

# Evolution-I

10+2

Evolutionary Biology

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## ORIGIN OF LIFE

Evolutionary Biology is the study of history of life forms on earth. Origin of life is considered a unique phenomenon in the history of universe. The universe is almost 20 billion years old. The Big Bang theory tries to explain the origin of universe. Earth formed about 4.5 billion years ago. At that time, there was no atmosphere on earth. Water vapour, methane, carbon dioxide and ammonia released from molten mass covered the earth's surface. UV rays from the sun broke up water into Hydrogen and Oxygen and the lighter  $H_2$  escaped. Oxygen combined with ammonia and methane to form water,  $CO_2$  and others. The ozone layer formed. As it cooled, the water vapour fell as rain, fill all the depressions and form oceans. Life appeared 500 million years after the formation of earth, i.e., almost four billion years ago.

**Panspermia:** Many scientists believe that life came from outside the earth. Early Greek philosophers thought units of life called spores were transferred to different planets including earth.

**Spontaneous generation:** For a long time it was also believed that life originated from decaying and rotting matter like straw, mud, etc. This was the theory of spontaneous generation.

Louis Pasteur by careful experimentation demonstrated that life comes only from pre-existing life. He showed that in pre-sterilised flasks, life did not come from killed yeast while in another flask open to air, new living organisms arose from 'killed yeast'. Spontaneous generation theory was dismissed finally.

Oparin of Russia and Haldane of England proposed-

1. that the first form of life could have originated from pre-existing non-living organic molecules (e.g. RNA, protein, etc.) and
2. That formation of life was preceded by chemical evolution, i.e., formation of diverse organic molecules from inorganic constituents.

The conditions on earth were –

- I. High temperature
- II. Volcanic storms
- III. Reducing atmosphere containing  $\text{CH}_4$ ,  $\text{NH}_3$ , etc.

In 1953, S.L. Miller, an American scientist simulated the conditions in laboratory. He created electric discharge in a closed flask containing  $\text{CH}_4$ ,  $\text{H}_2$ ,  $\text{NH}_3$  and water vapour at  $800^\circ\text{C}$ . He observed formation of amino acids.

In similar experiments others observed, formation of sugars, nitrogen bases,

pigment and fats. Examination of meteorite content also revealed similar compounds that indicate that similar processes are occurring elsewhere in space. With this limited evidence, the first part of the conjectured story, i.e., chemical evolution was more or less accepted.

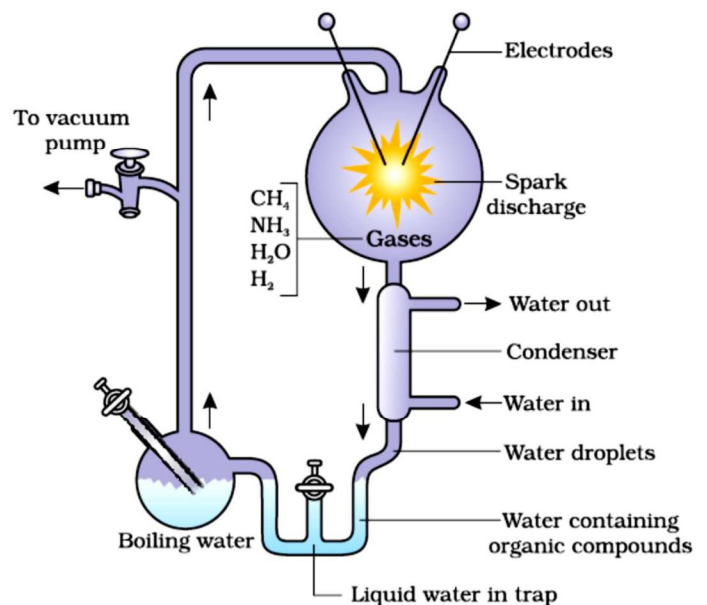


Figure 1 Miller's Experiment: A diagrammatic representation