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Thoughts on the Life Periods of Our Earth

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Abstract

The author thinks that the endless and timeless Universe is a permanent substance and energy flow as well as motion of celestial bodies. Celestial bodies may have physical and biological life. Our Earth has both lives which can be divided into different periods of time. Its physical life can mainly be characterized by the atomic evolution, sterility and appearance of water. Essence of the biological life is the existence of living unit. The biological life of our Globe started with the first living unite which began to influence on its environment which is a closed system for substance, flora, creature and man but not for hit of celestial bodies and for arrival of energies from the space as well as for radiation of its own heat. The biological life of our Earth can be divided into four parts: before photosynthesis, before man-kind, before 1778 and after industrial revolution.

Keywords: *Energy and Substance Flow; Physical Life; Atomic Evolution; Sterility; Closed System; Biological Life and its Consequences*

Preface

The Universe is endless substance and energy flow with motion of celestial bodies (including stars, comets, meteors etc.) on the basis of the low of Nature/God. The celestial bodies of the Universe are different depending on their type, position and age. It is supposed that our Galaxy was born more than 10 billion years ago in the Universe and the age of our solar-system and that of our Earth existing in that system may be 5 - 4.75 and 4.55 billion years, respectively. The birth of our Galaxy was the consequence of unknown movement of substance and energy. In our solar system the celestial bodies get energy mainly from our Sun and they have radiated heat. As to the life of our Planet it lasts from its birth through the present up till its demolition and this process can be divided into at least two basic periods: physical life and biological life.

Physical Life of our Earth (0 - 3,75/3,8 billion yrs)

Physical life of celestial bodies is not unchanged. They may have some common characteristics: birth, motion, atomic evolution, cooling, geological events, regular fluctuation of their temperature (effect of Sun), sterile condition, appearance of water and chemical reactions. As to the physical life of our Earth it can be supposed that it started as a glowing star consisted of hydrogen (H_2), helium (He) as well as atomic fusion. Its early atmosphere might be a solar type with the same components. That starting process can be called atomic evolution during of which different atoms - nitrogen (N_2), carbon (C), phosphor (P), sulfur (S) and the others as well as simple molecules - had been formed. The basic atomic/substantial pool of our Earth had evolved by the end of the atomic evolution process. This pool of our Planet is practically constant - only celestial bodies may bring some substance from the space on our Earth but nothing can leave it on natural way therefore it is a closed system for substance but not for arrival of energies from the space and for the radiation of its own heat. In the same time connections among the atoms may change time to time depending on the actual energetic conditions. That change is the base for the evolution.

Solidification of the surface of our Earth

It is probable that the atomic evolution practically ended by the solidification of the surface of our Globe. Compound and structure of the first solid surface of our Earth is not known but it may be imagined that composition of the early laves and that of the surface samples of other celestial bodies may be similar to that rigid native lifeless surface - see figure 1.

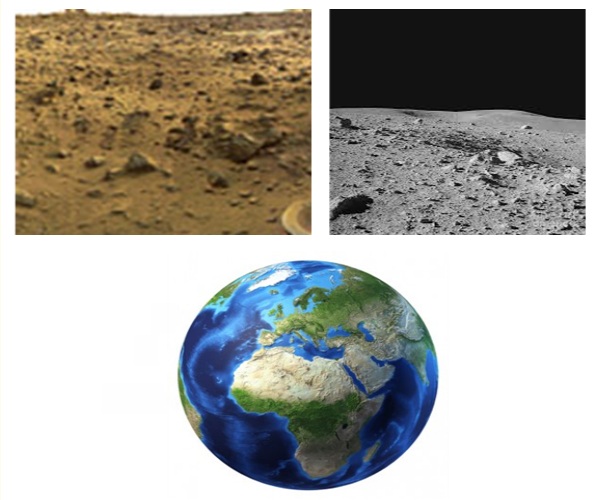

Figure 1: *The surface of the Mars as well as that the Moon and the picture of the Earth.*

Changes of the atmosphere

The first atmosphere of our Globe had also changed. It transformed into an anoxic one containing N_2 and CO or CO_2 etc. Appearance of oxygen (O_2) is an open question. Physical burning needs O_2, CO, CO_2 and H_2O could not be formed without O_2. It is a big question when did CO, CO_2 and H_2O appear and what was their birth order? It can be imagined that the process of appearance of O_2 and formation of CO and CO_2 as well as water had happened parallel many 100 million years before.

Appearance of water

It is sure that fluid water or ice came into view only when the Earth's surface was already solid and its temperature as well as the atmospheric pressure gave the possibility of its condensation and/or freeze. It can be supposed that water vapor had already existed earlier. Appearance of fluid water was very important not only for both chemical and later biological processes - because water is a medium for chemical reactions that is for formation of inorganic as well as organic compounds and latter the biological life - but for the so called circulation of water, too. We do not know when, how and why did the circulation start which process has played important role in regulation of the actual temperature of our Globe. It seems to be sure that CO_2 was already present in the atmosphere before this circulation.

Parts of physical life of out Earth

On the basis of the facts we think that physical life of our Earth - which was sterile/abiotic - had three distinct parts:

1. The first one can be characterized by atomic, physical and geomorphological events.
2. The second part started when the surface of the Globe became massive.
3. The third one began with the appearance of water and this part lasted till the birth of the first living unite.

Biological Life of our Planet (from the age of 3,75/3,8 yrs)

After the birth of our Earth in consequence of the mentioned atomic, physical and geomorphological processes - which supposedly lasted for 3.75/3.8 billion years - the first living unite that is the biological life appeared. The biological life is a special energetic and substantial phenomenon of a living unit which developed on the basis of the physical life of our Globe. Its formation is not known but it is a fact that the first living organism could form and live only in fluid water containing the necessary dissolved inorganic as well as organic substances - which were already built up on abiotic way - and its temperature, pH as well as atmospheric conditions were optimal. We do not know what was, what is and what will be the situation in respect of the biological life in the other parts of the endless Universe.

The living unite and the life

The living unit is a substantial matrix which is bordered by a permeable membrane/wall. Inside that unit and through its membrane/wall a characteristic organized and directed energy and substance transport flows till its own death. This process requires energy. The living unit is affected by external effects and it can accommodate to those only within the borders of its own life requirements. In the same time it influences on its environment, too. The living unit can change and mutate as well as multiply and its characteristics are bequeathed into its posterities.

The start of the life of the first living unite is unknown although energetic conditions of the biological life were studied by E. Schrödinger and A. Katsuki. They stated that living unit needed environment of low entropy because consumption of compounds of low entropy (for example: saccharides and so on) which were essential for its life was only possible in such circumstance. Suitable condition of entropy of our Earth has been ensured by the circulation of water and by the composition and condition of the atmosphere as well as the Earth's surface.

Biological life in a closed system

The so called closed system is a special situation and it has different types. Those parts of the Earth and the earthly surrounding all together which are suitable for a living unite at least to survive is called Biosphere. Our Biosphere is a special closed system because only celestial bodies may bring some substance from the space into it and no substance, flora, creature as well as man can leave it on natural way. In the same time it is open for arrival of energies and it can radiate its own heat. In case of an arteficial closed system - for example in a production tank - it is obligatory permanently to ensure those conditions (water, food, temperature, pH, atmosphere, circulation, elimination of metabolites and overpopulation) which are necessary for the continuous life and reproduction of the given living organism mass cultivated.

About the first living unite

The first living unite/microorganism appeared about 800 - 750 million years ago on our Earth. The process of its formation is unknown. As for the characteristics of the first microorganism it might be a pluripotent archaic type creature without nucleus that is it was a procarya. It is thought that its metabolism - in accordance with the anaerobic condition which is supposed - might be chemotrophic/autotrophic (perhaps heterotrophic?) but what was its exact substantial and energetic background it is unknown for us. We only know that at present such microorganisms have also lived which can survive a temperature more than 100°C and an atmospheric pressure more than 1 bar.

Effect of the first microorganisms

Since the appearance of the first microorganism the sterile condition of our Earth disappeared. The microorganism has permanently as well as in a growing degree - in consequence of its multiplication - influenced on the original condition as well as substantial and energetic processes of our Earth and the earthly environment by its metabolism. The microorganism has started to decompose, consume and transform inorganic as well as the already existing organic substances of abiosis and has produced different types of inorganic as well as organic compounds, gases and heat. Some of the compounds produced by it stored chemical energy. The cells of the first microorganism became the first organic mud of waters and complex organic components of ground. Without microorganisms there would not be any biological life on our Earth and the surface of our Globe would be similar to that of the other lifeless celestial bodies - see Fig. 1. During the life of the first microorganisms natural genetic changes have happened in them in consequence of which different types of cells - bacterial, eucaryal (fungal, animal) - have been formed that is the biological evolution has begun. See figure 2.

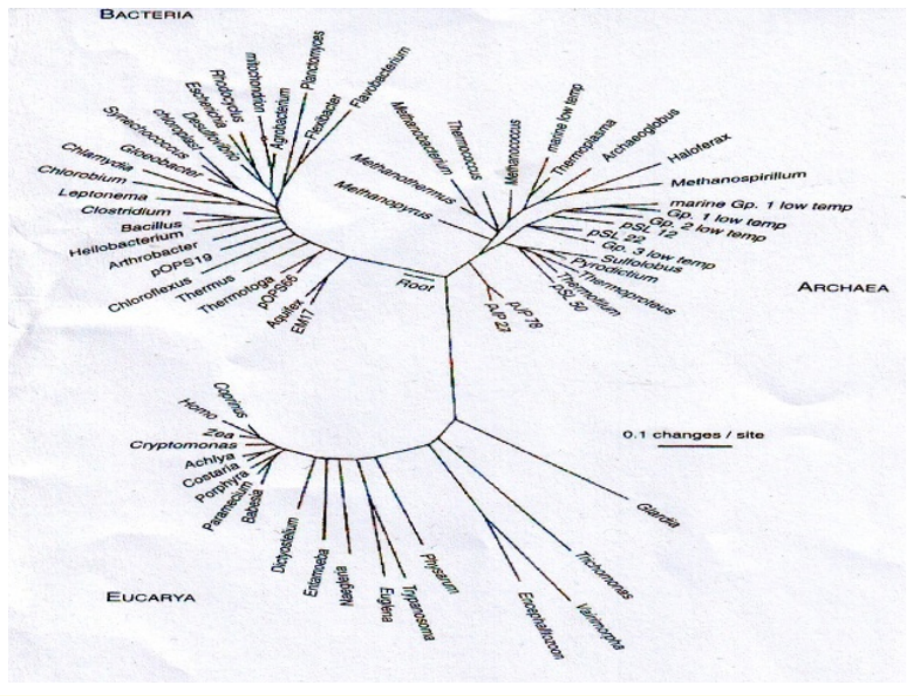

Figure 2: *One of the possible ways of phylogenesis by M Dworkin.*

Effect of phototrophic organisms

One of the mutants became the first phototrophic microorganism - the first plant - which started to consume not only CO_2 and the other substances needed for its life but also to use solar energy and to emit free O_2 into its environment where - during the next more ten million years - the concentration of the free O_2 increased. The consumption of CO_2 and the use of solar energy for production of organic compounds - that is the process of photosynthesis has meant not only a shorter or longer fixation of the energy of Sun but the decrease of the quantity of the free CO_2 also in the environment (accumulator function). That bounded energy and carbon remain in the substances - for example: plants, foodstuffs, feeds and mainly those micro as well as macroorganisms which were transformed into oil, coals and so on in the deep - till their decomposition when one part of the energy and carbon is utilized by a living organism and the other one becomes heat and CO_2 again as it happens during their direct physical burning. Therefore phototrophic organisms play a determinative role in the energetic and substantial processes of our Earth and they might also have role in formation of glaciations - about 700, 600 and more than 500 million years ago - together with different geological events which stored the organisms and gave the possibility of their transformation. During that process not only energy but CO_2 were also removed from the usual circulation of substance and energy in consequence of which the environmental conditions were changed, too.

Increasing concentration of free O_2 in the Biosphere gave the possibility not only for fullfilling of aerobic respiration but also for formation of animal world the members of which - except carnivorous ones - consume plants, O_2, water and so on to get the substances and energy which are necessary for their life. After about a 720/770 million years long biological evolution the first two men appeared less than 30 million years ago. The appearence of men as you will see latter has very serious consequences. A small portion of the effects of man-kind can be seen on the figure 3 as well as in the tables. These data were published earlier.

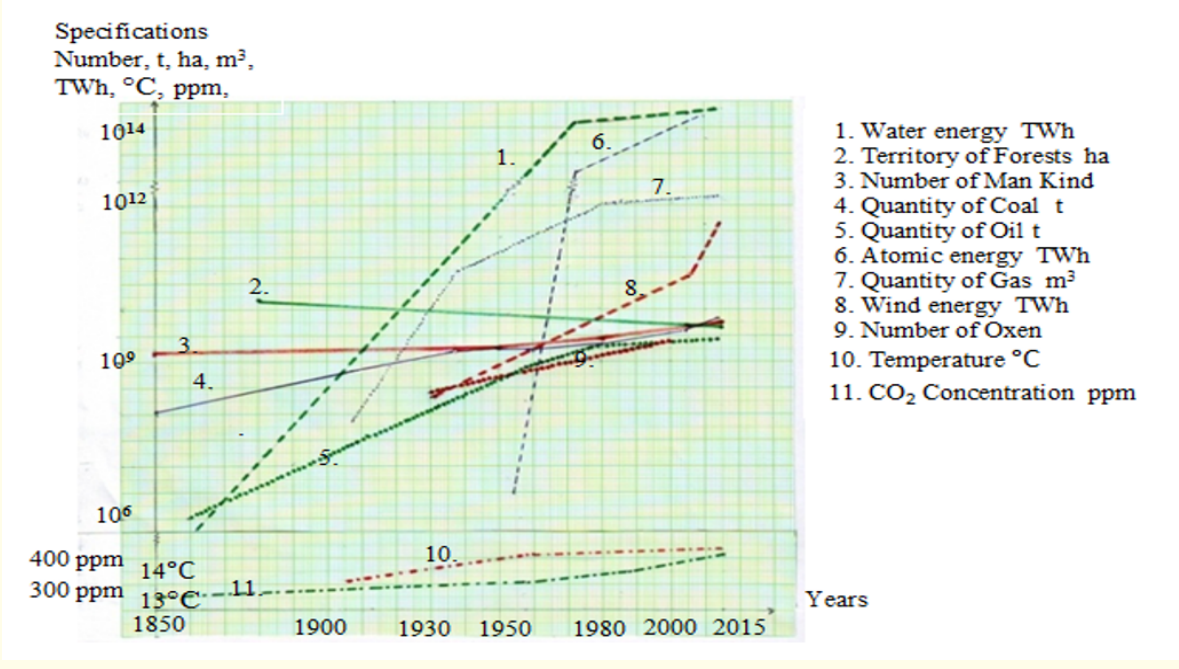

Figure 3: *Number of mankind and oxen; Quantity of energetic raw materials and energies; Dimension of territory of forests; Average temperature of the Earth and CO2 content of the atmosphere between the years of 1850-2015.*

Results

You can see measured values of eleven parameters - number of man-kind, that of oxen, quantity of energies (water, atomic, wind) used, that of energetic raw materials (coal, gas, oil), territory of forest, average temperature of the Earth and finally CO_2 concentration in the earthly atmosphere on the figure 3. The values of all parameters except one - the territory of forests - has continuously increased.

As to our calculations some of the details are presented in the table 1 and table 2.

Specifications	**Mass and fuels and their Average thermal values and the quantity of CO, liberated from the fuels; other energies; number and emissions of mankind and oxen at the different point of time**					
	1860	1935+37	1958	1980	2000+05	2009+14
Oil x 10^6t	1	279,5	809,8	3059	3590	4117
40,5 MJ/kg	4,05 x 10^{10}	1,13 x 10^{13}	3,27 x 10^{13}	1,23 x 10^{14}	1,45 x 10^{14}	1,66 x 10^{14}
CO_2 m^3	3,17 x 10^9	8,86 x 10^{11}	2,56 x 10^{12}	9,69 x 10^{12}	1,13 x 10^{13}	1,3 x 10^{13}
Coal x 10^6t	136	1280	1762	2805	5878	7823
20,35 MJ/kg	2,76 x 10^{12}	2,6 x 10^{13}	3,58 x 10^{13}	5,7 x 10^{13}	1,18 x 10^{14}	1,59 x 10^{14}
CO_2 m^3	3,12 x 10^{11}	2,92 x 10^{12}	4,05 x 10^{12}	6,45 x 10^{12}	1,37 x 10^{13}	1,72 x 10^{13}
Gas x 10^9m^3	un.	71	400	1531	2778	3479
37 MJ/kg	un.	2,62 x 10^{12}	1,48 x 10^{13}	5,66 x 10^{13}	1,02 x 10^{14}	1,28 x 10^{14}
CO_2 m^3	un.	1,37 x 10^{11}	7,72 x 10^{11}	2,95 x 10^{12}	5,36 x 10^{12}	6,72 x 10^{12}

Table 1: *Data to the Circulation of Energy and CO_2 on the Earth.*
(Abbreviation: un. = date is unknown).

Total						
MJ/Kg	$2{,}8 \times 10^{12}$	$3{,}99 \times 10^{13}$	$8{,}33 \times 10^{13}$	$1{,}8 \times 10^{14}$	$3{,}66 \times 10^{14}$	$4{,}53 \times 10^{14}$
CO_2 m^3	$3{,}15 \times 10^{11}$	$3{,}94 \times 10^{12}$	$7{,}38 \times 10^{12}$	$1{,}9 \times 10^{13}$	$3{,}01 \times 10^{13}$	$3{,}69 \times 10^{13}$
Energies	1866	1931	1954	1973	2005-2010	2012-2014
Water TWh	0	un,	un.	1296	3000	3756
Wind GW		0,3**m*	un.	un.	59	318
Atomic TWh			5******	203	2461	un.
Man-kind	1850	1937	1950	1980	un.	2014
Milliard	1,17	2,1	2,5	4.4	un.	7,5
CO_2 m^3/year	$3{,}2 \times 10^{8}$*	$5{,}75 \times 10^{8}$	$6{,}85 \times 10^{8}$	$1{,}2 \times 10^{9}$	un.	$2{,}05 \times 10^{9}$
Heat 25% of the metabolism W/year	$9{,}39 \times 10^{12}$**	$1{,}68 \times 10^{13}$	$2{,}0 \times 10^{13}$	$3{,}53 \times 10^{13}$	un.	$6{,}02 \times 10^{13}$
Oxen		1930-ties			1999 - 2000	
Million		438,9			1351,4	
CO_2 m^3/year		$4{,}98 \times 10^{10}$***			$1{,}53 \times 10^{11}$***	
Heat 50% of the metabolism W/year		$3{,}29 \times 10^{13}$***			$1{,}01 \times 10^{14}$***	
Methane 1/year		$4{,}38 \times 10^{10}$-$8{,}0 \times 10^{13}$*****			$4{,}93 \times 10^{11}$-$2{,}46 \times 10^{14}$******	

Table 2: *Data to the Circulation of Energy and CO_2 on the Earth.*

*(Abbreviations: un. = Date is unknown, *= in case of basic metabolism of a person: 270 l/day, **= in case of basic metabolism of a person: 88 W/day, ***= on the basis of an e x perimental datum of one calf of 75 kg: 311 l/day, ****= on the basis of an e x perimental datum of one calf of 75 kg: 89.16 W/day, *****= data of o x en: 100-500 l/day/animal, ******=MW).*

Conclusion

On the basis of the facts, measured values as well as our own calculations we think that the biological life of our Earth can be divided into four parts. It is necessary to know about these parts because each of them had/have special energetic and substantial processes which had/have biological consequences and vice versa.

The first part lasted from the appearance of the first archaic microbe till the beginning of photosynthesis (that part might be an anaerobic and/or semianaerobic? section in which biological transformation of the global environment and the mutation of the early microorganisms have started).

The second one lasted from the start of photosynthesis till the appearance of the first two men. During that period of time biological fixation of solar energy and production of free O_2 by plants has started and transformation of earthly environment as well as the biological evolution has continued.

The third part ended in 1778 and the last one has existed since that point of time. These two parts can be called anthropoid parts.

The first two parts can be described by only natural biological processes and by their consequences besides those lifeless effects which are permanent and determined the earlier physical life of our Planet, too. No unnatural event had happened!

The anthropoid part started with the appearance of the first two men and it can be characterized by the effects of man kind of growing number and by the consequences of their concise activities as well as the use of fire with all former but continuously existing influencing factors. That part had an important turning point in 1778. Since that date the industrial revolution has flowed with all its consequences.

On the basis of the collected data as well as our own calculations it can be stated that mainly since 1778 such energetic and substantial changes have happened on our Earth and in its atmosphere - that is in the Biosphere - which have been very different from the substantial and energetic situation of the earlier periods - e.g. before the appearance of biological life or that of the photosynthetic microorganism or that of the first two man or when the industrial revolution started. Causes and consequences of these changes can roughly be summarized in three points.

The first point contains the number, requirements and activities of human beings and farm animals in a closed system - for example the use of fire and other energies together with the environmental effects of industry - mainly by all artificial substances -, that of agriculture (especially animal breeding of industrial), transport, military activities, communal and scientific events; philosophy of profit and endless wishes of men.

Into the second point alteration of the surface of our Earth can be listed. Its natural surface has been modified by buildings, roads, deforestation, mines, farming lands, reservoirs and contamination of surface waters. These changes have modified the original possibilities of absorption, adsorption, reflection and utilization of solar energy and the heat radiation of the Earth. Besides they have great many unpleasant ecological consequences, too.

CO_2 and other non-inert gases, vapors, dusts and movement of aircraft and rockets- belong to the third point. They have influenced on the composition and condition of the atmosphere of our Earth in consequence of which original way of arrival of solar energy as well as that of leaving of heat and natural manner of water circulation have been modified. In consequence of the alterations listed above the climate of our Earth has also continuously changed [1-4].

What can be expected from future?

When somebody thinks about the essence of biological life then it can be concluded that it is only a new life in a natural environment. Therefore the present problem of man-kind is that the alterations have permanently grown and in consequence of which the life's conditions in our closed Biosphere have worsened. Perhaps there is still time enough to save the biological life, but for that it is necessary to order drastic restrictions immediately.

Bibliography

1. Ralovich B. "The Place of our Earth in the Universe and Turning-Points in its Life (Thoughts induced by the Climate Change)". *American Association for Science and Technology* 1 (2014): 116-119.

2. Ralovich B. "The Place of our Earth in the Universe and Turning-Points in its Life". In Narro A, Folloni A, Pitasi A, Ruzzeddu M. (eds): Inventing the Future in an Age of Contingency, Cambridge Scholars Publishing, Newcastle upon Tyne, UK (2017): 203-209.

3. Ralovich B. "Data on the Changes Occuring in the Biosphere since 1778". *Open Journal of Ecology* 6.7 (2016): 387-403.

4. Ralovich B. "The effect of the biological life and man-kind on the Earth (mainly between 1778 and 2015)". *Journal of Ecology and Toxicology (Open Access)* 1.3 (2017): 1-4.

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