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Physical Processes are the Basis for the Origin and Development of Life on Earth

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Abstract

When we talk about the evolution of life, we generally assume that we are looking at the evolution of primitive single-celled organisms such as bacteria and algae. But these first living creatures that we can perceive are by no means primitive; they are already highly differentiated living creatures with all the criteria and abilities that correspond to our definitions of life. There is a temporal and scientific gap between the interterritorial prebiotic molecules and the early complex life forms mentioned above. The development of prebiotic molecules into life forms must have a cause. It seems obvious that physical forces had an influence on the primordial molecules, which played a decisive role under the conditions of a cooling earth. This functional "symbiosis" made the evolution of life on earth possible. An attempt will therefore be made to describe the principles of development and their interrelationships based on the current state of knowledge in physics and to focus biological research on this.

Keywords: Conditions of life, Early life forms, Physical chemical evolution

Introduction

The development of organic matter is connected with cosmological processes of the creation of matter as a whole from the energetic change after the Big Bang to atoms and molecules [1,9,11]. It must therefore be stated from the outset that energetic processes are the basic prerequisite for morphological formations and processes. In this context, the statement by W. Heisenberg "Energy controls matter" is fundamental.

A chemical reaction is energy dependent. Energy is the basis of the processes. With regard to the origin and development of life on earth, it seems necessary to take a closer look at the physical factors that play a role in these processes. There is currently a tendency to analyze the structural development of biological matter. The physical conditions of the processes, however, are the basis. It is therefore important to present explicit considerations in order to demonstrate this fundamental importance. The examination of the current basic prerequisites for the origin of life on earth should show that physical processes are the basis in biological systems and have largely been retained even in highly developed biological systems. It must be understood that this way of thinking must be taken into account and used in a very special way in the increasing specialization trend in applied science.

Discussion

Humanity's thirst for knowledge about the environment has always driven people, at least since ancient times. Science developed to clarify the relationships in the objective world. One of these questions is directed at the origin of life on earth. How did this development come about? How did it happen? Since the mid-modern era, these questions have occupied scientists such as Jean-Baptiste Lamarck, Lorenz Oken, Georges Louis Leclerc, Comte de Buffon and even Charles Darwin with his theory of evolution. Interpretations based on Mach's principle on the origin and function of the cosmos [6] are also widespread and much discussed. But the cosmos is not a rigid structure; it is subject to constant change, in which the initial conglomeration of atoms led to primordial molecules. These find-

ings are moving philosophical thinking further away from causal interpretations of the evolution of biological matter. This is because there is a real reality characterized by scientific phenomena with the simplest causes. Natural laws describe the world of quanta, impulses and structures. The last few centuries have also been characterized by outstanding discoveries in the fields of natural sciences such as biology, chemistry and physics.

The question of the origin and development of life is one of the central scientific focuses. The emergence of life from inorganic and organic substances began in the Hadean, the first part of the Precambrian period, about 4 billion years ago. The question of whether simple compounds originally formed extra terrestrially or terrestrially must remain unanswered. However, certain elements such as carbon, nitrogen and others and water can be named as determining factors in this development process.

It is assumed that in the first step, the formation of simple molecules through the energetic atomic structure led to the formation of organic compounds. In the further development of these molecules, higher-order structures were formed, so that in a second step, complex organic molecules were formed from these simple structures. These subsequently became the basic building blocks of cells, cell associations and biological systems [12,13]. In the context of further consideration, it appears necessary to separate the development processes of inorganic and organic matter. The properties and physical conditions are too divergent.

Currently, considerations about the origin of life are summarized under the term chemical evolution, within which molecular structures develop in highly differentiated forms and correspond to the definition of life [7]. The focus here is on spontaneous structure formation through autocatalysis. The chemical composition of the atmosphere, hydrosphere and lithosphere at that time as an expression of the climatic conditions are the basis of the considerations.

But a chemical reaction is a process in which several reactants come into contact with one another and in which energy is required or released. A description of the processes must be treated separately and according to certain criteria:

1) Atomic or molecular physical reactions,
2) According to the atomic structure,
3) Environmental factors such as the magnetic field and
4) Properties of the water.

It has been proven that the high-energy conditions immediately after the Big Bang led to the development of molecules as the building blocks of our everyday world today. After the Big Bang 13.7 billion years ago, quarks and gluons moved freely in a quark-gluon plasma in the very first phase of the universe. After a phase transition, hadrons formed and thus the building blocks of atomic nuclei - protons and neutrons. Thus, atoms were created in the early days of the universe and continued to develop and differentiate with the dynamics of cosmic events.

The differentiated physical conditions within the structure of atoms and subsequently of molecules determine their properties. Chemical evolution attempts to describe the formation of organic molecules from inorganic material through the action of energy. It must be remembered that over billions of years the cooling of the earth led to the formation of continents and oceans, so that complex compounds were formed from the first elements such as carbon, nitrogen and hydrogen, which enabled the formation of the first simple organic compounds.

What energetic, physical and structural conditions underlie an atom? The nucleus of an atom consists of one or more protons, which are positively charged hadrons and are classified as baryons, and neutrons and electrons as atomic shells with a negative charge. Electrons are structureless energy condensations, as defined by Paul Dirac. From a chemical point of view, all properties and interactions are essentially based on these elementary particles. The interactions of electrons lead to physical properties such as electricity, electromagnetism and electromagnetic radiation, important characteristics for life forms.

Magnetism is a physical basis for the biology of life. It is caused by the spin of electrons. The spin of a particle is a quantum mechanical property. It is explained by the torque of an electron around its own axis. Depending on the direction and speed of rotation, the particle has a certain value. With a positive or negative sign, it characterizes the atomic and molecular energies and structural properties of organic matter. In this respect, its value appears quantized. The spin is linked to a magnetic moment. This means that a magnetic field surrounds every particle with a spin.

Under the influence of the earth's magnetic field, an energy transmission to organic molecules takes place, which is made possible by the quantum mechanical system. This energy can be explained as a resonance energy with effect on the molecules. It leads to molecular vibrations. The oscillating electromagnetic field thus induces oscillating electrical dipole moments, which become a resonance condition. This is how energy is absorbed in the system. Periotic foreign excitement can compensate for energy losses of a system through constant energy intake. And so all molecular interactions are controlled, the biochemical processes and physiological reactions. The energy transfer determines the entire self-contained regulation system via the response in the sense of feedback regulation. Therefore, magnetic fields are the basic requirement for life on earth. Because the energetic dynamics of the molecules in turn determine their physical and biological reaction.

As mentioned above, it is assumed that interstellar matter contains elements that form organic molecules in an apparent state of equilibrium. Under the conditions of space, atoms such as hydrogen, carbon, nitrogen and others first lead to the formation of these molecules. The formation of these molecules is discussed in research using various mechanisms, but they are due to a system of chaotic distribution. The dynamics of space are influenced by gravity, because of which organic molecules came to Earth. These prebiotic compounds were thus the basis for the development of complex molecules.

According to considerations in chaos research [8], there is the potential possibility of a system behaving chaotically to its advan-

tage. Through targeted perturbations, different periotic movements can be controlled and stabilized in the chaotic area. In this sense, living nature uses these regulation mechanisms to be able to react to changing conditions.

The structures of matter form from the properties of the atom. Reaction cycles of Chemistry are explained by means of valence structural theory. In terms of this legal atom, the carbon atom as a basic building block is of central importance. Due to its special electron configuration, it has the ability to form complex molecules. The formation of chains and ring 6-shaped structures is possible via covalent bonds. The chains can enter into cyclical networking and form branches [14]. Van-der Waals forces work between non-polar carbon chains, which lead to induced dipoles, with weak binding intensities. Overall, carbon atoms have the most extensive variety of chemical compounds. Organic compounds create organic compounds from the inclusion of elements such as nitrogen, phosphorus, oxygen and other atoms. This gives the possibility that organic molecules could also form in the interior terrestrial space. With the contact of this molecules to the terrestrial area, the development could begin.

The extraterrestrial first organic molecules were lost with contact with water on earth, which led to the further development of these molecules in the direction of chemical evolution. The physical properties and the changeability of the carbon structures in contact with water and other elements form the basis of the development of prebiotic molecules at biological levels and ultimately evolutionary to the complex biological matter. According to research by Hamed Gamalaldien and his team [3,5] based on the analysis of oxygen isotopes of zircon crystals in ancient rocks it can be assumed that a water cycle of fresh water, cloud formation and precipitation existed 500 million years earlier than previously thought. This also means that interterritorial molecules that came to Earth were very quickly exposed to the physical properties and conditions of water.

The structural properties of the molecules of the water are diverse. There is a special feature in contact with biological matter, which is called matter with hydrophilic, highly changing matter. This leads to different loads in the contact zones and the separation of the loads compared to ambient water. The interpretation is scientifically discussed. One assumes the theoretical assumption of an electrically charged double layer [15]. This zone is referred to as the exclusion zone (EZ), a term formulation that refers to the Australian J. Watterson and was examined in detail by *G. H. Pollack* [10]. This EZ stores and emits electromagnetic radiation and thus leads energy to the system [4]. This keeps the dynamics of the energetic processes going. In this sense, it is conceivable that this effect on early organic molecules had an energetic influence.

In everyday terms, the formation of hydrogen molecules via hydrogen bonds is weak according to Jeffrey's classification at <17 kJmol and can be represented as O-H... O. In other words, a hydrogen bond exists when two functional groups interact via hydrogen atoms. This means that a covalently bonded hydrogen atom can be bound to a free electron pair of another atom. These resulting structural formations can give rise to extended physical properties with regard to water molecules. Cluster formations as a spatial structure show a stable structure. They have a higher bond strength, which seems to be associated with vibrational states [2]. Hydrogen bonding is therefore a basis for the further development of biological molecules and their diversity up to complex, highly specialized systems.

Hydrogen bonding is therefore a basis for the further development of biological molecules and their diversity up to complex, highly specialized systems. Biological systems can absorb electromagnetic energy via their electrons using photons or from outside. This electromagnetic energy means resonance energy, energy that results from the amplitude and frequency of the surrounding electromagnetic field. This energetic effect affects the spin of the molecules, so that the dynamics of the structure are stimulated.

As can be seen, the physical conditions for all steps in the formation and development of biological systems are the basis of the dynamics. Just as in the fundamental first processes of organic matter formation, these physical control processes also prove to be basic processes in highly developed systems. These physical conditions made chemical evolution possible. They are equally the basis of all biochemical processes and the physiology of today's highly complex biological phenomena and thus a prerequisite for life on earth.

Current research in the field of chemical evolution is focused on the first early bacteria and their evolutionary development. But these early life forms are already highly developed systems with all the properties that correspond to the definition of life. In order to bridge the gap between the first biological molecules and the highly developed life forms mentioned above, the importance of light and temperature will be discussed.

It is obvious that biochemical reactions only became possible when the temperature on Earth dropped. Based on the current temperature ranges within which life on Earth is observed, one can assume that these conditions could have been comparable to those of the prebiotic phase. It therefore seems necessary to analyze the significance of electromagnetic radiation separately. Electromagnetic radiation is characterized by a dualistic nature. The corpuscular nature is represented by photons. Their influence as energy potential, like the mechanism of the EZ of water mentioned above, affects the energy status of the electrons and thus affects the sphere of action of the molecules.

The wave nature of electromagnetic radiation, which is defined according to quantum mechanical laws, is limited to the wave ranges between infrared and ultraviolet in the terrestrial environment with a temperate climate. One could imagine that these parts of the light could initially have little significance for prebiotic or early organic molecules. Only the development of systems and metabolic forms reveals a useful influence, as is evident, for example, in the context of photosynthesis. The development of life on earth corresponds to a continuity of physical influences. The fundamental influence of physical forces is always present. Living matter is con-

trolled and maintained by energies. Physical forces maintain the energy and dynamics in the molecular area, metabolic processes of highly developed living beings form and maintain the viability of their systems.

Conclusion

Organic matter was formed from atoms and molecules in interterritorial space. Prebiotic molecules developed, favored among other things by the special physical properties of the carbon atom. After these structures, which could be detected in space, met water on earth, further development took place. Taking the energetic conditions into account, one can therefore deduce the development of prebiotic molecules into the first complex structures and, as a result, early biological systems. The basis for this must be seen as the low-energy conditions that existed throughout evolution. In conclusion, from the initial conditions, one must state that the viability of any biological nature depends on these physical conditions and shaped the evolutionary processes. Without this interaction, terrestrial life is not possible. The high-energy influences that have been discussed in many considerations, such as high-energy electrical activities and the associated intensive electromagnetic fields, appear unreal, as they have a destructive effect on biological structures. Biological matter and its complex structures only exist in a certain resonance space from which they gain energy and control their molecular dynamics.

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