

matter. He took boiled mutton gravy, filled it in a crooked vial and showed the appearance of minute living organisms in the gravy after a few days. He argued that air contains micro-organisms and was the source of contamination.

③ Pasteur's experiment: Louis Pasteur prepared hay infusion in swan-necked flask as shown. The infusion was boiled to kill the microbes in it to make it sterile. The flask remained free of life for over 18 months. But when swan neck was broken and infusion came in contact with air, microbes appeared. Thus Pasteur proved that life comes from pre-existing life only.

### • Cosmozoic theory of panspermia:

1. Cosmozoic theory was proposed by Richter. According to this theory life is distributed throughout the cosmos in the form of small resistant bodies, called Cosmozoa. These contained living germs or spores. These reached the earth accidentally from some other planet and developed into various organisms.

② According to Helmholtz, life came to this planet in the form of germs along with meteorites falling from some other planet.

③ Arrhenius proposed theory of cosmic panspermia. According to this theory, life along with particles of cosmic dust reached earth under the pressure of stellar rays.

Franklin Crick and Leslie Orgel have recently revived the theory of panspermia. They assumed that there are civilizations at advanced stages on other planets in our Galaxy.

two observations:

The theory based on following two observations:  
① Genetic code: There is only one code for all forms of life on earth because life has originated and diversified from a single 'seed' or germ.

② Metal molybdenum: The metal molybdenum forms a base for many enzyme systems. Although, so important, it constitutes just 0.02% of the total metal composition of the earth. It means life must have been exported to this planet from some other planet, where molybdenum is present in large proportions.

### • Biochemical origin of life (Oparin concept):

The theory which finds the widest acceptance was put forward by Russian scientist.

A.I. Oparin in 1938. It states that "Life originated spontaneously from some nonliving organic compounds in the oceans of primitive earth", about 3.5 billion years ago.

Ledenberg considers three stages in the origin of life viz. chemo-geny, biogeny and cogeny. On the surface of primitive hot earth simple elements like hydrogen, carbon, nitrogen and oxygen combined and recombined to form organic compounds like simple sugars, lipids, amino acids, purines and pyrimidines (chemo-geny). By the condensation and polymerisation of these simple organic molecules such as carbohydrates, proteins, lipids and nucleic acids formed. Nucleic acids were the link between nonliving and living world (biogeny). Aggregation of these macromolecules formed highly organised coacervates having nucleic acids, proteins and shells of carbohydrates. From coacervates arose the first cell. Further evolution in these cells resulted in only