

Origins of Life, A New Cooperative Model

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Abstract

Why and how our living-bodies, such as human beings, have been originated from a barely non-life planet into the highly-intelligent life existing Earth have been interested and pursued by large population of readers and investigators. The main genetic material that leads to origin of life is the longstanding-dispute among researchers. There are three main categories of life origin theories, RNA world, alternative RNA world, and we herein suggest a new cooperative model of most genetic materials participation system based on our new systematic and logic deduction.

Keywords: Life evolution; Human evolution; RNA world; Alternative RNA world; Genetic information system; Life origin; Genetic information replication; Genetic material cooperative model

Why and how our living-bodies, such as human beings, have been originated from a barely non-life planet into the highly-intelligent life existing Earth have been interested and pursued by large population of readers and investigators. Based on evolution of Darwin's arguments [1], some detailed evolutionary theories and steps have been renewed and discussed by modern evolutionists and investigators, including the evolutionary step of first genetic information processing, retrieval and replication. It seems to be one of the major topics of life origin. In this article, we will discuss the problem of first genetic information replication system on primitive Earth.

Previous Hypotheses

Present established hypotheses about the origin of life contain three scenarios; (i) evolution from prebiotic broth that is originated from inorganic compounds by the energy of meteorites crashes or lightnings; (ii) input from outside meteorites or comets that carry primitive lives; (iii) synthesis in the deep sea vents that carry energy of Earth heat and catalyzed with metals or sulphur [2-7]. Among these three hypotheses, first scenario was previously divided into RNA world hypothesis and alternative RNA world hypothesis [2-5].

RNA World and Alternative RNA World

There have been DNA [8], RNA [2-4, 9,10] and protein [11,12] as presently main genetic material hypotheses regarding the first genetic information retrieving and duplication. Since first genetic information duplication is the foremost important step to copy a life with integrity and persistency, it is widely accepted that this process is a crucial step and parallel process in evolutionary progression for life creation. In this article, we try to overview these hypotheses.

RNA world is the most frequently reported and studied theory in which has invited many specialized books and lead to most critical arguments [13]. RNA world is the argument that RNA is prehistoric than any other genetic materials and RNA itself can originate primitive life. RNA world is the mainstream of present studies and understandings. The main argument of RNA world is the self-replication characteristics of RNA and an argument that the world life comes from RNA viruses. But more recently, there are increasing arguments of alternative RNA world. These hypotheses argue that other genetic or biomolecules such as small peptides might take part in genetic material information transfer in life origin [14].

New Deduction

In order to answer the question of RNA world or alternative RNA

world, let us go one step further. Let us make some logic deduction first. We need first to answer the question of genetic material replication and life; which comes first and what is life? Genetic material replication and life, which comes first? This question likes the dilemma as a "chicken and egg problem". There is no definite answer but we can deduce they might occur at same timescale. The second question is what is life? We must first understand the meanings of "life". There are many detailed papers to discuss "life" [15]. Since life is so complicated, a form that contains not only genetic materials replication, but also cell membranes (material isolation) and sugars (energy donor) for keeping cells alive, it seems a little naive to think only one material (RNA or proteins) can originate life. RNA world argument seems unconvincing and meet our challenge now. Since there might be a lot of materials, such as proteins, lipids, sugars at the time of RNA presence, we further deduce that more than one material might take part in life origin instead of RNA or protein alone. Is this deduction logical? [16-17] we are doing new systematic studies now.

New Cooperative Model

Here, we provide a cooperative model to explain the first genetic replication system establishment. Since we presently cannot root out any possibilities of genetic materials, such as pro-DNA, DNA, pro-RNA, polymers or protein occurred in the stage of life origin. We may hypothesize that there might be pro-DNA, pro-RNA and pro-peptide polymers coexistence in prebiotic broths at the stage of early genetic information duplication by natural non-life form replication systems [18-24]. So there is no such a question of which single genetic material can fulfill this process alone. However, these polymers cooperatively and competitively reproduce genetic information. We have this hypothesis by finding many reports that materials promoting genetic replication such as ribosome are a mixture of RNA and proteins. And we think the genetic information duplication is a complex process and might be fulfilled by more than one type of materials. It is the cooperative model of action in producing the first life. So, according to our deduction, among all three genetic-carrying materials presently existing, RNA, owing to its characteristics of competitive advantages, might be a possible media of initial genetic information reproducible

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in the life-origin on Earth. But all the other materials, like today's life form, also take part in life origin process—from the melting pot of all genetic materials

Competing Among Genetic Materials

Since we believe there are almost most genetic materials in the time of life origin, can we further think the competitive status of these genetic materials? Considering the quickest producing characteristics of RNA, the unstable and short generation times of RNA make them the fittest vehicle of normal mutations for evolutionary reasons. Not only can RNA be genetically copied into either DNA or peptide, but the shortest generation time of RNA make them the competitive advantageous than DNA and peptide to play workable roles in evolution of genetic systems on the Earth. Until now, RNA family represents the largest varieties of sources of genetic materials in the sea of the Earth nowadays which is most similar to the conditions of prehistoric times[25]. So, according to our perspective, although RNA is the mostly well-regarded original informational carrier in the secondary evolutionary stages (genetic information originating stage) of life on Earth among all three genetic-carrying materials, presently no existing experimental approach has been used to verify these differences of genetic information copying and mutations. According to the golden law of evolution given by Charles Darwin-survival of the fittest, the fastest duplicative speed of RNA may be a driving-force for important role of RNA may take important roles in these genetic materials and in life-origin but not alone.

In the future, it is deserved to find out how these genetic materials cooperate with each other to replicate themselves. Are these processes enzyme participations or more primitive? How do these processes evolve with times? All this kind of questions remains to be elucidated.

Conclusion

Since we deduced that genetic material duplication system happened in the similar stage of life origin, we suggest a new cooperative genetic material model that a number of genetic material worked cooperatively in life origin of primitive earth because only some complicated form of genetic materials can sustain a life survival and proliferations. Even though RNA plays an important role in life origin, it cannot form life alone.

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