

EVOLUTION

ORIGIN OF LIFE

THEORIES OF ORIGIN OF LIFE (OPARINE AND HALDANE)

This theory was proposed by **Abbe Lemaitre**. According to it, the universe originated about 15 billion years ago due to a thermonuclear explosion of a dense entity. This thermonuclear explosion is called **Big-bang**. About 4.6 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**. The very hot central part of this solar Nebula became still hotter & converted into the **sun**. Now, due to condensation of atoms and dust particles moving around the sun formation of the other planets took place [**Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune**]. The solid part of our planet earth was called Lithosphere and the gaseous part was known as atmosphere. When the earth's surface cooled down and its temperature decreased to 100⁰ C, water formed on it.

Ancient Theories for origin of life :

1. 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.

on first day	:	Earth and heaven
on second day	:	Sky and water
on third day	:	Land and plants
on forth day	:	Sun, moon and stars
on fifth day	:	Fishes and birds
on sixth day	:	Land animals and first man Adam and from his 12th Rib first woman Eve.

According to **hindu mythology** the world was created by **God Brahma**. (The first man was **Manu** and the first woman was **Shraddha**).

According to it life has not changed ever since its origin.

Special creation theory lacks scientific evidences so it is not accepted.

2. Cosmic panspermia theory-

- Some scientists believe that life came from-outer space.
- Early Greek thinkers thought units of life called spores were transferred to different planets including earth.
- 'Panspermia' is still a favourite idea for some astronomers.

3. Theory of spontaneous generation (Abiogenesis / Autogenesis) –

- This hypothesis was supported by ancient Greek philosophers.
- According to this theory life came out of decaying and rotting matter like straw, mud, etc. spontaneously.
- They believed that the mud of Nile river could give rise to fishes, frogs, crocodiles etc when warmed by light rays.
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4. 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 reject 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.

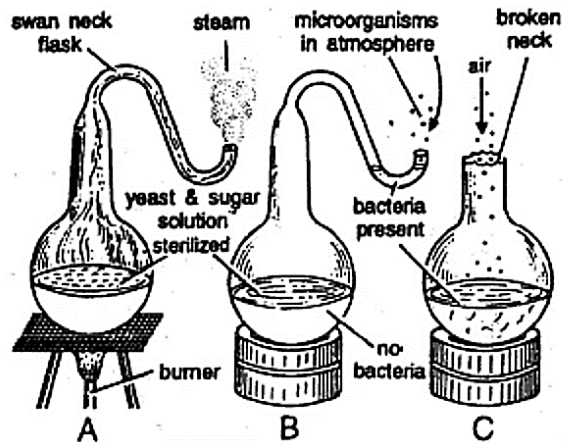
He observed that maggots developed only in the uncovered jar while maggots could not developed in the meat in closed jars.

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 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 or Germ theory** and he disproved abiogenesis.

He prepared sterilized **syrup** of sugar and killed yeast 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 neck 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'.

Important Points

- According to this theory life originated by the **composition of chemicals**.
- Oparin's theory is based on Artificial Synthesis. So also called as **artificial synthetic theory**.
- Ist life originated in the water of oceans. So water is essential for origin of life.

There is no life on moon due to absence of water.

- At the time of origin of life free O₂ was absent, so first life was **anaerobic**.
- In the primitive atmosphere free oxygen was present but complete oxygen consumed in composition so primitive atmosphere of earth was **reducing**.
- Oxygen was reproduce by photosynthesis and atmosphere converted in **oxydising**.