THEORIES OF ORIGIN OF LIFE – A MISNOMER

Even today biologists have not succeeded in defining the phenomenon of life although the whole biology is about it. Darwin did not even discuss the origin of life in *The Origin of Species* while attempting to discuss the various forms of life. How to define 'life' is a baffling question that affects biology, biochemistry and genetics. Life has not been defined but described in terms of the properties or attributes of a living being. But none of these attempts characterizes the phenomenon of life but only indicates its manifestations. Although the phenomenon of life has not yet been defined and understood, we have so many theories about how it originated! These theories will serve no purpose at all. They will only mislead people.

All the theories proposed so far assume that life originated from non-life with no evidence whatsoever and despite our failure to create life from non-life. This is much like the assumption of the evolutionists that new species evolve from existing species. Several theories have been advanced to explain the origin of life. These can be broadly categorized into four a) pre-biotic soup theory, b) gene-first model, c) metabolism-first model [1] and d) panspermia theory [2].

a) Pre-biotic soup theory

The pre-biotic theory was pioneered by Stanley L. Miller and Harold Urey of the University of California, San Diego U.S.A. They demonstrated that simple amino acids and several complex organic compounds could be formed in a closed system containing hydrogen, ammonia, methane and water vapour under the influence of an electric discharge. These results were considered to be strong evidence to suggest that a similar reaction might have taken place in the primitive atmosphere under the influence of lightning, resulting in the formation of amino acids and from them, the proteins. These organic substances might have accumulated in the soupy sea. It is believed that by chance combination of atoms, macromolecules were formed from which self-reproducing structures were formed. According to the primordial soup theory, self-replicating entities, the precursors of life arose spontaneously under favourable conditions in the primitive environment of the earth by chance.

"The suggestion that random chemistry could produce the molecules of life "held the field for a long time." But later calculations appeared to show that the early atmosphere contained much more carbon dioxide and much less hydrogen than Miller's model required, and correcting these concentrations cast doubt on the likelihood that complex molecules would form in abundance. Where, then, might organic precursors have come from? There is some, albeit scant, evidence for their arrival on comets colliding with the earth, but there is little enthusiasm for this as a solution. Finally, there is no geologic evidence, in either sediments or metamorphic rocks, that such a soup ever existed." [1]. If that is the case, why should scientists propose such unfounded theories and propagate?

b) Gene-first model

This model is handicapped by the chicken-and-egg problem associated with DNA and protein. Since DNA codes for protein, it is required for the production of protein

while protein is required for the synthesis of DNA as catalyst. The role of DNA in the pre-biotic scenario thus became suspect. The importance shifted to RNA as it can function as temporary information carrier and catalyst. According to the RNA World Hypothesis, the first living system was a polymer(s) of catalytic RNA capable of self-replication that subsequently evolved the ability to encode more versatile peptide catalysts [3]. Mineral-catalyzed reactions, followed by a series of fractionations, have been suggested to offer the most plausible route to RNA [4, 5].

According to Smith *et al*., a stable cell wall is required to protect the first primitive organism. The first cell wall might have been an internal mineral surface, from which the cell developed a protective biological cap emerging into a nutrient-rich "soup". Ultimately, the biological cap might have expanded into a complete cell wall, allowing mobility and colonization of energy-rich challenging environments [6].

c) Metabolism-first model

Even while the RNA world hypothesis was seriously considered, Günther Wächtershäuser, proposed a radically alternative theory of the origin of life based on iron sulfide. Iron disulfide (pyrite) can catalyze a variety of crucial biochemical reactions. According to him the earliest living system was not a nucleotide-based replicator but a mineral-based metabolizer converting simple and abundant inorganic compounds like carbon dioxide and hydrogen sulfide into more complex organic ones on the surface of a pyrite crystal [7, 8, 1] Wachtershauser's theory of auto-origin suggests pyrite formation as the earliest energy source for life based on surface metabolism and autocatalytic reproduction cycle. Essentially, it is a theory of carbon fixation from an archaic, pyrite-pulled version of the reductive citric acid cycle [7, 8]. Another view is that life on the earth might have begun in rocks on the ocean floor more than four billion years ago. Hot springs deposit a honeycomb of iron sulphide mineral on the ocean floor. This would have served as the ideal place for life to originate [9]. Bernal preferred life to begin by catalytic assembly on a mineral surface [10].

Another suggestion is the clay system of Cairns-Smith [11]. Clays may have been the catalysts that spurred the spontaneous assembly of fatty acids into small sacs that ultimately would have evolved into the first living cell. These vesicles could be induced to grow and split into separate vesicles under laboratory conditions. Many other substances with negatively charged surfaces also catalyzed formation of vesicles. When montmorillonite particles were loaded with a fluorescently labeled RNA and those particles were added to micelles, the RNA-loaded particles could be detected inside the resulting vesicles. When the labeled RNA alone was encapsulated inside vesicles, it did not leak out. This is considered as a demonstration of growth and division without any biochemical machinery [12].

d) Panspermia theories

The idea that life originated on this planet in continuation of the inorganic evolution received a jolt when, in 1973, Francis Crick and L. Orgel proposed a new theory called the "directed panspermia" [2]. According to them, spores of life might have been sent to the earth in an unmanned spaceship by a more advanced civilization evolved billions of years ago on a planet of another star. *In effect, the theory only shifted the venue of the origin of life from this planet to another planet but did not explain how life*

originated. The original panspermia theory did not say that the spores were intentionally sent to other planets, but merely said that microbes in space brought life to planets like the earth. In different versions of the theory, the microbes are supposed to have been transported by light pressure (Arrhenius's radio-panspermia), meteorites (ballistic panspermia), or comets (modern panspermia) [13]. As of today, there is no evidence whatsoever to believe that there is a region in the universe other than the earth that supports life. Hence panspermia can be treated as just a hypothesis with no basis.

The literature on origin of life leads us nowhere. The reports, which go as theories, are mere views and speculations! The following conclusions drawn from a study will give a representative sample of the stories (italics added): "A CO-dominant atmosphere *may have* existed when life originated. This atmosphere *could have* produced a variety of bioorganic compounds with yields comparable to those obtained from a strongly reducing atmosphere. A small amount of CO_2 *could have* allowed the primitive Earth to freeze. This could mean that CO *would have been* more stable in the atmosphere than previously thought because of the reduced vapor pressure of water. Methane and ammonia *would have been* also more stable and *could have* contributed to the synthesis of bioorganic compounds. CO_2 is *likely to have been* present, but it *might not have been* significantly involved in the synthesis of bioorganic compounds." [14]. We construct storylines of this kind to bridge the gap between inorganic evolution and organic evolution to promote the assumption that life originated from non-life. However, studies conducted recently by Craig Venter and his team of researchers have indicated that the assumption could be grossly wrong and misleading. They constructed in the laboratory the genome of the organism *Mycoplasma genitalium*, a parasitic bacterium with the smallest genome for any free-living cell, and named it *Mycoplasma genitalium* JCVI-1.0. But it did not spring to life [15]. The failure of the synthetic genome to spring to life questions the very basis of theories of origin of life that life originated from non-life through mere combination of chemical elements. Further none of the theories of origin of life is qualified to be called so, as they all still remain in the non-life domain. As of today, there is no clear suggestion whatsoever as to how life originated.

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