

## Heredity and evolution

### Origin of Life

#### ❖ Origin of Life:

Life as the inherent capacity of living organisms to utilise the outside materials (light, gases or food) for energy, growth and reproduction through chemical reactions (metabolism) in a controlled manner.

Many theories have been advanced to explain the origin of life. Some theories are described below:

**Theory of special creation:** According to this theory life was created by some Super Natural Power (God). This theory has no evidence, hence it is a rejected theory.

#### **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 non-living things spontaneously. They believed that the mud of the Nile River could give rise to frogs, snakes, crocodiles. Abiogenesis was strongly supported by Von Helmont. He claimed formation of mice in 21 days, if a sweat-soaked dirty shirt is kept in wheat barn.

#### **Theory of Biogenesis: -**

**Harvery (1651) and Huxley (1870):**

**Omnis vivum ex ovo or vivo.**

New organisms can be formed on earth only by preexisting life. This theory rejects the theory of Spontaneous generation. This was performed by - **Franesco Redi's Experiment (Italian 1668)-**

They took cooked meat in three jars. One was un-covered, the second was covered with parchment and the third was air tight. They observed that maggots developed only in the uncovered jars 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.

**Lazzaro Spallanzani (Italian 1767)-**

They 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 preexisting ones in the air rather than spontaneously.

### **Louis Pasteur (French 1862)-**

Pasteur is popular for Germ Theory of Diseases and he disproved abiogenesis. He prepared sterilized syrup and yeast by boiling them in flasks. He took two flasks one is broken neck and another dust particles in the air were trapped by the curved neck which serves as filter while in broken neck flask colonies of microorganism developed.

### **❖ 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 (1923) 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 was originated by the composition of chemicals.
- Oparin's theory is based on Artificial Synthesis.
- First life was originated in the water of ocean. 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  $O_2$  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 will be reproduced by photosynthesis and atmosphere converted in oxydising.