

Life Origin on Earth, Insights among Different Arguments

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Abstract

The enigma of life origination on Earth is an open question for biomedical scientists. Apart from derivative arguments from Darwin's theory (gradual evolution), some other evolutionary hypotheses have been established—including the evolutionary step of genetic information duplication from prebiotic broths, outsider living-form landing, from volcanic eruption in deeper sea and cooperative biological origin hypothesis and so on. In this editorial article, we discuss the advantages and limitations of different types of life-origin hypotheses and proposed crucial steps in evolutionary progression of life origin on Earth. The major objective of this editorial is to elucidate the different characters of many existing hypotheses.

Introduction

The enigma of life origination on Earth is an open question for biomedical scientists [1,2]. Apart from derivative arguments from Darwin's theory (gradual evolution), some other evolutionary hypotheses have been established—including the evolutionary step of genetic information duplication from prebiotic broths, outsider living-form landing, from volcanic eruption in deeper sea and cooperative biological origin hypothesis and so on. In order to serve wider people, a short editorial is given.

Current Popular Hypotheses

Current popular hypotheses of life origin on Earth are divided as:

1. RNA world hypothesis [3,4];
2. Volcanic eruptions under deep sea hypothesis [5,6];
3. Meteoroid or alien landing hypothesis [6];
4. Cooperative biologic models [7,8];
5. Motility at the origin of life [9] and so on.

RNA world hypothesis

Greatly influenced by Darwin's book, the majority topics in life origin is the RNA-world evolution model that utilize models of gradual evolution by natural selection (Dr Ogel, UK) [3,4]. After the formation of this RNA world hypothesis, the experimental data showed that pro-RNA and/or pro-peptide can be synthesized in environmental conditions of early earth [10-12]. Its synthetic processes are somewhat like PCR (polymerase chain reaction) of biochemical studies in current biotechnical utilities.

There are different types of DNA-, RNA- and protein-originated evolution hypotheses regarding the first genetic information being duplicated. There are a lot of experimental data can be used to support two possibilities of genetic material duplication [10-12]. For example, we simulate genetic information duplication processes in lab conditions (Figure 1).

But this likes "chicken-or-the-egg" dilemma concerning from which genetic polymer comes first and we cannot tell in sure which topic is the right answer. Since 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 in evolutionary progression in life creation. This hypothesis discusses one of the crucial

factors for evolution, formation rate or turn-over speeds of different genetic materials (DNA, RNA and protein), to further suggest an important role RNA may play in life origin on Earth [3,4].

Organic compound origin and synthesis deriving from volcanic eruptions in deep sea

Organic compound origin and synthesis deriving from volcanic eruptions in deep sea was hypothesized by Dr. Wächtershäuser (Germany) [5,6]. This hypothesis exists quite long but has less experimental work supporting owing to limitations of current technical advancements.

Meteoroid or alien landing hypothesis

Meteoroid or alien landing hypothesis is one of the most possibility arguments. Though widely neglected by critics, we still think it is one of the most feasible arguments worldwide until now. It is reliant on belief or science [13,14]. This argument needs long time to debate.

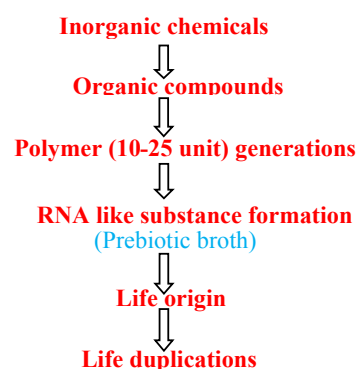


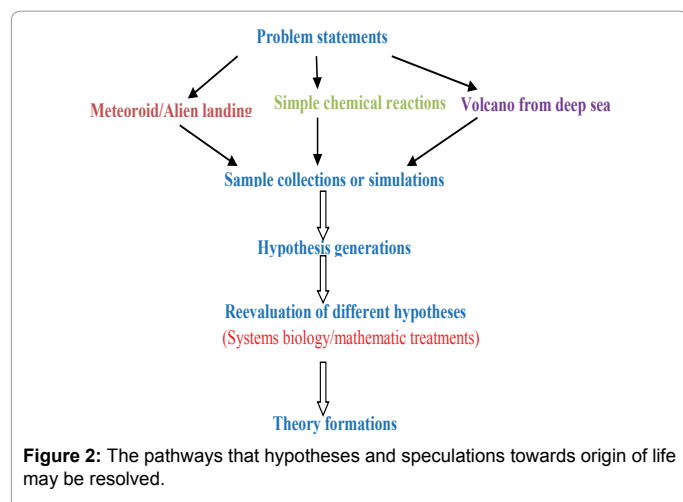
Figure 1: Schematic diagram of life origin and duplications by RNA world hypothesis.

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Others

Beside these three arguments, other new hypotheses still need to be evaluated [7-10]. We do not want to reiterate them here owing to space/time restraints.

Discussion

Different findings and arguments support each form of life-evolution theories while they are still reliant on solid experimental data and/or natural clues. There are a lot of experimental data can be used to support these possibilities. Some key-processes such as the matter of speed and a step of stability speak personally. We need some wider visions (Figure 2).

Future Direction

Now, we begin to believe that all three genetic materials can be simultaneously present at the era of genetic information duplication [7,8]. We made this conclusion by finding arguments that materials of genetic replication such as ribosome are a mixture of RNA, proteins and many others. It is possible two, three genetic materials, cell membrane, different energy donors and others cooperatively duplicate themselves right at its beginning [7,8]. For different modalities of life-origin, every reader will give his own verdict. This is an open question now.

Conclusion

Life origin on earth is unknown to us. This editorial gives our visions to this matter. Certainly, besides biologists, mathematical/physics-majored scientists are also very useful to take parts these researches and finally offer their contributions [15-18]. Let's decide which answer is right as early as possible.

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