LOH-Hypothesis and MRH-Hypothesis: the resume of the twelve-year development

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Abstract
The present state of the LOH- and MRH-hypotheses of living matter origination and reproduction is given.

1. Introduction
The question on the boundary between living and inanimate (mineral) matters was considered by us in [1]. In our terminology, DNA and RNA are the simplest forms of the precellular living matter, while N-bases, riboses, nucleosides, and nucleotides are the living-matter simplest elements (LMSE). When formulating the Life Origination Hydrate Hypothesis (LOH-Hypothesis) and Mitosis and Replication Hydrate Hypothesis (MRH-Hypothesis), we proceeded from the understanding that the chemical processes that underlie living matter origination and its extended reproduction are thermodynamically conditioned, natural, and inevitable and are governed by similar physical and chemical laws. On this basis, we developed the notions on the mechanisms of living matter origination and reproduction in parallel.

2. Present state of the hypotheses
The hydrate (clathrate) mechanisms for the mitosis and binary fission and for the living matter origination were first proposed and grounded in [2, 3] (the term “MRH-Hypothesis” was introduced in [4]) and in [1] (the term “LOH-Hypothesis” was introduced in [1]), respectively. In [1], in the framework of the LOH-Hypothesis, a first realistic explanation for the DNA monochirality was given. The LOH-Hypothesis and MRH-Hypothesis were developed and published in [8]-[18] and [7, 9], respectively, and presented orally at the conferences [19]. According to the LOH-Hypothesis, LMSEs, DNA and RNA molecules, amino-acids and protocells originated repeatedly from CH₄, niter, and phosphates under the planet crust surface or seabed within the crystal cavities of the honeycomb CH₄-hydrate structure; the chemical processes passed slowly through all successive chemical steps in the direction of gradual decreasing in the Gibbs free energy of reacting systems. The LOH Hypothesis allows for answering the following questions. (1) In what phase did the LMSEs form? (2) From what substances did the LMSEs form? (3) By what mechanism did the N-bases, riboses, and nucleosides form? (4) Is Nature capable of synthesizing LMSEs from minerals with no external energy? (5) How had methane hydrate originated? (6) How had CH₄ and NO₃ met together? (7) Why no substance but NO₃ reacted with CH₄-hydrate? (8) How did DNA- and RNA-like molecules form from nucleosides? (9) Is there a relation between DNA and RNA formation, on the one hand, and the atmosphere composition, on the other hand? (10) Why do only five chemical elements usually enter the DNA and RNA composition? (11) Why are N-bases entering DNA and RNA similar in their composition and structure? (12) Why are N-bases and riboses limited in size? (13) Why are N-bases not identical? (14) Why do only five N-bases usually enter the DNA and RNA composition and why do other N-bases, such as xanthine, sometimes enter the DNA and RNA compositions? (15) Could D-ribose (DR), desoxy-D-ribose (DDR), thymine and uracil exist simultaneously in a reaction mixture containing CH₄ and niter? (16) How had it happened that the sequences of N-bases in DNA and RNA molecules are not random? (17) Why did Nature choose DR and DDR, but not their L-enantiomers or mixtures of enantiomers for DNA and RNA syntheses? (18) How did protocells originate?

The LOH-hypothesis is supported with numerous thermodynamic calculations; a number of field observations and C. Menor-Salvan’s experiments count in its favour (see Refs. in [9]). It attracts interest of researchers. For example, Prof. H. Seligmann, the scientific editor of the book [7], wrote the following opinion in its preface about our Chapter: “This most interesting hypothesis develops a concept that escapes conceptions established through the force of habit, which frequently result in dominant, yet unproven intuitive truths. This hypothesis will doubtlessly produce new deep insights into every level of DNA associated processes, and probably also
general cell physiology, if given the deserved consideration and further developed.”

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References


