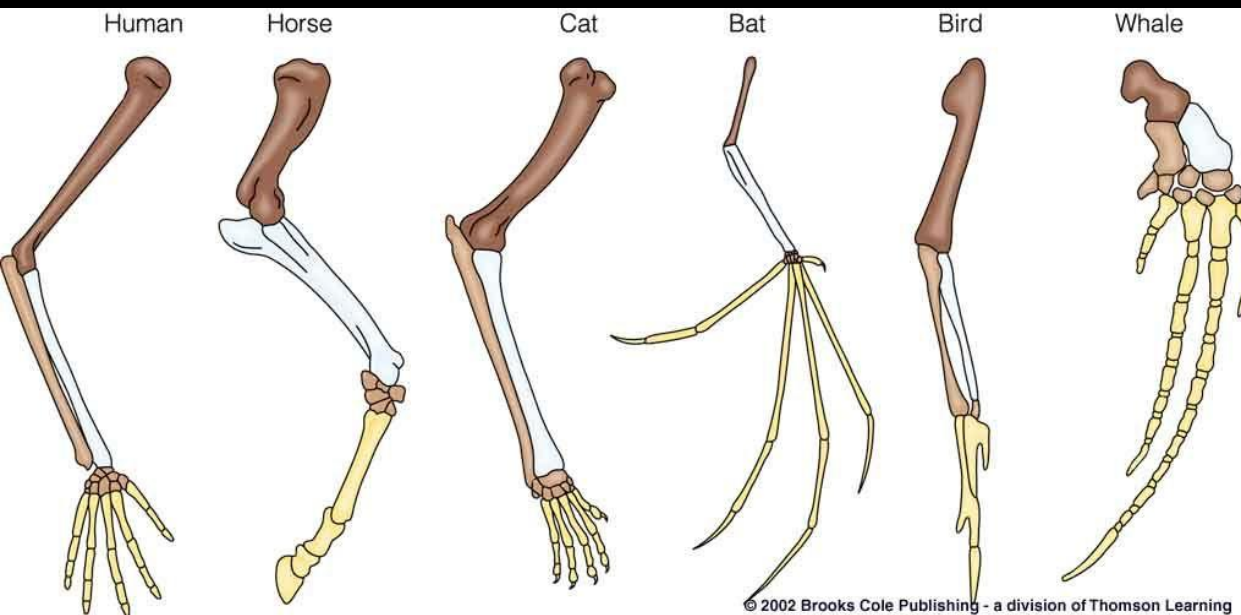
# EVIDENCE OF ORGANIC EVOLUTION

- Many types of evidence support the doctrine of organic evolution.
- These are: morphological and anatomical, embryological, palaeontological, biochemical.



# MORPHOLOGICAL AND ANATOMICAL EVIDENCE

- The aspect of morphology and anatomy, which provide evidence for evolution are body organization, vertebrate organs, homologous organs, analogous organs, connecting links, vestigial organs and atavism.

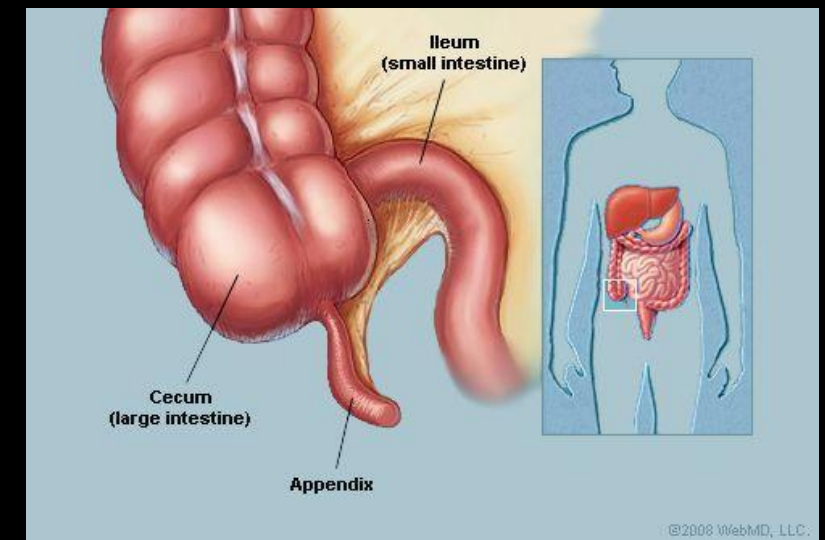
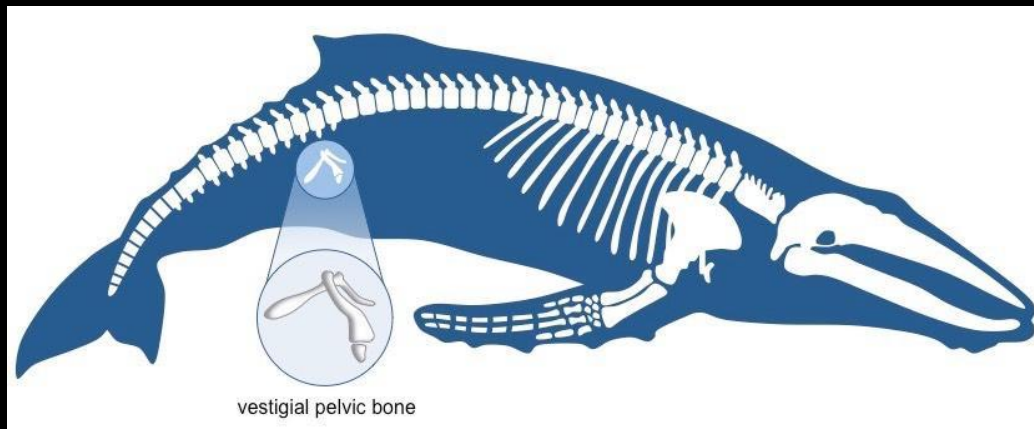


# MORPHOLOGICAL AND ANATOMICAL EVIDENCE

- Homologous organs have basic structure of similarities, even though the organ maybe used in different ways. Homologous organs indicate evolutionary ties between the organisms possessing them
- Analogous organs have similar functions but are not homologous and do not indicate close evolutionary ties.
- Occasional presence of vestigial organs is to be expected as an ancestral species adapts in different modes of life and evolves into new species.

# MORPHOLOGICAL AND ANATOMICAL EVIDENCE

- Example of homologous organs are the forelimbs of frog, man, and the flippers of the whale.
- An example of an analogous trait would be the wings of insects, bats and birds.
- Examples of vestigial structures include the human appendix, the pelvic bone of a snake, and the wings of flightless birds.



# MIMICRY

- Mimicry, which increases the fitness of an organism for a particular environment, provides evidence of evolution.
- In batesian mimicry, a harmless or edible species (the mimic) has evolved to resemble another species (the model) that is dangerous in some way. Predators will avoid the mimic as well as the model.
- In mullerian mimicry, several different species—all of which are poisonous, harmful, or distasteful—have evolved to resemble one another. Predators easily learn to avoid their common warning coloration.

# MIMICRY

- An example of Batesian mimicry is the poisonous coral snake and the king snake, which is the mimic.
- many snakes share the same auditory warning signals, forming an auditory Müllerian mimicry ring

EXAMPLES



*coral snake*



*king snake*

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# EMBRYOLOGICAL EVIDENCE

- The aspect of embryology which support the doctrine are similar to early development, resemblance among vertebrate embryos, recapitulation theory, and temporary nonfunctional embryonic structures and development of organs.

# EMBRYO LOGICAL EVIDENCE

- The embryos of related animals are more similar than the adults.
- The accumulation of genetic changes since organisms diverged in evolution modifies the pattern of development in higher vertebrate embryos.

# BIOGEOGRAPHICAL EVIDENCE

- Areas that have been separated from the rest of the world for a long time have organisms specific to those areas.
- Each species originated only once (at its center of origin).
- From its centre of origin each species spread out until halted by a barrier of some kind.





# PALEONTOLOGICAL EVIDENCE

- Paleontology is the study of past life based on the fossil record. The fossils are petrified remains or impressions of the ancient organisms preserved by natural means in rocks or other media like amber, ice, volcanic ash, etc.

# BIOCHEMICAL EVIDENCE

- Animals show relationships in biochemical reactions. The enzymes are essentially alike in their nature and action in most animals (trypsin is found in many animals from protozoan to man). This shows that all animals are related to one another.

# BIOCHEMICAL EVIDENCE

- Blood sera of closely related vertebrates are more similar than sera of distantly related vertebrates.
- The sequence of amino acids in common proteins such as cytochrome C or haemoglobin reveals greater similarities in close related species.
- A greater proportion of the sequence of nucleotides in DNA is identical in closely related organisms.
- The universality of the genetic code is further evidence that all life is related.



THANK YOU FOR LISTENING