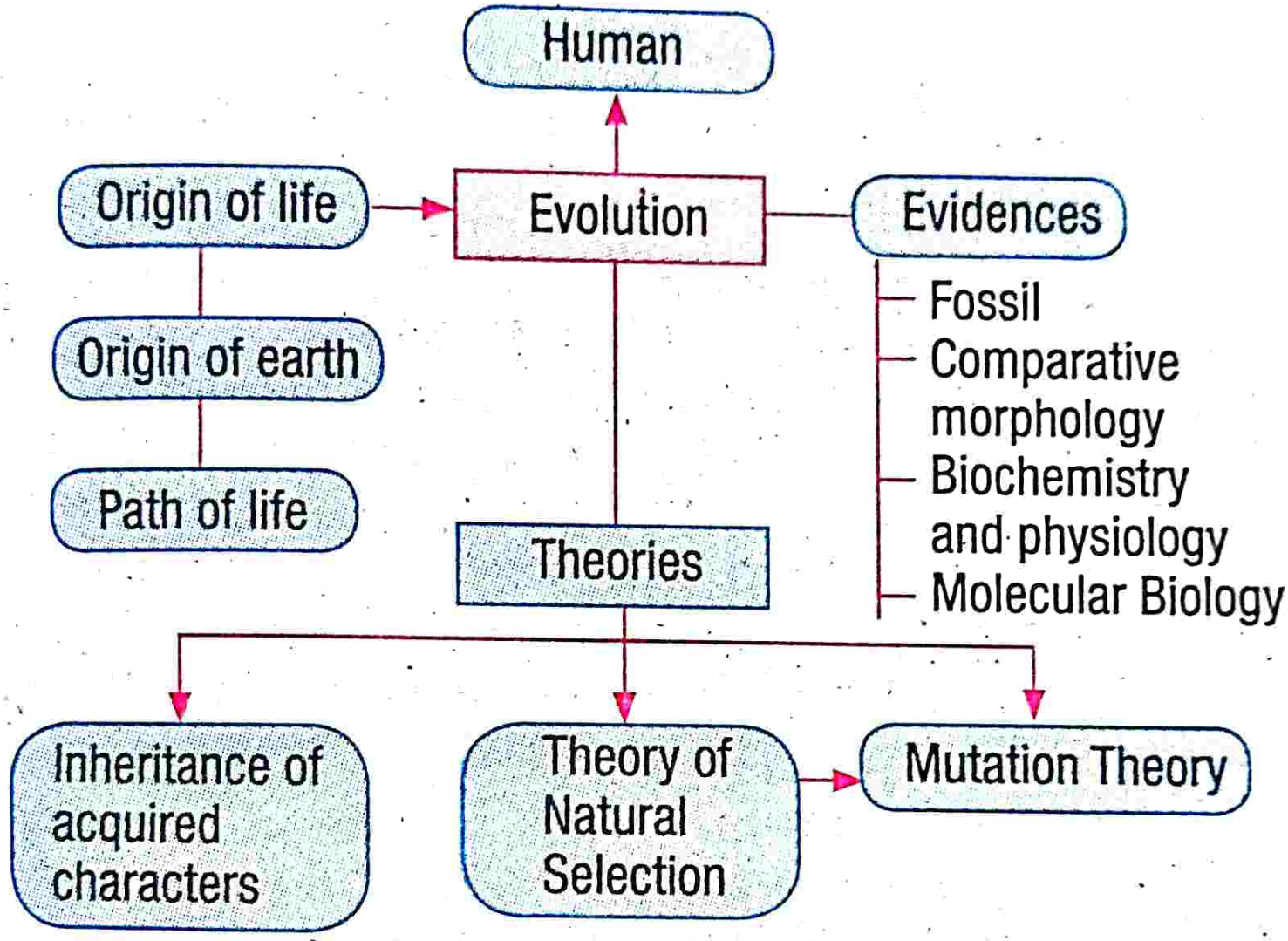

Origin of life

The most persistent and contemporary laws that exist even today about the origin of life are Panspermia and Chemical evolution.

1. **What is Panspermia theory?**

The Panspermia Theory argues that life has originated in some other planet in the universe and accidentally reached the earth. The organic substances identified in meteors that fell on the earth support the Panspermia Theory.

2. **The proponents of the theory of chemical evolution.** J.B.S. Haldane, A.I. Oparin

Analysis of illustration 8.1 (Textbook page 124)

- **Atmosphere of primitive earth - peculiarities**
  Atmosphere contains gases like hydrogen, nitrogen, carbon dioxide, methane, ammonia, water vapour, hydrogen sulphide etc. There were no free oxygen.
- **Sources of energy**
  Thunder and lightning, Ultraviolet radiations, Volcanic eruptions.
- **Formation of ocean :** The amount of water vapour in the atmosphere increased. The condensation of it resulted in incessant rain. Raining that continued for thousands of years resulted in the formation of oceans.
- **Chemical reactions that led to the formation of cell.**
  Different types of chemical reactions took place in the ocean. As a result simple organic molecules like amino acids, mono saaccharides, nitrogen bases, fatty acids etc. were formed. From it complex organic molecules like protein, polysaccharides, nucleotides, lipids etc. were formed. Later nucleic acids and an envelop of lipid around it was also formed. These were the primitive cells.

Analysis of indicators (Textbook page 125)

- **Atmosphere of primitive earth and chemical components in the glass flask.**
  The atmosphere recreated was similar to that of the primitive earth. The gases that were present in the primitive earth like methane, ammonia and water vapour were filled in the flask.
- **Organic molecules formed after the chemical reaction.**
  Amino acids

3. **What inference was arrived at from this experiment?**
   The molecules that were formed in the atmosphere reached the ocean through rainfall and through chemical reactions gave rise to life forms.
4. **How did Urey and Miller recreate the atmosphere of the primitive earth in the laboratory?**
   They took the gases that were thought to be present in the atmosphere of the primitive earth in the flask.

High voltage electricity similar to that of lightning and thunder was generated using electrodes. Then this gas mixture was cooled with the help of a condenser.

Geological Time Scale - Analysis

- **Primitive cell :** Origin of life on earth 3800 million years ago.
- **Prokaryote :** Origin of prokaryotes 3500 million years ago.
- **Eukaryote :** Origin of eukaryotes 1500 million years ago.
- **Multicellar organisms :** Origin of multicellular organisms 1000 million years ago.

Explanation of the indicators (Textbook page 126)

- **Primitive cell**
  The first primitive cell was formed about 3800 million years ago.
- **Origin of prokaryotes**
  About 3500 million years ago prokaryotes were formed from primitive cells.
- **Origin of eukaryotes**
  It is about 1500 million years since the eukaryotes were formed. When membranes bound organelles were formed in prokaryotes they became eukaryotes.
- **Appearance of multicellular organisms**
  About 1000 million years ago multicellular organisms evolved. It is believed that eukaryotes formed colonies and from it the multicellular organisms evolved.