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Research Article

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Resonance as a Basic Phenomenon in the Formation and Regulation of Organic Matter

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Abstract

With the subject-specific separation of physical chemistry from physiology, the step towards emphasizing energetic processes in biological coerces was taken. Nevertheless, the morphological consideration of their processes is still largely in the foreground. But you have to realize that these energetic processes are the basis of life. The physical facts of the laws of nature are the basis and must also be the basis of scientific consideration. If one follows the development of life and all its forms of life back to the physical foundations on the basis of today's scientific analyses, conclusions emerge that expand our knowledge. A form of regulation of life processes, the resonance, will have to be discussed. Despite the relevant knowledge in physics and chemistry, considerations on this are not always common knowledge. Quantum mechanical perspectives are required in order to be able to penetrate deeper into the processes of origin of life.

Introduction

The striving to understand the environment, to use it, is an ancient striving of mankind. It has occupied mankind since archaic times. With the development of defined approaches and methods, this effort led to an increasing understanding of the interpretation of the relationships. And even today, an army of scientists is trying to get deeper insights.

In this sense, philosophy, like the natural sciences, plays a mutually complementary role. Thoughts Alexander von Weizsäcker on Kant's philosophy stated, for example, that causality is not an assertion, but means the prerequisite for perceptibility. And this becomes understandable through quantum mechanics and only points to the limits of instantaneous perception. Understanding with the knowledge of the moment is the task.

If you look at the development of scientific explanations, you will find a development like a cascade of knowledge that gained a special boost in the 19th century with Darwin's theory of evolution. Further milestones followed. In 1865 Gregor Mendel defined Mendel's laws named after him, Eduard Stasburger, Oscar Hertwig and Albert von Kolliker recognized the cell nucleus as the carrier of genetic information in the period from 1884 to 1888. Theodor Heinrich Boveri founded the chromosome theory in 1903 and in 1910 Thomas Hunt Morgan discovered the position of various genes on the chromosomes. James Watson and Francis Crick determined the double helix structure of DNA in 1953. And at the same time, quantum mechanics was developed as a physical theory to explain the properties and laws of states and processes of matter. It began in 1900 with Max Planck's thoughts on the so-called quantum theory and was developed in the first half of the 20th century by Werner Heisenberg, Erwin Schödinger, Max Bern, Pascual Jordan, Wolfgang Pauli and many others as well as by Paul Dirac in connection with the special theory of relativity Albert Einsteins on the basis of today's explanations and findings.

Discussion

If one analyzes the function of biological matter from the point of view of physics based on current knowledge, one has to deal with the meaning of magnetism, that effect of magnetic fields on matter that either reacts to these fields in a certain way or develops magnetic fields themselves. The vibration behavior, the resonance, represents the basic properties.

Resonance means an energetic fluctuation. The energy levels of a system are tuned to the frequency of a monochromatic radiation. The strong absorption of radiation that occurs when the resonance conditions are met is registered. Instead of the oscillation at a constant frequency, one considers the resonance of a certain energy, which corresponds to the difference in energy between the two excited states of the system. In atomic and molecular physics one speaks of resonance when the energy of a photon is absorbed. The process is called resonance absorption. The electron falls back from the excited state to the ground state. The resonant frequency of a magnetic nucleus is influenced by its electronic environment and other magnetic nuclei in the molecule. It has been proven that electrons have spin. Therefore, many nuclei possess spin angular momentum. Orbital and spin angular momentum are associated with a magnetic moment. The energy of a magnetic field μ in a magnetic field B is calculated as the scalar product $E=\mu \cdot B$. The different energies of electrons in a magnetic field, which result from the interaction with external fields, are represented in the vector model in such a way that

they process.

The magnetic moments of the nuclei sense the local magnetic field at their location. The local field can differ from the applied field, since this induces an electronic orbital angular momentum. This creates a small additional magnetic field at the cores. In doing so, different valences of the processes are registered, which are also important in the interpretation of clinical reactions: the chemical shift as a local contribution, a molecular contribution and the solvent contribution. The local contribution is defined as the sum of a diamagnetic contribution and a paramagnetic contribution. The diamagnetic contribution opposes the external magnetic field and shields the considered core. The paramagnetic contribution strengthens the external magnetic field and deshields the nucleus under consideration. The molecular contribution arises from induced currents in neighboring molecules. The applied field induces a current in the electron distribution of the neighboring group and thereby induces a magnetic moment whose magnitude is proportional to the field strength of the applied field, the so-called magnetic susceptibility.

As already described, the resonance frequency of a magnetic nucleus is influenced by its electronic environment and other magnetic nuclei in the molecule. Applied to chemical bonding processes, Pauling means that the energy of electron pair bonding is mainly resonance energy attributable to the exchange of the two electrons between the atomic orbitals [7]. An important rule of resonance states that only boundary structures with the same number of unpaired electrons can resonate with each other. As a rule, for covalent bonds, this means that an atom can form an electron pair bond with any of its stable orbitals. One such bond is found in the hydrogen molecule. It owes its stability to resonance. Two electrons with antiparallel spin and one stable orbital each in the connected orbital are required for an electron pair bond.

The energy of bonding dissimilar atoms is greater than the energy of a normal covalent bond between those atoms. In the limit, when the two atoms do not differ in their properties, the binding energy is equal to the energy of the covalent bond. The additional binding energy is due to the ionic character of the bond. The energy of the resonance between the ionic and covalent boundary structure, the ionic resonance energy, is added to the energy of the covalent bond.

This behavior describes the resonance theory proposed by Theodor Foerster in 1948, a structural theory in which the description of the chemical bond or the behavior of the covalent bond becomes understandable, since it is about the exchange of two electrons with opposite spins of two atoms. Resonance means an energetic fluctuation. The resonance brings stability.

In molecular physics one speaks of resonance when the energy of a photon is absorbed. This process is called resonance absorption. The electron falls back from the excited state to the ground state. In doing so, medically intracellular signal cascades are activated, which then lead to perceptual performance. From this it can be deduced that resonance has a fundamental function as a control system. The importance and dynamics that photons have in the physiology of the cell is evident in the germination phase of plant seeds [2].

Research speaks of a chemical evolution. It presents the hypothesis of the formation of organic molecules from inorganic material in the Hadean between the formation of the earth 4.6 billion years ago and the emergence of life on earth, the beginning of biological evolution between 4.2 and 3.8 billion years The core of the hypothesis is found in the knowledge that the first biological compounds and prebiotic molecules must have come from inorganic materials through the influence of energy. In the energetically highly turbulent phase, one can expect that in the chaos of energetic turbulence, according to the laws of chaos, contacts of the early atoms and primordial molecules occurred, which led to the formation of ever larger and more differentiated molecules [1]. The RNA world hypothesis assumes that so-called ribocytes emerged as primitive hypothetical precursors of today's forms of life, which are based on RNA and represent a central component of the hypothesis [5, 8]. They, it seems, were capable of replication and translation of their "genetic information" with regard to a primitive metabolism. In fact, if one follows the reasoning of Paul Nurse, who defined five characteristics for the prerequisites of life, then one has to consolidate the definition with the facts of the cell as the atom of biology, the gene, natural selection, since life consists of Understanding chemistry after order out of chaos and life as an information system for today's understanding [6]. But as the statement that life and chemistry evolve out of chaos already implies, there is a knowledge gap between the originally formed and evolved from chaotic states first molecules as the basis of organic materials and the definition of ribocytes. But it seems very likely that the Earth became a habitable zone because of water accumulation [3]. Water and energy, whether they are to be defined as magnetic, thermal or gravitational forms, form a unit and are therefore the prerequisite for the development of life forms. And so, they are also the conditions of life in general, from which one cannot free oneself.

One has to come back to resonance and its importance. Just as the resonance theory states as a structure theory, the resonance energy determines the physical, chemical and biochemical processes and is also the basis of regulatory physiological processes. Thus, resonance has the meaning of a lawful regulation as the basis of life.

Nevertheless, the question arises, how did the first organic compounds form? Were they processes that were driven from outside, such as by energy turbulence in the chaotic primordial atmosphere, or were they autocatalytic processes? If one refers to the research project LUCA (Last Universal Common Ancestor), one comes to the conclusion that the primordial cell must have obtained its energy primarily from hydrogen. This is also conclusive with regard to the further development phases of life on earth and is confirmed by observations of biological processes that are still ongoing today. But this explanation still contains an ambiguity, because one postulates a primordial cell. But a cell is a complex structure that had to evolve. But that also means that there are basically chemical energy- controlled processes, both

on earth and extraterrestrial, which can lead to the development of organic matter and thus to forms of life. In this sense, one condition seems indispensable and at the same time limits the localization of the processes: the presence of water. It is obvious that the processes took place in the terrestrial realm. The observation seems to be that water in space is predominantly amorphous water. In this state, amorphous water has lost its character as a liquid and must therefore be recycled thermally, thereby limiting the probability of the development of organic matter to habitable zones. However, water also means that hydrogen must be present as an indispensable prerequisite.

In order to classify the importance of the quantum mechanical properties of the hydrogen atom in the process of formation of the first organic molecules, one has to come back to the concept of the wave function. The wave function of an electron in the ground state of a hydrogen atom is a basic element in the explanation of organic bonds. When two atoms are bonded, the electron of one atom behaves in such a way that its spin pairs with the electron of another atom. With the interpretation according to the valence theory, the spin pairing makes it possible for properties and reactions, especially of organic compounds, to be explained. Using the example of the hydrogen molecules, it means that the electrons are between the two atoms and hold them together. According to quantum mechanics, the wave functions interfere constructively. This pairing of the spins allows for a low energy wave function.

Under the condition of the time-independent Schrodinger equation, the energy is the energy of the system. The Schrodinger equation thus becomes an eigenvalue equation with the energy as the eigenvalue and the wave function as the eigenfunction. In this form, the equation for calculating the energy eigenvalues serves as an abstract mathematical atomic model related to hydrogen atoms.

And that brings us back to the physical conditions and forms of bonding that result from the importance of water. In any case, one can assume that the primordial cell or the highly developed cells of today's life drew and still draw their energy from the dynamics of hydrogen.

It is conceivable that various simple molecules such as methane, ammonia and others formed in the conglomerate of the early earth's atmosphere, as well as simple forms as precursors of amino acids. This development is described by Erwin Schodinger as a form of real order to which all physical and chemical laws that take place in an organism are subject. Every kind of law and order is based on the uninterrupted thermal movement of the atoms. Schrodinger finds the explanation in the statistical movement of heat. The regularity of order in biological systems is unparalleled in inanimate nature. It is regulated by a small, highly ordered group of atoms. This means creating an order that prevents decay into atomic chaos. Order out of disorder is the principle according to which nature proceeds and which makes the main line of natural processes, especially irreversibility, understandable. It is the principle of quantum theory.

This is how hydrogen and other early elements such as carbon, nitrogen, phosphorus and others become molecular precursors of biological matter. However, this also involves physical binding forces. And this basic behavior developed in early evolution has been preserved since it is the basis of biological matter.

The properties of water are fundamental to life on earth. The physical, chemical, electrical and optical properties are based on the structure of the water molecules and the resulting interactions between the water molecules. The basis for this is hydrogen. Hydrogen is weakly diamagnetic. It is therefore capable of resonance. The hydrogen atom consists of a positively charged nucleus and a negative electron that is bound to the nucleus via the Colomb interaction. Resonance energy transfer occurs when an oscillating electric field of incident electromagnetic radiation induces an oscillating electromagnetic dipole moment. Under conditions of resonance, the energy is transferred. Via the hydrogen bridge as an electrostatically attractive force between two molecules, water is transformed into structural formations with special physical properties. Although these bonds are only weak compared to the bond within a molecule and are therefore volatile, the linking of water molecules via hydrogen bonds into clusters enables three-dimensional linking. Thus, in the presence of biological matter, the water becomes, among other things, an energy reserve which, by absorbing electromagnetic radiation and releasing this energy component via the emission of protons, triggers a process that influences the biological material. This reaction at interfaces, the observation going back to John Watterson and Gerald H. Pollack, the processes described as an ordered structure in the structure as an exclusion zone, could also have played a role in the earliest stages of development of biological matter [8].

Thus, biological matter could form, starting from simple molecules, through precursors of amino acids, to more sophisticated forms. As already described, a fundamental role is played by the hydrogen bridges, which with the energetic physical force made possible the formation of ever more complex connections and played a special role in the formation of genetic substrates [9]. This is how cells may have come into being, which also developed further on their own through symbiotic bonds. And symbioses are the driving forces of evolution, which always have repercussions on the genome. An example of this is the assimilation of mitochondria, which according to current knowledge were originally independent structures and are the energy motor of cells in today's cell tissue.

The basis of the emergence of biological matter and thus particularly geared to the development of life on earth are subtle processes within which physical relationships and laws are the basis, in which resonance, in the definition of resonance energy, is essential. Resonance means energetic fluctuation. In its mathematical-physical detailed abstraction, resonance is the dynamic of life.

Conclusion

The origin of life is the result of astrophysical processes and their development. With the emergence of the first atoms and

simple molecules, including possible precursors of amino- acids, a basis was formed that made possible the development of biological matter on the basis of chemical-physical laws. The energetically chaotic conditions of the early universe initiated the encounter and thus their contact with a material conglomeration. One might ask whether these first biological precursors can be traced back to processes in the interstellar space or only in a habitable zone that formed on early Earth. The fact remains, however, that further development was only possible through contact with water. The water with its physical-chemical properties and also its special properties as a three-dimensional structure are the prerequisites for further development; a development that is assigned to the habitable zone as a condition. The term must first be limited to the physical conditions typical of the earth. Resonance-energetic reactions play a role as a basis, as well as bonding- typical prerequisites that can be assigned to the hydrogen molecule, which serve the structure and at the same time the function. A special form of molecular bonding is the hydrogen bond. This process of development from simple molecules to complex forms goes a long way. But the physical processes and their mutual influence were and remain the basis of biological physiology. One can state that resonance is the basis of life. Relevant dynamic interpretations of laws and factors of physics determine the processes. In this sense, the statement by W. Heisenberg is complete: the energy determines the matter. Life is a mathematically and physically explainable process.

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