

High Yield Hints - Origin of Life

1. Theory of Biogenesis was put forward by Louis Pasteur in 1862 to explain the origin of life. It states that life originates only from pre-existing life. **Protobionts** are aggregates of artificially produced pre-biotic molecules in experimental conditions. It shows the capacity to maintain internal environment but lacks the ability of division. **Coacervate** is a mixture of proteins and polysaccharides surrounded by a film of water. Since a lipid bilayer is absent, it lacks the ability to divide. **Congogeny** refers to the evolution of perception, expression and communication in the primitive organism (Eiobionts). Congogeny marked the diversification and evolution of photosynthesis.
2. The primitive atmosphere was reducing without oxygen. Oxygen was bound in the water molecules and in metallic oxides. Ozone layer was also absent in the primitive atmosphere.
3. The energy for the chemical reactions in the primitive earth was obtained from UV radiation.
4. Urey and Miller used a mixture of Water, Methane, Ammonia and Hydrogen in the Spark chamber to conduct experiment to prove chemical origin of life. They obtained amino acids and peptides after the experiment.
5. The first photosynthetic organisms were Cyanobacteria. Galapagos Islands are a group of 14 islands in the Pacific Ocean near South America. Darwin observed variations among the plants and animals inhabiting the Galapagos Islands.
6. Specimens with fake structures similar to plant parts are called as **Pseudofossils**. Paleontology is the study of fossils. **Fossils** are dead remains of plants and animals lived in the past ages. Fossils may be **Unaltered fossils** (whole body buried in resin or ice), **Petrified fossils** (replacement of body parts by minerals), **Moulds** (hardened mud surrounding the fossil) **Casts** (petrified fossil with moulds) and **Prints** (foot prints of animals). Determination of the age of fossils is called **Dating of fossils**. Various methods used for dating the fossils are Radioactive clock method, Radiocarbon method and Potassium Argon method. The most accurate method of fossil dating is **Electron-Spin Resonance method**.
7. **Discontinuous distribution** is the existence of closely similar species in separated places. Examples are Peripatus, Alligators etc. **Adaptive radiation** or Divergent evolution is the development of functional structures from a common ancestor. The concept of adaptive radiation was suggested by Osborn in 1898. Darwin's finches, Marsupials, evolution of mammals are some of the examples of adaptive radiation.
8. **Convergent evolution** is the formation of similar structures in unrelated groups of organisms. Wings of insects and birds evolved in the same line. Aquatic vertebrates also show characters evolved through convergent evolution. **Parallel evolution** is the convergent evolution in closely related animals. For example the running adaptations in Horse and Deer.
9. **Homologous organs** have same structure but perform different functions. Examples are Pentadactyl limbs of vertebrates, Mouth parts of insects etc. **Molecular Homology** is also found in animals. Example is the Blood Proteins of Man and Apes. **Analogous organs** have different structures but perform same functions. Examples are Wing of insects, birds and bat, Flippers of whale and fins of fishes etc.

10. **Vestigial organs** are rudimentary non functional organs which were well developed and functional in the ancestors. About 90 Vestigial organs are found in man. Some of them are Nictitating membrane, Coccyx, Ear muscles, Vermiform appendix, Wisdom teeth, Hair on the body etc. Rudimentary pelvic girdle of Python, Wings of flightless birds, and Splint bone in the leg of horse are also vestigial organs.
11. **Connecting link** is an organism which possesses the characters of two different groups. Examples are Euglena, (plant and animal) Proterospongia (protozoa and porifera), Peripatus (annelida and arthropoda), Neoplina (annelida and mollusca), Lung fishes, Egg laying mammals, Archaeopteryx etc.
12. **Atavism or Reversion** is the reappearance of ancestral characters in present animals. Examples are ability to move ear pinna, hairy body, short tail, long canines etc.
13. Retrogressive metamorphosis is found in Ascidia and Sacculina. During metamorphosis, many of the structures disappear.
14. Recapitulation theory was put forwarded by Von Baer in 1828. It was later called as Biogenetic law by Haeckel in 1866. It states that "Ontogeny repeats Phylogeny".
15. Missing links are transitional forms found as fossils. Eg. Archaeopteryx.
16. Eohippus or "Dawn Horse" was the first formed horse and Equus is the modern horse.
17. Herbert Spencer first suggested the idea of survival of the fittest which was later named as Natural selection by Darwin.
18. Replica plate experiment was conducted by Joshua Lederberg and Esther Lederberg in bacteria to show the pre adaptive nature of some mutations.
19. Genetic drift or Sewal Wright Effect is the random changes in gene frequencies by chance. Founder Effect is a situation in which a new population showing genetic drift is established by only a few founding individuals. Bottle neck phenomenon is the condition in which the number of individuals in a population decreases to form small groups that becomes isolated.
20. Sibling species are morphologically identical but do not interbreed (*Drosophila pseudoobscura* and *D. persimilis*). Polytypic species has two or more subspecies. (Sparrow)