

Anthropic Principle, Cosmophysics and Biosphere

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Abstract

It is shown, that the Earth biosphere main parameters, such as the alive matter total mass, the DNA and peptides length, are connected with the observed Universe parameters. In particular, the length of the integral genome DNA of the Earth biosphere is equal to the Hubble radius. The consideration of humanity as the biosphere matter especial part provides us to value the human mass limit and extremal quantity; the obtained results coincide with the ones, calculated by the demography specialists. The obtained relations are explained by the author conception of the synergistical evolutioning Universe, where the nonequilibrium structures, including the alive ones, are created under the action of the observed energy forms as well as of the dark energy. The connection between the biosphere and Universe parameters provides us to extend the Anthropic principle notion as well as the observer conception because the biosphere is an adaptation tracing system, which adjusts itself under the Universe evolution to be the one unit with it.

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INTRODUCTION

It is shown that the Big Numbers, discovered by the A. S. Eddington [9, 10] and P. A. M Dirac [8], show the connection between the elementary particles physics and cosmology.

Within our approach to the synergetical Universe description it was revealed a set of connections between the Earth biosphere parameters and the Universe cosmic parameters in the Hubble radius limit.

These connections are easily explained if one considers the biosphere as a unite synergetical nonequilibrium structure, forming and evolutioning in a resonance with the Universe evolution. The Earth biosphere is affected not only by the solar and planet energy, but also by the action of the so-called “dark energy”, which is 73% of the whole Universe energy [11].

THE BIOSPHERE AND THE ALIVE MATTER QUANTITY

Let us consider the Earth biosphere according to V. I. Vernadsky [5, 12] as a unite substance of alive matter. The biosphere mass is $m = (1.5 \div 2.5) \cdot 10^{15}$ kg in dry weight whereas the total alive matter mass is valued as $\tilde{m}_{bio} = (3.6 \div 6.5) \cdot 10^{15}$ kg [7]. The average value gives $\langle m_{bio} \rangle \approx 5 \cdot 10^{15}$ kg.

The Earth biosphere mass is connected with the mass of the Universe in Hubble radius:

$$m_{bio} = \frac{8\pi}{3} \alpha_{Gp} M_H = \frac{8\pi}{3} \frac{Gm_p^2}{\hbar c} M_H = 4.5 \cdot 10^{15} kg. \quad (1)$$

Thus such parameter as the biosphere mass or the alive matter quantity is expressed by the simple cosmological relations as well as by the relations of the elementary particles physics. It proves the non-accidentality of the biosphere parameters and the cosmic resonance of its structure with the Universe one.

We also note that the number of biospheres, analogical to the Earth one and spread in the Universe, can be valued by such a way:

$$N_{bio} \approx \left(\frac{M_H}{m_{bio}} \right)^{1/2} \approx 4.5 \cdot 10^{18}, \quad (2)$$

what coincides with our value, obtained earlier within the alive matter thermodynamics [1]. It is known, that the base biosphere mass is provided by plants, whereas the animals mass

is $m_a \approx 4.9 \cdot 10^{12} \text{kg}$ [7]:

$$m_a = \frac{m_{bio}}{920} = 2 \left(\frac{m_p}{m_e} \right) m_{bio}. \quad (3)$$

THE EARTH BIOSPHERE DNA AND THE COSMOLOGICAL PARAMETERS

It follows from (1) and (2) that the biosphere can be considered not simply as the alive matter, but as the united system, possessing the total genotype. Within such an approach we can consider the integral features of the whole biosphere DNA (the integral genome).

The total quantity of the nucleotides pairs N_{Nbio} , with the average mass $m_{Nbio} = 660m_p$, which consist the DNA of the all Earth biosphere organisms, is equal to 1% of the total alive matter quantity. Thus

$$N_{Nbio} \approx \frac{10^{-2} N_{Pbio}}{\left(\frac{m_{Nbio}}{m_p} \right)} = \frac{2.7 \cdot 10^{40}}{660} = 4.1 \cdot 10^{37} = \frac{\alpha_{Gp}^{-1}}{4}. \quad (4)$$

The single nucleotide length can be expressed by the electromagnetic fine structure constant:

$$l_N = \alpha^{-1} \cdot \lambda_e = 3.4 \cdot 10^{-10} \text{m} \quad (5)$$

Thus the total length of the all DNA and RNA nucleotides of the Earth biosphere is

$$L_{Nbio} = N_{Nbio} \cdot l_N = 1.38 \cdot 10^{28} \text{m}. \quad (6)$$

The length of the work part of the whole biosphere DNA (integral genom) is like to Hubble radius.

$$L_{NW} = 10^{-2} L_{Nbio} = cH^{-1} = R_H = 1.3 \cdot 10^{26} \text{m}. \quad (7)$$

The obtained relations prove that the Earth life and the total biosphere are the integral parts of our Universe (in modern time, under $t_0 \approx 14 \cdot 10^9$ years), such as electrons, protons, stars and planets. Thus the alive matter is the functional structure in the cosmos construction, what is expressed by the set of physical and cosmic relations, obtained in this work.

THE COSMIC RELATION FOR BIOSPHERE IN DYNAMICS

The biosphere is reproduced with the rate $\dot{m}_{bio} \approx 3.4 \cdot 10^{14} \text{kg/year}$ [6]. During the biosphere existing time $\Delta t_{bio} = 4 \cdot 10^9$ years it was produced the biomass quantity close to the Earth mass:

$$\dot{m}_{bio} \cdot \Delta t_{bio} = 1.36 \cdot 10^{24} \text{kg} \approx \frac{3}{2\pi} \cdot M_E, \quad (8)$$

where $M_E = 6 \cdot 10^{24} \text{kg}$ is the Earth mass. It is easy to see that the produced biomass quantity will be accurate equal to the Earth mass in $\Delta t_f = 13.5$ milliards years. This time is equal to the modern period of the Universe existence, which is close to the Hubble time:

$$t_f = t_U = 13.5 \cdot 10^9 \text{years} \sim \frac{1}{H_0}. \quad (9)$$

It means that the Universe existing time during the Earth biomass production period is

$$\tilde{t}_U = 2t_f = 2t_U \approx 27 \cdot 10^9 \text{years}, \quad (10)$$

$$\frac{M_E - \dot{m}_{bio} t_{bio}}{\dot{m}_{bio}} = 17.6 \cdot 10^9 - 4 \cdot 10^9 = 13.6 \cdot 10^9 \text{years}. \quad (11)$$

Again we have revealed the astonishing structural temporal resonance.

The formation of the biomass flow \dot{m}_{bio} is realized under the action of the solar energy flow $\dot{E}_S = 9 \cdot 10^{13} \text{J/s}$, used by the biosphere plants for the photosynthesis [6]. The following relation has place under this process:

$$\dot{E}_S = \frac{c^5}{G} \left(\frac{m_e}{m_p} \right)^{11,5} \cdot \alpha^{1/2} = \alpha^{18} (0.618)^{2/3} \cdot \frac{c^5}{G} = 8.97 \cdot 10^{13} \text{J/s}. \quad (12)$$

It can be seen from (12), the calculated \dot{E} value is strictly correspondent to the empirical one, indicated in the reference book.

During the period t_{bio} in biosphere it is possible to create $N_E \sim 10^{38}$ cells $\sim \alpha_{Gp}^{-1}$, in the Universe, correspondingly, $N_U \sim 10^{57}$ cells. The account of the total square of the alive cell inner membrane (mitochondrias, core etc.), which prevails the cell surface square by some orders, gives the following number $\sum S_{cbio} \approx 10^{52} \text{m}^2 \approx S_U$, which shows the approximate equality of the total surface of the all existed alive matter and the Universe sphere surface within the Hubble R_H .

For the all cells of the Universe the surfaces squares relation can be equivalent to the squares relation of the Universe sphere and the Planck size sphere. Such a relation is able to present the Universe information contents (10^{122} bit) in the Planck's units.

The Earth biosphere includes $N_{cbio} \approx 10^{28}$ cells. The number of cells, existing in the modern time, is

$$N_{cU} \approx N_{cbio} \cdot N_{bio} \approx 10^{47}. \quad (13)$$

Then the total surface square of the all Universe cells under the condition of their regular division during the existence period can be equal to the Universe surface square within the Hubble radius (!)

$$S_{cbio} = N_{cU} \cdot \frac{t_{bio}}{t_c} \cdot \pi l_c^2 \approx 10^{52} m^2 \approx S_U = \pi R_H^2. \quad (14)$$

It proves the existence of the strong connection between the structures of the Universe and alive matter.

We note that for alive cell, as an elementary unit of alive matter, namely the membrane is one of the most important structures. It is the boundary between the cell organoids and the outer world; the all nourishing substances transport is produced through the membrane. Besides, the membrane plays the defense role.

In such galaxy as the Milky Way the biospheres number is approximately 50 millions [1].

$$N_{bioG} \approx N_{bioU} \cdot \frac{m_{Gal}}{M_U} \approx 5 \cdot 10^7. \quad (15)$$

In Universe there are approximately $N_a \approx 10^{21}$ star systems. Among them there are $N_{abio} \approx 3.3 \cdot 10^{18}$ inhabited ones. The question about the reasonable civilizations numbers was considered by us in the work [1].

The obtained relations show the strong and covered connections between the Universe structure, its parameters, and the alive matter characteristics on Earth as well in Universe as a whole, Our results are easy explained within the synergetical approach to the evolving Universe description: dark energy and dark matter form the synergetically non-equilibrium structures, galaxies, the star system and alive matter in the kinds of biospheres as the unite systems of many biological kinds, also including the man.

CONCLUSION

The obtained structural resonances prove the fine synergetical adjustment of the Earth biosphere parameters to the Universe structure as a unit. According to V. I. Vernadsky the Earth biosphere is considered as the unit alive matter. The equality between the biosphere total genom length and the Hubble radius proves the biosphere reaction on the unit Universe evolution. Under the Universe “wave length” $\lambda_U = R_H \approx L_{NW} \approx \lambda_{vac}^{-1/2}$ the biosphere genom can be considered as a special “antenna”, which size is equal to the wave length of Universe. Thus the biosphere evolution is probable synchronized with the Universe evolution. Be the way it is reasonable to note that the formation of the planet Earth and its biosphere took place $4.5 \cdot 10^9$ and $4 \cdot 10^9$ years ago, correspondingly. This formation occurred after the beginning of the Universe spread acceleration, 5 milliards years ago, when the Universe enters into a new phase of its evolution. This new period, determined by the “dark energy” properties, is characterized by the creation of the complex biological structures, accepting the “Universe pulse” in direct sense and being the **Universal evolution observes** from the physical and biological points of view. This role is played not only by man or humanity, as it was assumed earlier within the Anthropic principle, but by the whole biosphere. The biosphere genom reacts on the Universe fields dynamics and it yields the special biosphere response be the new kinds creation, including those ones, which have the reason. Thus it is possible to speak about the psychozoic era not only in respect to the Earth and its biosphere development, but in connection to Galaxy and even to the whole Universe, with correction for any material carrier of alive matter. Taking into account the J. Wheeler conception about every observer participation in the Big Bang and the quantum observation of its tracks (cosmic microwave background radiation etc.), we can suppose that the whole Earth biosphere and others ones in unit take part in the Universe development because they occupy the essential part of its phase volume [2].

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