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REVIEW ARTICLE

Time, Temperature and Life

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ABSTRACT
The history of how ideas about life were formed is shown. It all started with primitive people and their beliefs. Since then, in the minds of people, illusory ideas gradually intertwined with ideas about the real world, overgrown with legends and myths, and then formed the basis of religious ideas about the origin of life, death and the afterlife. These ideas still live in the minds of many people on the planet today. However, in recent decades, new scientific data has been obtained that can radically change the idea of what life is. It is established that for living beings, time flows relative to their temperature: the biological clock can accelerate and slow down depending on the temperature of a living organism. At the same time, the temperature itself also has a relative value for "life". It turned out that at a "comfortable" temperature, "life" blooms like in Paradise, with a progressive increase in temperature, life loses its health, gets sick and dies like in hell, and when frozen, "life" is preserved indefinitely (preserved). In turn, "life" can be replicated, fragmented, and stored in molecular form and/or as a database, but only at a temperature that provides their comfortable storage. As the fifth measurement, it is proposed to consider the temperature.
***Key words: H**istory, religion, science, life, time, temperature, philosophy.*

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It is shown that temperature is worthy of the status of the fifth dimension, since temperature changes the length, width, height, volume, mass, specific gravity, aggregate state of living and inanimate objects, and the course of the biological clock, that is, time.

INTRODUCTION

Ideas about the origin and formation of life are still not fully formed [1]. Philosophers and scientists around the world are constantly trying to figure out what life is [2].
Let's look at the world history of the development of these ideas and modern factors that call into question the inviolability of previous theories about life, in order to try to guess the future modernization of the modern philosophy of life and death.
It all started in the age of primitive man. However, primitive man had very little true information about Nature and therefore did not understand and even feared it. Moreover, he deified Nature, and worshipped unknown divine forces. In this regard, the ideas of primitive people about life were born under the influence of beliefs. We must admit that for many centuries and millennia, these ideas have not undergone drastic changes. The proof of this is that much later, namely, in the middle ages, blind belief allowed the Holy Inquisition to provoke the belief of believers that the Earth is flat, not round. In addition, the Ministers of religion managed to preserve many other beliefs that support human behavior [3].In particular, this is how the basic ideas about the origin of life, about death, and about life after death were formed. It is no secret that these religious ideas about life and death still dominate the minds of the less

educated today. However, highly educated people tend to believe in facts that contradict religious ones, if they have a scientific basis. Therefore, despite the fact that educated people are aware of religious beliefs about life and death, the consciousness of this part of humanity is dominated by scientific ideas about the origin of life, about death and about life after death [3].

The first idea of the hierarchy of all life on our planet, which has come down to our days, was the idea formed by the ancient Greek philosopher Aristotle. Aristotle was the first researcher to systematically study biology. He suggested that the cause of everything that happens in Nature can be attributed to four different types of simultaneously acting factors: material, form, factors of living and inanimate nature as sources of change, and the ultimate cause of the existence of things (in the case of living beings - it is adaptation to a certain way of life). [4]Next, Aristotle suggested that all living things can be arranged on a step scale, starting from plants at the bottom and ending with people at the top.But for many hundreds of years after Aristotle, researchers of nature continued to modernize this Scala Naturae,adapting it to the hierarchical concept of the world on the model of the perfection of the deity: God is at the top, and on the lower levels are angels, people, animals, plants, and so on.[3]

Only after the scientific revolution gave new data about nature, it became possible to recognize other ideas as part of society, some of which were not recognized by the majority of society for some time. The most famous of these innovations were Linnaeus ' taxonomic system and Auguste Comte's hierarchy of Sciences (A.Comte 1842). In addition, at the end of the 20th century, the key concept in biology and its philosophy was the theory of "levels of organization" of all living things.

However, despite attempts at scientific understanding of this concept, there is still no consensus in the world of science about the nature and meaning of the concept of "levels of organization»[1]. The rapid progress of the life Sciences has led in recent decades to a radical transformation of ideas about what life is. The fact is that during this period, it was shown that "life" multiplies and fragments in molecular form and in the form of a database and can be embodied in anything from artificially created organisms to organs grown outside the body, to materials with bioprinting[5].

New ideas about life forms completely destroy the previous ideas about the boundaries between categories defined by culture, and raise completely new questions for the formation of ideas about the levels of organization of life. However, these scientific data are not the only ones and the last. It is surprising, but humanity has long been aware of factors whose role in the origin, maintenance and improvement of life (evolution) remains insufficiently studied and even ignored. In particular, the factors that have a significant impact on the organization of life and the evolution of all life on Earth and to which researchers have paid insufficient attention are time and temperature.

Based on personal experience of scientific research on the life and death of various biological objects (from bacteria, isolated mitochondria and grains of cereals to fish, frogs and warm-blooded animals), it is assumed that the inclusion of these factors in the analysis of empirical areas in which new life-death relationships are reinterpreted can help the progress of philosophy not only about life and death, but also about life after death and the immortality of the living.

RESULTS

Currently, there are several explanations of the origin of life, the development of species and being, as well as the possibility of life after death. Most of them are based on rational reflection, which combines the ideology of a person, as well as less rational practices and more emotional practices than generally feed what has been called "beliefs" orblind faith. [6].

However, in parallel with beliefs, there are scientific facts that are difficult to ignore today, not only for scientists, but also for believers. Among such data, **time** is a very important factor in influencing life.

Time is the fourth dimension. We all move in time in only one direction at a (fairly) fixed speed. The definition of time in the exact Sciences is considered from the point of view of fundamental interactions between atomic and subatomic particles at absolute zero. [7]This is important because the atomic behavior accelerates at a higher temperature. After all, temperature is a measure of the average kinetic motion of particles.[8]

It is shown that over time (over millions and thousands of years of the evolution of life on the planet) there has been a radical change in the environment surrounding humans and animals (ecology). Modern biological objects live in an environment that has changed significantly under the influence of human activity and differs from the one for which man was originally created by Nature and in which life has developed for thousands of years. In this regard, it is legitimate to say that a person was not created to exist in urban conditions, to work in factories and factories, to sit at desks and tables while studying in schools and universities, as well as to sit for many hours in front of a TV screen, computer and/or smartphone in an office space. At the same time, it was found that a significant change in the environment can very quickly change the life of living creatures. So, a vivid demonstration is the fact that female fruit flies (Drosophila) almost instantly turn on and off egg production in response to changes in the food supply[9].

Another important factor affecting life is temperature. It has been found that temperature changes the quality, physical, chemical, physico-chemical, and biochemical properties of chemical elements, materials, substances, and living objects. [10-12]For example, physicists have shown that increasing temperature reduces the lifetime of a polaron and the lifetime of a polaron increases with increasing radius. These data allowed us to propose a way to improve the quantum transition in the nanostructure by increasing its temperature.[13].

In classical chemistry, the most famous law is Arrhenius, which States that an increase in the temperature of the interaction medium by 10 °C increases the rate of chemical reactions by an average of 2 times. [14]

It is shown that organisms have adapted to the environment in the temperature range from 0 to +113 °C during evolution. [15]. In the most general form, the dependence of all living things on temperature in the specified temperature range is reduced to the following regularity: an increase in temperature increases the rate of reproduction and the intensity of metabolism of microorganisms, and there is a certain temperature range in which cells are most happy. That is why it is true to say that for living beings, time passes relative to body temperature. To prove this statement, the biochemical basis of this "biological time" is described and the biological theory of relativity (BTR) is formalized. In parallel with Einstein's special theory of relativity, the BTR describes how time flows through time frames, contrasting biological time in the temperature scale with more familiar (and constant) ones) "calendar" time measurements. This new view of the passage of time makes it possible to explain biological variability in the corresponding time scale in a new way and to explain the observed variations (both temperature-dependent and independent). In addition, the new theory allows you to make predictions about the time of biological phenomena and even manipulate the biological world around us. [16]

At the same time, it was found that there is a certain "ideal temperature for the prosperity of life" of each living biological object and that the upper value of this temperature range is determined by the upper temperature of the maximum stability of the enzyme. In particular, for Escherichia Coli, such an ideally comfortable temperature is a temperature within +35 °C. It was found that the ideal temperature for an organism can be used to determine how close to the maximum temperature each particular organism can maintain viability. Finally, it was found that when the temperature reaches + 42 °C, the growth of microorganisms slows down. [17]

The normal human body temperature is usually 36.5 - 37.5 °C (97.7–99.5 °F). [18] However, in fact, the human body temperature is different and varies throughout each day by 0.5-1.0 °C. In general, body temperature depends on many factors and is regulated by the central nervous system. Thermoregulation of the body is part of the homeostatic mechanism that maintains the optimal operating temperature of the body, since temperature affects the rate of chemical reactions and metabolism. The each person's body temperature regularly changes up and down throughout the day depending on the person's circadian rhythm. The lowest temperature occurs about two hours before a person usually wakes up. At the same time, people's body temperature drops to the lowest values usually at 4 am and rises to the highest values in the afternoon, namely, in the period from 16 to 18 hours (provided that the person is awake during the day and sleeps at night). [19]

In addition, regardless of cyclical daily changes in total body temperature, the local temperature of various parts of the body in humans also changes periodically. It has been shown that inflammation and many diseases increase the temperature of the body and / or inflamed (sick) parts of it. Cold air and / or cold water, as well as an ice bubble, lower the temperature of the body's surface when it comes into contact with it. And the aging of the body reduces the overall body temperature and its variability. [19]

It is established that body temperature is sensitive to many hormones. In this regard, women of fertile age have a temperature rhythm that changes depending on the menstrual cycle. Information about such temperature dynamics increases women's awareness of fertility and is used in gynecology for regulated reproduction using hormonal contraceptives that suppress the temperature rhythm and increase the typical body temperature by about 0.6 °C (1.1 °F). It has long been known that inflammation and malignancy increases the local temperature in the body of warm-blooded animals and people. High body temperature is a natural indicator of illness, so elevated body temperature is used to diagnose diseases. For this purpose, mercury thermometers were used for a long time. In recent years, they have been increasingly replaced by thermal imagers that provide infrared imaging of exposed parts of the body. Infrared thermography (IRT) is a fast, passive, non-contact and non-invasive alternative to conventional clinical thermometers for monitoring body temperature. IRT is successfully used to diagnose breast cancer, diabetic neuropathy, peripheral vascular diseases, hypoxia, and ischemia. The thermal imager is also used to detect problems related to gynecology, kidney transplantation, dermatology, heart, newborn physiology, fever screening, and brain imaging [20-29]

At the same time, a very important scientifically established pattern is that it is heat, not cold, that is a serious obstacle to life. It was found that heating biological objects only a few degrees above the corresponding optimal temperature, which ensures cell division and growth of biological mass, is a serious problem for survival. [30]. It has been shown that the high-temperature limit of cell division is a factor limiting life [31].

In recent years, there has been strong evidence that about 2 billion years ago, the Earth had a very high temperature, which limited the evolution of microbes and delayed the emergence of complex multicellular life. On the other hand, there are convincing arguments in favor of the fact that later on the Earth there was a biological increase in weathering by organisms (mainly microbes and plants), which led to a general decrease in the temperature of the Earth's surface. The decrease in the Earth's temperature is a paradox, since the Sun became hotter during this time period. However, today there is evidence that this is true. One such confirmation is the fact that heat-loving microbes are among the oldest known species of creatures. They developed when the Earth was hot, and they still like to live in hot springs and inside the bodies of warm-blooded animals. [32]

There is no generally accepted lower temperature limit for life on Earth. The fact is that when free-living cells of microorganisms and spermatozoa of animals and humans are cooled, they dry out, which increases the viscosity of their internal environment until they acquire the properties of glazing. This phenomenon excludes the crystallization of water inside the cells. Therefore, in this state, the cells can retain their structure during very deep freezing. At the same time, cooling and freezing inhibits cellular metabolism to almost zero, so with deep cooling, cells can survive without metabolism for an indefinite period of time. However, it is the glass transition temperature that represents the overall lower thermal limit for life on Earth, although its exact value differs for unicellular (usually above -20 °C) and multicellular organisms (usually below -20 °C). [33].

On the other hand, extremely low or high temperatures, regardless of their frequency, have a significant impact on the evolution of living biological objects. The impact of extreme temperatures on the evolution of species has the greatest impact when extreme temperatures cause mortality or persistent physiological injuries, or when organisms cannot use behavior to protect themselves from extreme temperatures. [34,35].

At the same time, under the influence of human activity on the planet in the last century, there has been a change in climate and, above all, temperature. It is established that changes in the ambient temperature affect the ways of expressing life traits and the relationship between them. In particular, even small deviations from the average seasonal temperatures change health and mortality indicators [36], and during a heat wave, the incidence and mortality increase to maximum values. [35,37].

However, the influence of temperature on all living things is still not always predictable and understandable from the perspective of the generally accepted modern view of life. In all likelihood, the reason for this is the lack of any scientific data. In particular, it is still not sufficiently explained why *Drosophila melanogaster*, grown at a lower temperature regime develops more slowly, but becomes a larger adult. [38,39].

To get out of such "dead ends" and to scientifically explain such paradoxes revealed when considering life in extremes, von Neumann proposed to distinguish between metabolism and replication (reproduction) [40]. An example of the usefulness of using this recommendation to understand and explain such paradoxes of nature is the study of the influence of temperature on the duration of development and viability of *Trichopria anastrephae*, parasitizing drosophila *D. suzukii*.In these studies, it was shown that pupae with D. suzukii under 24 hours of age were exposed to T. anastrephae parasitism for 24 hours. The results of the study showed that higher rates of parasitism and offspring production were obtained at temperatures from +15 to +25 °C. At temperatures of +10 and +35 °C, there were no individuals. At the same time, it was found that at + 20 and + 25 ° C, the generation duration was the shortest, and the reproductive rate was the highest in comparison with other temperature regimes. [41] These data showed the ability of *T. anastrephae* to adapt to different temperature conditions and were very useful for improving biological control programs against *D. suzukii*.

That is why a very important factor in the impact on the life of biological objects and humans is climate change and an increase in the life expectancy of people and animals, the rapid beginning of which occurred in the 20th century. During this period of time, the planet Earth experienced a global warming of the climate, and on the other hand, the life expectancy of people increased. Moreover, this happened despite the fact that before that, in the course of evolution, it had already exceeded the life expectancy of great apes, which rarely live to 50 years. It is believed that people's life expectancy has increased largely

due to changes in living conditions, nutrition, and medicine [42]. These changes have particularly minimized mortality in childhood.
Therefore, time is a relative measurement for living things, since their biological clock changes its course depending on their temperature. Moreover, the biological clock may stop! This happens when molecules and/or other forms of "vital" information are "properly" frozen.
The temperature also has a relative value for "life": "life" is happy at a "comfortable "temperature, unhappy at a higher temperature, dies at an excessively high temperature, but "freezes", losing metabolism (preserved), for an infinitely long time with proper freezing.
It is known that temperature changes the aggregate state of substances and materials. In addition, temperature affects not only time (the fourth dimension), but also the first three dimensions (length, width, and height): increasing the temperature increases the length, width, and height of items. Therefore, heating changes their volume, mass, specific gravity, and many other physical and chemical properties. [43-46]
In this regard, it is proposed to consider the temperature as the fifth dimension.

CONCLUSION

Throughout its history, humanity has not known the true essence of life. However, in recent decades, scientific data has been obtained that can dispel many misconceptions. It is established that temperature and time are of relative importance for life: a change in the temperature of living organisms changes the course of their biological clock, that is, changes the "biological" time, and an increase in temperature from absolute zero changes its comfort for life sequentially from preservation (preservation) of life, complete "comfort" (happy life), extreme non-comfort (sick life) and, finally, death. At the same time, frozen "life" (preserving it indefinitely) is equivalent to life after death. In addition, temperature changes the length, width, height, mass, specific gravity, aggregate state, and many physical and chemical properties of living and inanimate objects.
In this regard, it is proposed to consider the temperature as the fifth dimension.

CONFLICT OF INTEREST
None

SOURCE OF SUPPORT
Nil

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