

# NEET · CBSE eBOOKS

CLASS 11 & 12th



Learning Inquiry  
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CLASS 12<sup>th</sup>

Evolution

misostudy



## 01. Big -Band Theory:

This theory was proposed by **Abbe Lemaitre**. According to it, the universe originated about 20 billion years ago due to a thermonuclear explosion of a dense entity. This thermonuclear explosion is called **Big- bang**. About 4.5 billion years ago, the origin of our solar system took place by the gaseous clouds formed due to this explosion. These gaseous clouds collapsed and converted into flat disc-like structure made up of atoms and small particles due to their own gravitational pull. These flat-disc like structure is called **SOLAR-NEBULA**.

## 02. Ancient Theories For Origin of Life:

### (i) Theory of special creation- Mythology based theory

The greatest supporter of this theory was **father Suarez**. According to Bible life and everything was created by god in 6 days.

### (ii) Theory of Spontaneous Generation (Abiogenesis or Auto genesis)-

This hypothesis was supported by ancient Greek philosophers like Thales, Anaximander, Xenophanes, Plato, Empedocles, Aristotle. According to this theory life was originated from nonliving things or decaying and rotting matter like straw, mud etc. spontaneously. They believed that the mud of the **Nile** river could give rise to frogs, snakes, crocodiles.

### (iii) Cosmozoic Theory-

Proposed by **Richter**

Protoplasm reached on earth in the form of **spores** or other simple particles from some unknown part of the universe with cosmic dust and they gave rise to various forms of life.

### (iv) Cosmic panspermia theory

Proposed by **Arrhenius**.

According to this theory organism existed throughout the universe and their spores could freely travel through space from one star to the other.

### (v) Theory of Biogenesis

**Harvey (1651) and Huxley (1870)**

**Omnis vivum ex ovo or vivo.**

New organisms can be originated on earth only by pre-existing life. This theory rejects the theory of Spontaneous generation but cannot explain origin of life. To prove Biogenesis and to disprove abiogenesis experiments were performed by-

**Francesco Redi's Experiment (Italian 1668)-**

He took cooked meat in three jars one was uncovered, the second was covered with parchment and the third was air tight. He observed that maggots develop only in the uncovered jar while maggots could not develop in the meat in closed jars. This proved that larvae were formed from eggs laid by the flies in open jars. Since the meat in closed jars could not be visited by flies so no larvae could develop. Therefore life originated from preexisting life.

**Lazzaro Spallanzani (Italian 1767)-**

He boiled vegetables and meat to prepare a sterilized nutritive soup and then he kept some of it in air sealed flasks and some in loosely corked flasks

He observed that the soup in sealed flask remained sterile while microorganisms appeared in the soup in loosely corked flasks.

Thus even microorganisms were formed from pre-existing ones in the air rather than spontaneously.

#### Louis Pasteur (French 1862)-

Pasteur is popular for **Germ Theory of Diseases of Germ theory** and he disproved abiogenesis. He prepared sterilized **syrup** of sugar and killed yeast by boiling them in flasks. He took two flasks one of broken neck and another of curved neck (swan neck flask). No life appeared in swan neck flask because germ laden dust particles in the air were trapped by the curved neck which serves as filter while in broken flask colonies of microorganism were developed. By the experiment he proved that life comes only from pre-existing life.

#### Modern theory of origin of life

##### (Oparin-Haldane theory of origin of life)

##### Naturalistic theory OR Theory of Chemical Evolution-

- This theory was proposed by Russian Scientist **A.I Oparin** and **J.B.S Haldane** (England born Indian scientist) Oparin's theory was published in his book **ORIGIN OF LIFE**
- According to this theory life originated by the **composition of chemicals**
- Oparin and Haldane proposed that the first form of life could have come from pre-existing non living organic molecules and that formation of life was preceded by chemical evolution.

### 03. Chemical Evolution

#### (i) The atomic stage-

The earth was originated about 4.6 billion years ago Early earth had free atoms of all those elements which are essential for the formation of protoplasm. The lightest atoms like **carbon, hydrogen, nitrogen and oxygen** formed the primitive atmosphere. **most abundant of all of them was hydrogen**

#### (ii) Molecular stage (Origin of molecules and simple Inorganic compounds)-

Free atoms combined to form molecules and simple inorganic compounds. Due to presence of high temperature, active hydrogen atoms combined with all oxygen atoms to form water and leaving no free oxygen. Thus the primitive atmosphere was **reducing** (without free oxygen.) unlike present **oxidising** atmosphere (with free oxygen). Hydrogen atoms also combined with nitrogen to form  $\text{NH}_3$ .

#### (iii) Origin of early organic compounds-

the nitrogen and carbon of the atmosphere combined with metallic atoms forming nitrides and carbides. Water vapour and metallic carbides reacted to form the **first organic compound Methane ( $\text{CH}_4$ )** Later on **hydrogen cyanide (HCN)** was formed. Water which formed. on earth due to high temperature evaporated so **clouds** were formed. Water vapor changed into rain drops and by the collection of water on earth primitive oceans were formed.

**(iv) Origin of simple organic compounds-**

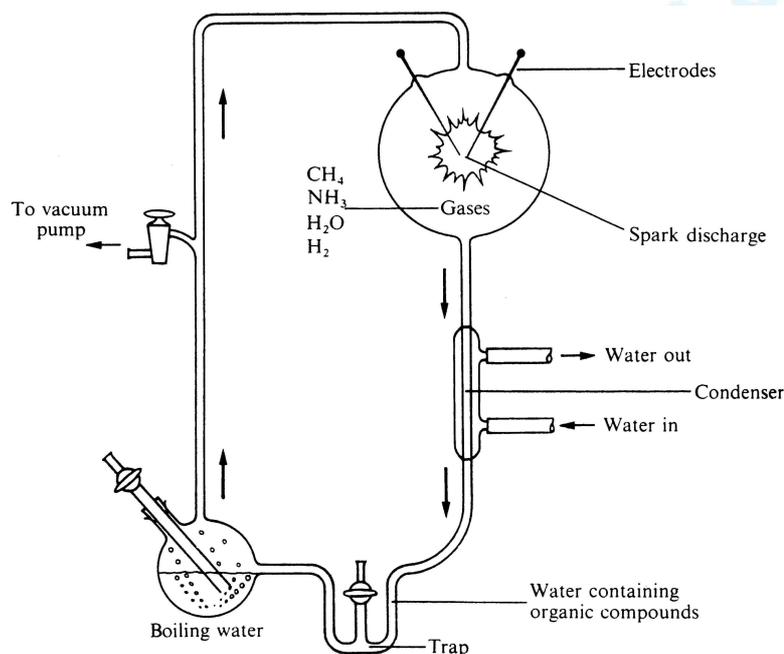
Water of primitive oceans contained large amount of methane, ammonia, hydrogen, cyanides, carbides, ni-trides. These early compounds interacted and formed simple organic compounds like, aldehyde, Ketones, Alcohols, Pentose and hexose sugar, Amino Acids, Glycerol, Fatty Acids, Purines, Pyrimidines etc.

**(v) Origin of complex organic compounds-**

The small simple organic molecules combined to form large complex organic molecules. Amino acids Joined to form polypeptides and proteins, which were non-enzymatic and non structural. Simple sugar units combined to form polysaccharides. Fatty acids and glycerols united to form fats and lipids. Sugar, nitrogenous bases, phosphates combined into nucleotides which polymerized into nucleic acid, which unable to replicate.

**Experimental Evidence for Formation of Simple Organic Compounds-**

**Stanley Miller**, Who was a student of **Harold Urey**. In this experiment Miller took the mixture of **methane, ammonia and hydrogen (ratio 2 : 1 : 2)** in a large flask and passed steam over it by boiling water and connecting it with a glass tube. Electric spark was dis-changed at 800°C in the mixture by using two tungsten electrodes as **source of energy**. After 18 days the fluid was collected and analysed. This dark red fluid was found to contain Simple amino acids- glycine, alanine, aspartic acid. Simple organic acids- formic, acetic, oxalic, lactic, succinic acids. etc. Pentose, hexose, aldehyde, ketone etc. From these compounds how various forms of life was originated we will studied it in **Biological evolution**.



*Apparatus used to synthesize amino acids in Stanley Miller's 1953 "origin of life" experiment.*