

(Non)living Leftovers

Notes on living and nonliving matter

What is (in)organic intelligence?

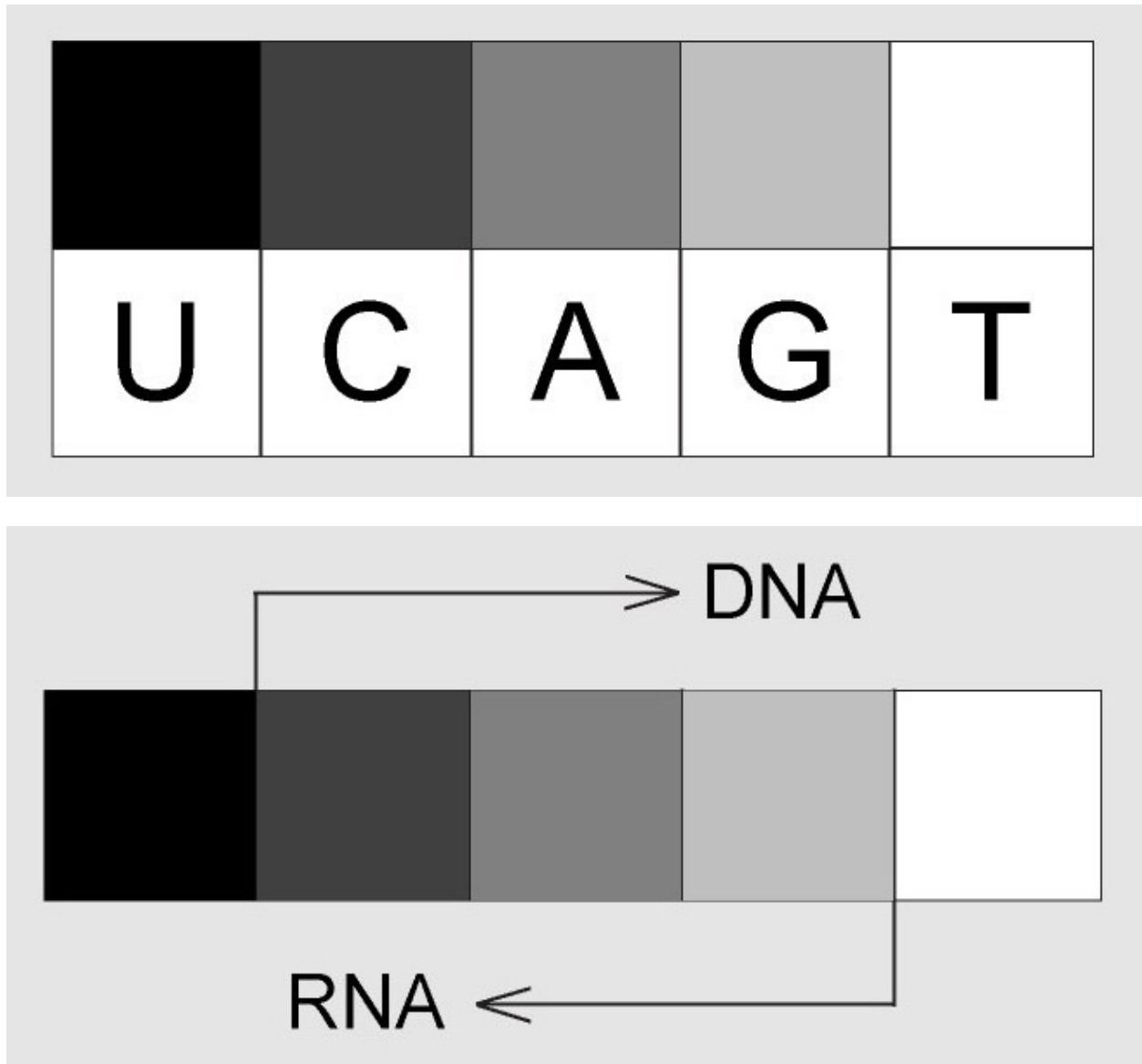


Fig.01 Visual representation of RNA and DNA - Fundamental properties of our environment (hot-cold, light-dark) are impressed/ encoded in the first living molecule(s) (proto-RNA) and remain preserved in the genes of all life forms on Earth.

Four years ago I wrote an article about the relationship(s) between living and nonliving entities posted under the title “Living-Nonliving Matter”. It was inspired by the still unresolved question regarding the appearance of life on this planet, the possible emergence of living from nonliving matter and life as an observer. While trying to define this relationship I was then focused on the micro(proto-RNA)level, recently I became interested in the Biosphere as the largest living entity in relation to the Artificial Intelligence as its possible nonliving counterpart and wrote a few articles posted on this blog.

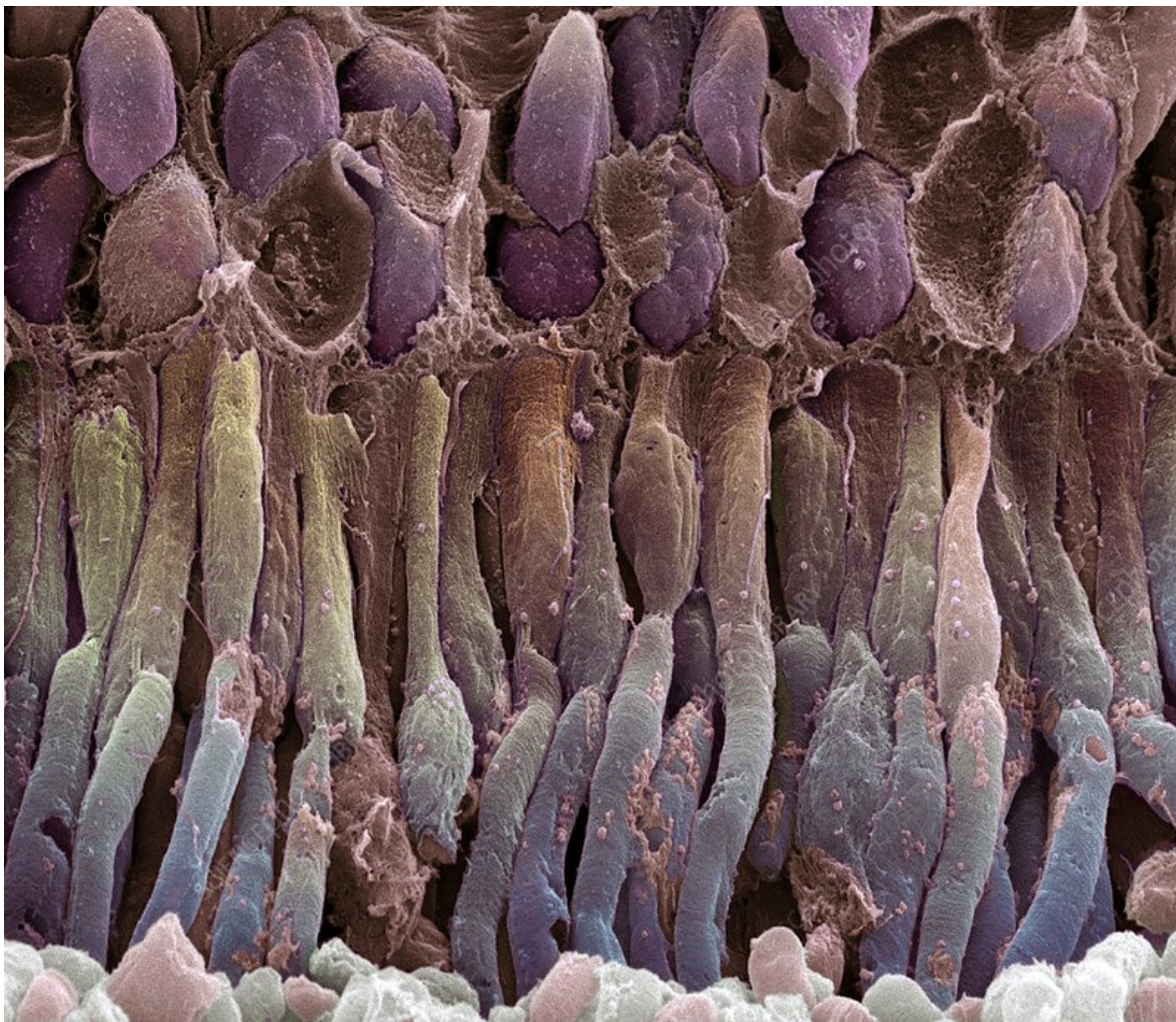


Fig.02 Living observer: retina rod cells. Light triggers signals in the photoreceptors after passing through a neuron layer. These signals travel to the neurons and on to the brain.

Here are some sentences, paragraphs, questions, thoughts, most of them not included in those articles, now collected as some kind of leftovers. Thought perhaps it would make sense to present them even in this incoherent way.

-Now, we will try to find the similarities and differences between human(living being) and AI as a nonliving entity(“being”?) in relation to some basic notions:

observer – observed (there is no observer without change, but also there is no change without an observer)

change – no change (both “time” and “space” are change-based notions; when there is no change there is no time nor space).

existence – nonexistence (there is no existence without change)

time – eternity (what is the smallest and the largest unit of time and how they relate?)

space – infinity (what is the smallest and the largest unit of space and how they relate?)

order – chaos (entropy) / life – death (there is no life without change)

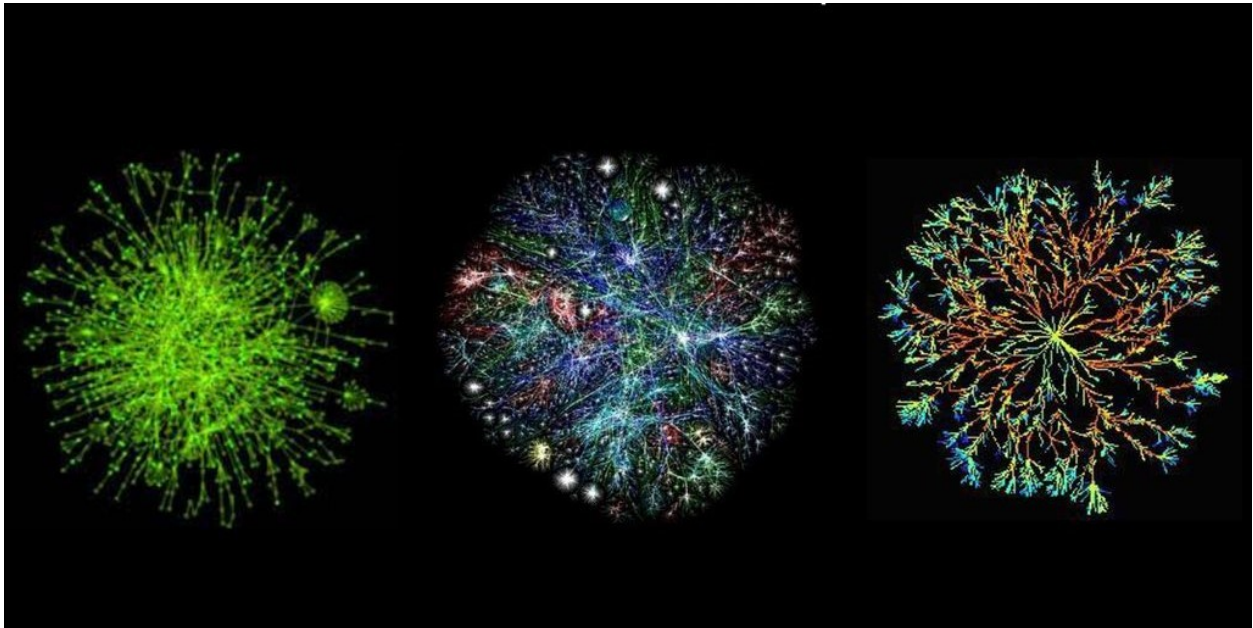


Fig.03 a)Yeast protein interaction network, b) Internet network, c)Bacterial colony growth Ben Jacob

-These oppositions are not symmetric like usual black/white, hot/cold, positive/negative. In a way, it seems these notions are more in meta-relationships. Time is meta-eternity; space is meta-infinity, etc. From within time we could define eternity, but from eternity it is not possible to define time. Or, life could „see“ dead, but it is not possible to „see“ life from the position/state of non-living(dead). Observer has to be living, changeable, limited, temporary and having memory. There is no observer possible without some kind of memory.

eternity – infinity – chaos -> non-living

time – space – order -> living

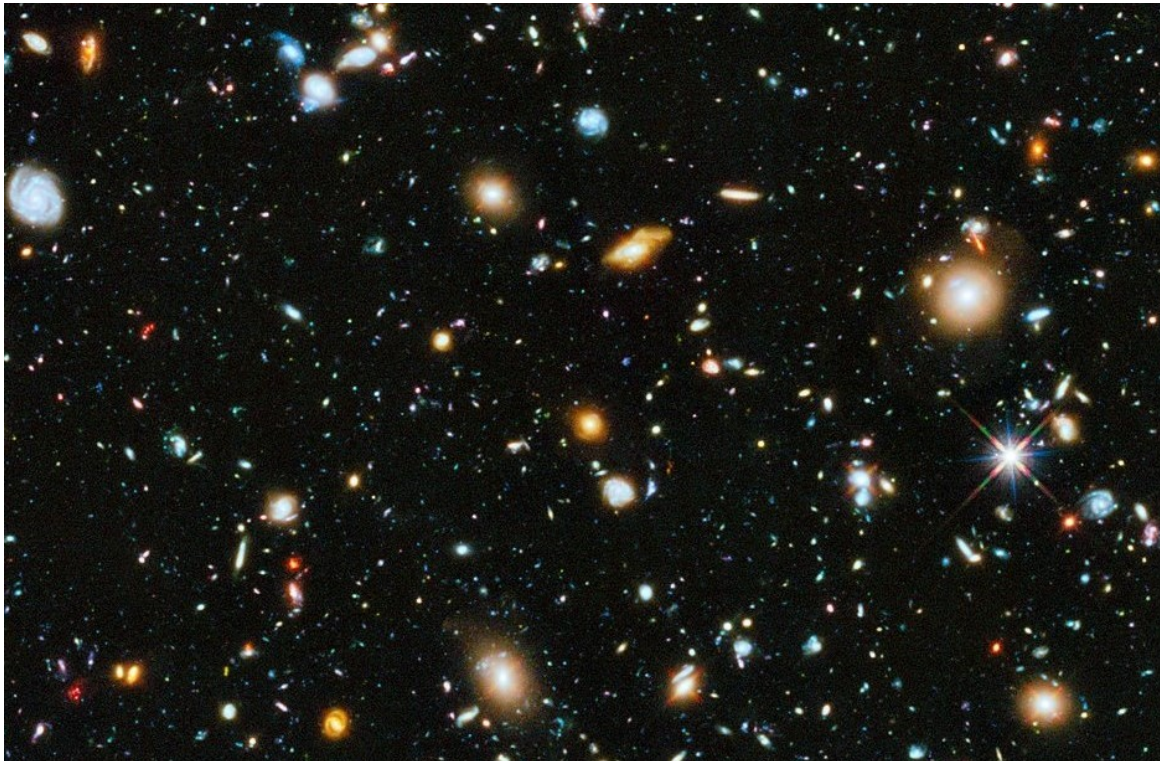


Fig.04 Cosmos observed by a (non)living observer – Hubble Ultra Deep Field

-We could interpret life as an interval of “sound” between the intervals of “silence”, or an interval of “something” between the intervals of “nothing”. From the position of life itself, there is only it and its surrounding; there is only life and the universe. When there is no life there is no universe. We could understand life to be a reflection, an interpretation of the universe. All different expressions of life,

various life forms, are different pictures/interpretations of the universe. On the other hand, the universe itself is a projection of life's properties (change, motion, space, time, temperature, etc.) that life imposes on its surroundings. Life and the universe might relate to each other as the positive does toward its negative.

-From the position of eternity there is no difference between one second and one billion years. In the eternity there is no motion, no change, no time and no observer. Both the observer and the observed are finite and changeable.

-Eternity is one kind of infinity, it relates to the notion of time. There are spatial infinity, numeric infinity, set theory infinity, and the orders of magnitude infinity, from infinitely small to infinitely big. In principle, all infinities are states of no change, while the finite states are changeable. What might be other kinds of infinities „out there”?

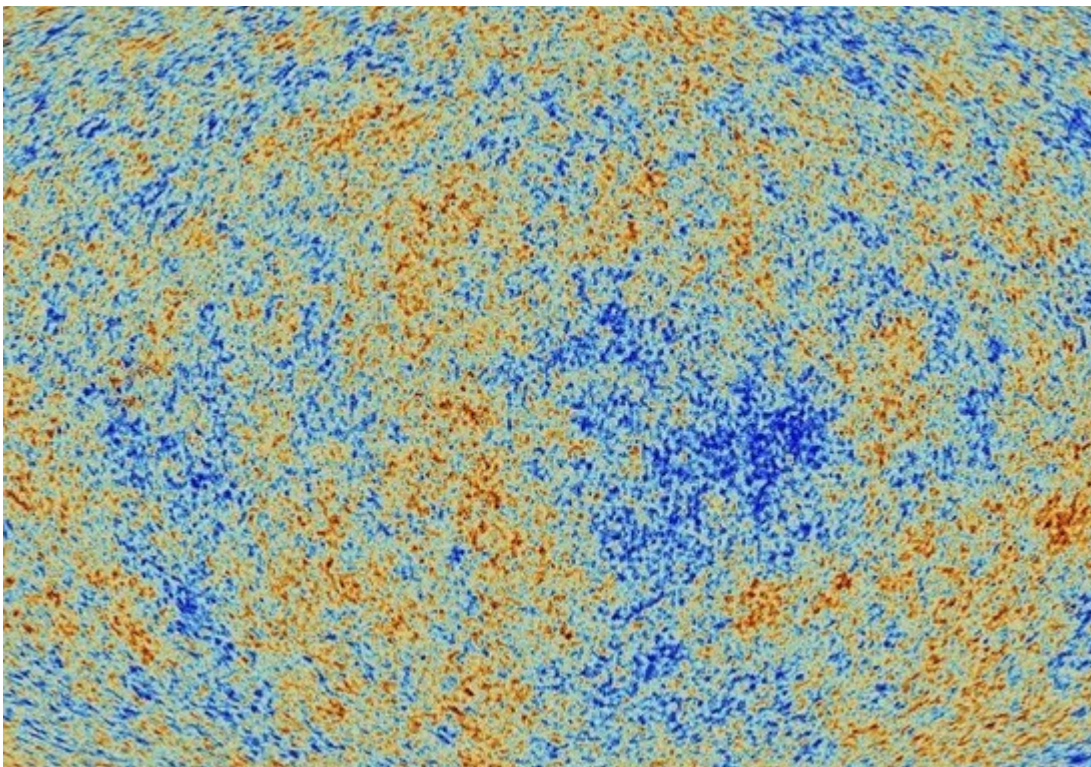


Fig.05 The cosmic microwave background radiation

-We could imagine a straight line stretching in both directions through space without ends. We could also imagine moving along this line while our size, for an outside observer, remains the same in relation of the basic length unit on that line / let's say 1m/. This would be one kind of spatial infinity. We could now imagine another kind of a straight line on which the length units are, for an outside observer, changing by the order of magnitude. Starting from 1m(10^0) in one direction it will be 10^1 , 10^2 , 10^3 ... 10^{∞} , while in the other direction it could be 10^{-1} , 10^{-2} , 10^{-3} ... $10^{-\infty}$. In this case there are two possibilities for the observer while moving along this line:

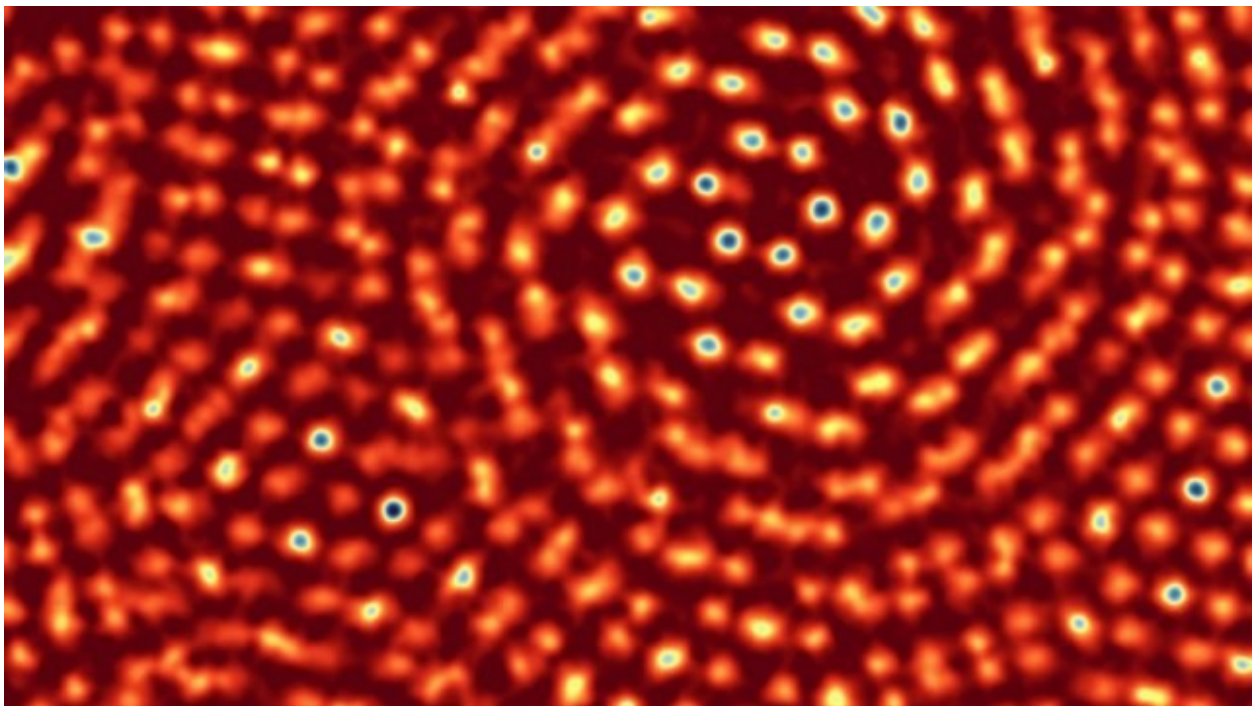


Fig.06 Ptychographic image of two sheets of molybdenum disulfide. The distances between individual atoms range from a full atomic bond length down to complete overlap.' Image and caption credit: Cornell University, 2018

-a) while moving, observer would also change in the same way and in that case it will not notice the change of size of the line unite, while the size of the objects around the observer would become smaller or larger depending in which direction is moving.

-b) or, the size of the observer is not changing, and moving in one direction the observer will also become smaller, while moving in the opposite direction the observer will become larger.

Similarly, we could imagine two time scale, one which is uniform/monotonous with the constant unit of 1sec, or another in which each subsequent unit is changing by the order of magnitude. Something like a normal speed movie run fast forward or slow motion. How one relates to these two kinds of time scales depends of the properties of its time units as an observer. In any case it is necessary to define a referential observer who's spatial and time properties are uniform: time unit $t=1\text{sec.}$ and spatial unit $s= 1\text{m}$ that correspond to the human scale.

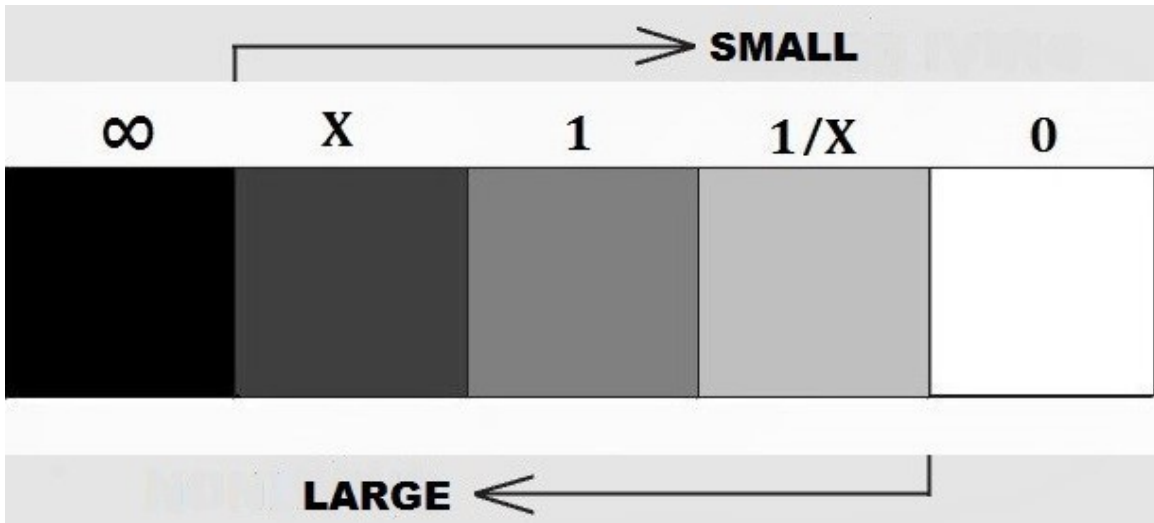


Fig.07 Infinite large, finite large, one, finite small, infinite small

-I might be 2000 years away from Cleopatra on the chronological line, but I am also just a heartbeat away from her. The moment my heart stops “I” will be in the “same place”(“moment”, “time”) together not only with “her”, but with all the “people” that once lived. In fact, with all the living entities that ever inhabited the earth. Even with the “beginning” of the entire “universe”. But at that point there will be no “me” and there will be no “universe”. Without observer there is no observed.

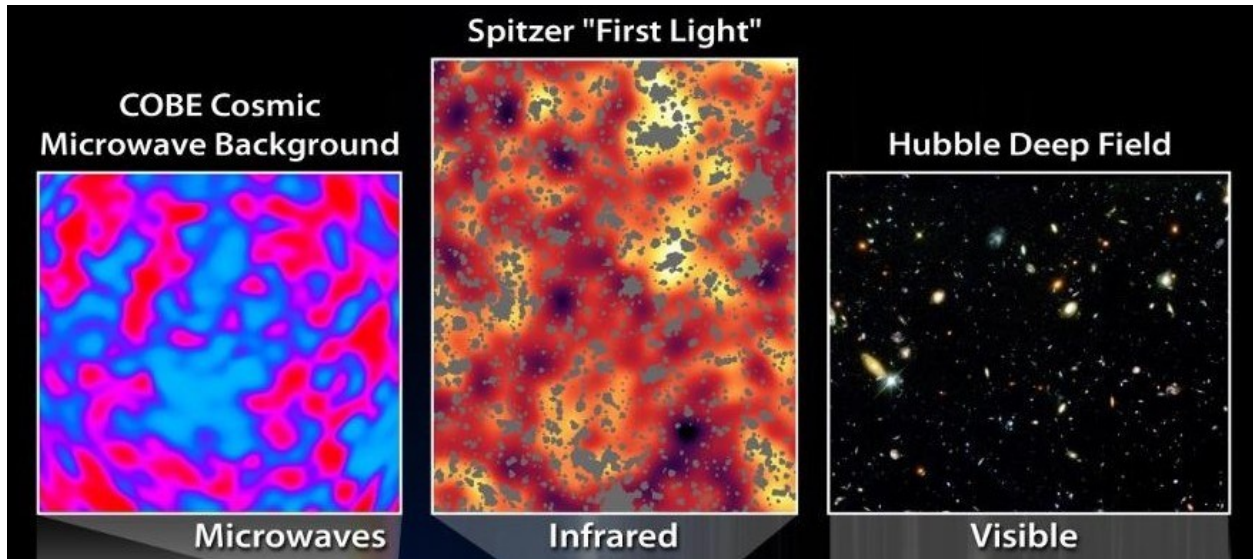


Fig.08 Three stages of the Universe

-On the other hand, perhaps there is no such thing as infinity/eternity. It is just a notion/concept of a (living) observer that could not be experienced directly. An observer could only observe the end of existence of another observer, when another observer is turning into non-living matter.

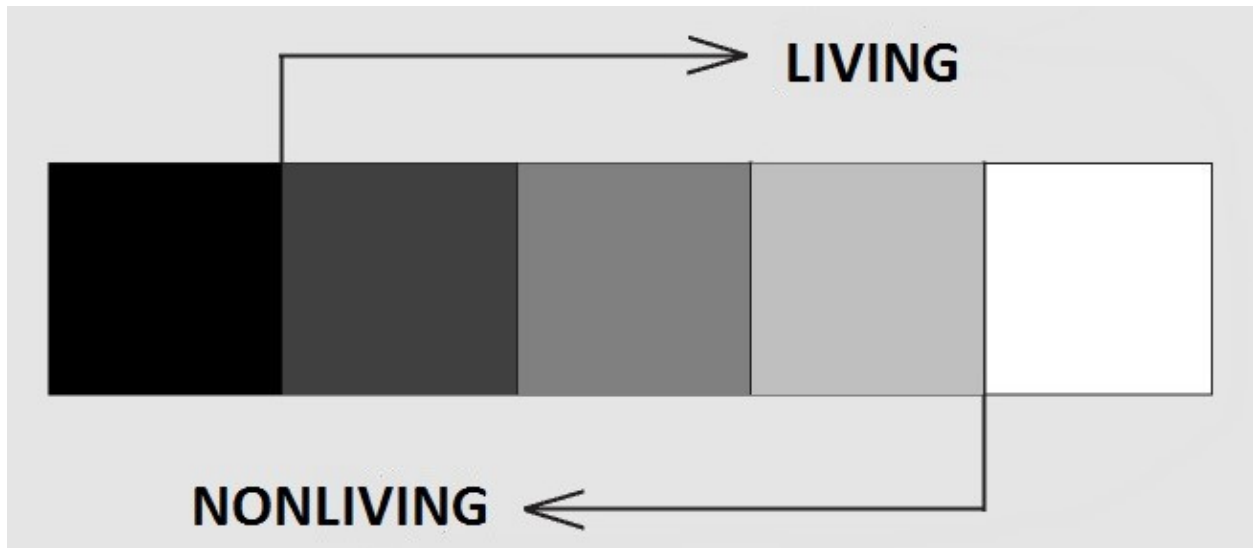


Fig.09 Living-nonliving relationship

- 1. What was first transition from non-living to living matter/emergence of life?
- 2. How does the transition from non-living to living matter depend of changing of the order of magnitude of its building blocks?

-3. How from nonliving came living matter? From living matter then came living intelligence. Then from living came nonliving intelligence.

-Atoms of phosphorus or carbon or nitrogen are dead but RNA is alive. On certain level of magnitude we are all made of non-living matter. What makes a certain combination/configuration of these non-living elements to become alive? There seems to be the limit in smallness below which there is no life, but is there a limit in the opposite direction. If a bacterium is a very small one cell organism, could the entire biosphere on Earth be considered to be one very big organism, and are there limits in size? If life could spread to other planets through space travels, and humans colonize the solar system, and then manage to move beyond, would all these become one living organism?



Fig.10 The Four-layer Internet Model Network

-This transition from non-living to living matter is at the same time transition from eternity to time, or infinity to space, no-change to change, or from chaos to order.

-How an element of a cell (messenger RNA) “knows” what to do while participating in the cell’s metabolism? How it knows what to do, when to do and where to go? And we consider an element of a cell not to be alive (?)

-Is there in the nature perhaps some kind of specific property (“life force”) that emerges within a certain configuration of non-living matter turning it into living?

Oppositions: hot-cold, dark-light, black-white, positive-negative are symmetrical.
Oppositions: order-chaos, time-eternity, space-infinity, life-death, change-no change, are not symmetrical.

-From the position of life we could see death, but from death we could not see life. Same is with time and eternity, from within time we could see eternity but from eternity we could not see time. And from life we could see death, but from death we could not see life. In a way, order is meta-chaos, time is meta-eternity, space is meta-infinity and life is meta-death, change is meta – no change.

-These main categories: time, space, order, life, change are properties of the (living) observer, including the notion of memory as well. Observer is meta-observed.



Fig.11 Model of a human cell

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-When trying to understand /explain the emergence of living from nonliving, we have to take into consideration the nature of the observer(s). Are they looking from the prospective of biology or chemistry? What is their time and space scale? Just consider these differences between bacteria and human. What is a human year for bacteria, and what is two billion (human) years in the development of single cell organisms?



Fig.12 Cell structure – from the 5th grade Biology class notebook
(found in a garbage container)

-If we have a small bulb with two wires connected to a (charged) battery, we will see the light. Bulb will be “On”. However, if detach one wire either from battery or

from the bulb, the light will be “Off”. In both cases all the elements were there, but there was this miniscule change that made all the difference. And in this example, the wire was not connected or disconnected on its own will.

-An apple on a tree is living, while an apple falling from a tree becomes nonliving. Or it is in transition from living to nonliving, while falling still having some living properties but transiting into nonliving irreversibly. Is then the entire life a transition from living to nonliving?

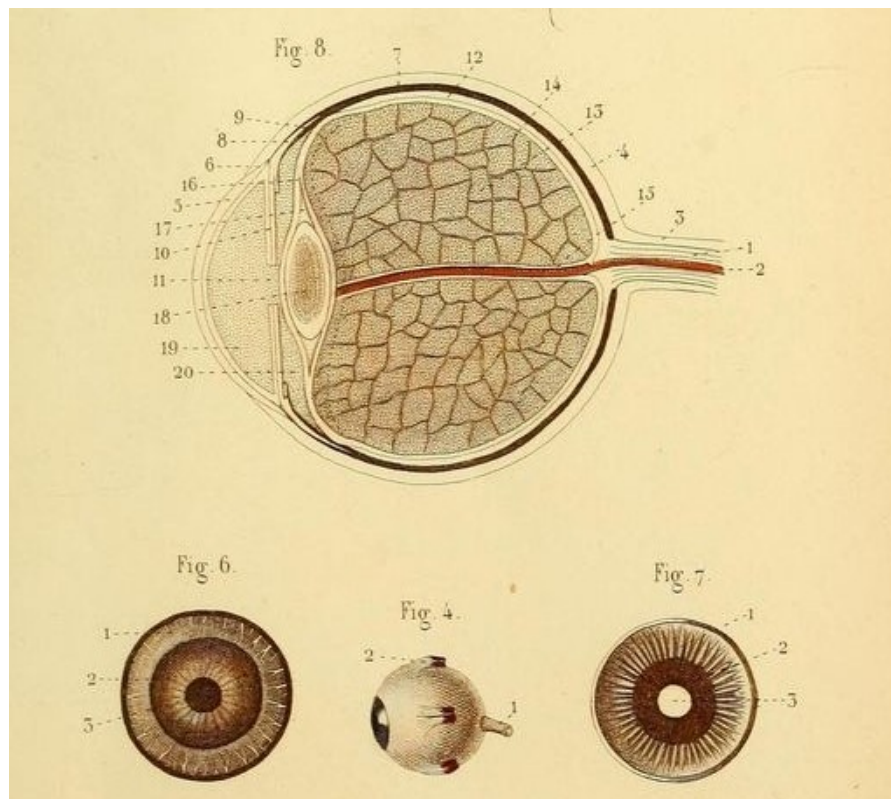


Fig.13 Human eye anatomy

-Can be such an observer that is nonliving? Or we should consider gradations here. Also what does it mean living, is it only in biological RNA/DNA sense or some other kind of “living form”? What would be AI as an observer; not only to see but to understand what it sees? And not just to compare one distribution of set of pixels with another. Can nonliving be an observer? Can nonliving be conscious and have its own will, to decide to turn on/off the light when it wishes, not how it is programmed? And have a second thought and change its decision? Can nonliving AI recognize and understand what life is and what are living beings?

-At some very small scale elements/components of both living and nonliving entities (human, AI) are dead matter.

-Input-output relationship-> metabolism; observation

-What is AI metabolism? Input: energy, data, commands; Output: heat, performance, result.

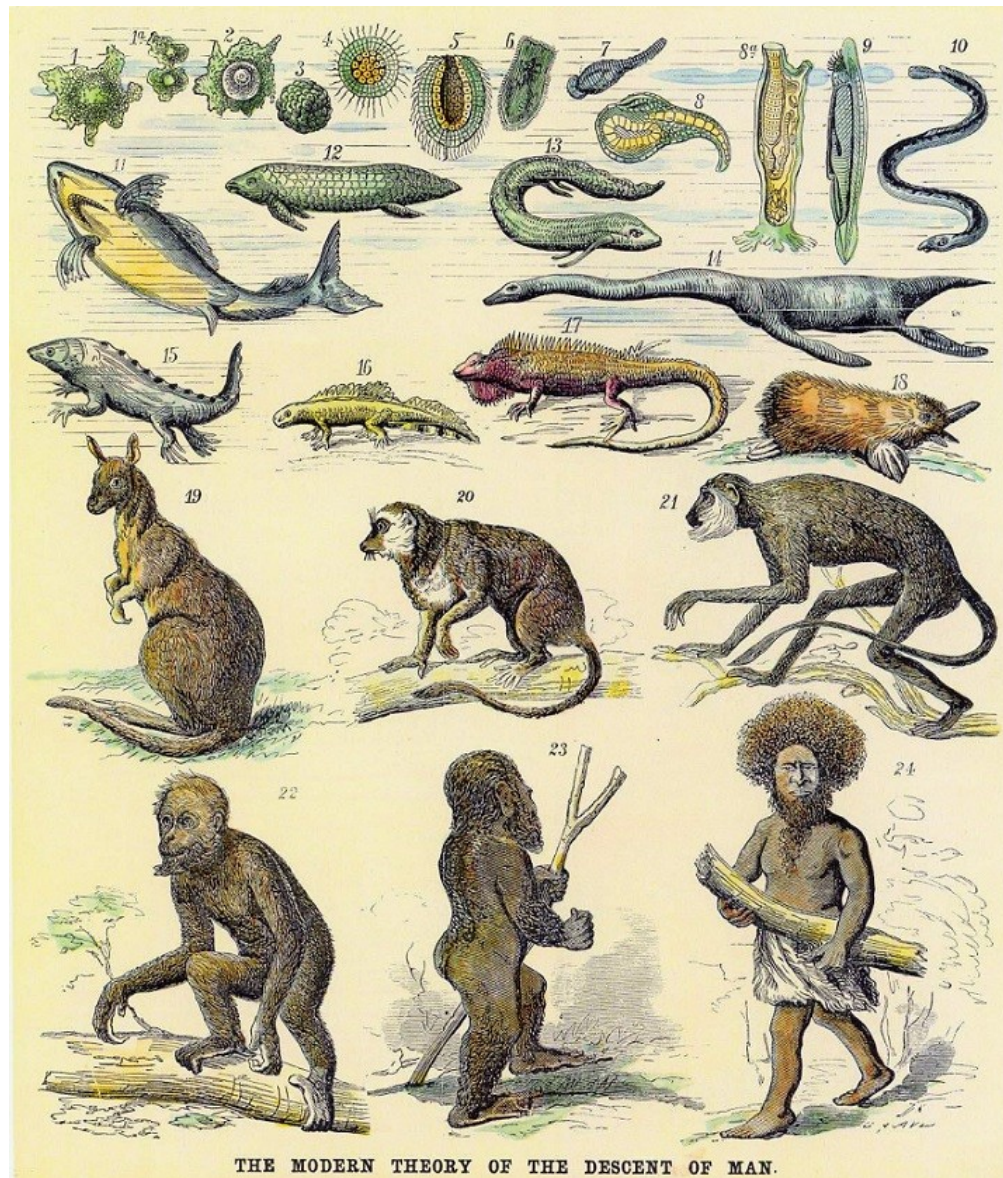


Fig.14 The Descent of Man

-If the Biosphere emerges as a single (conscious) living being (complex organism), then the entire evolution of life on Earth could be interpreted as its embryonic

development. The emergence of the first life form was at the same time the moment of “conception” of the Biosphere. Interestingly, while many complex organisms are morphing through their embryonic stages, here all these stages also remain present and actively participate in the constitution of the Biosphere, from bacteria to humans.



Fig.15 Evolutionary tree: prae-bacteria->bacteria->protists -> fungi, plants, animals

-Does an intelligent entity (living or nonliving) have to be conscious? Is conscious property only of a living being? What about intelligence? Can nonliving entity like AI, become truly intelligent?

-What is the difference between nonexistent (before birth or/and after death) and a non-living entity? Can entity be nonexistent? It might make sense if, at some point it becomes existent (born or produced). And when it existed up to certain point and then ceases to exist (die or destroyed).

-How our thoughts and consciousness sustain continuity as we move through space? This clearly shows that our thoughts are a product and integral part of our body(brain) and follow its movement. Even movements of physical phenomena such as a cannonball or a proton through space that can be calculated, but how their properties are located at x_1 in a moment t_1 , the next moment (t_2) disappears and appears at point x_2 remains a mystery.

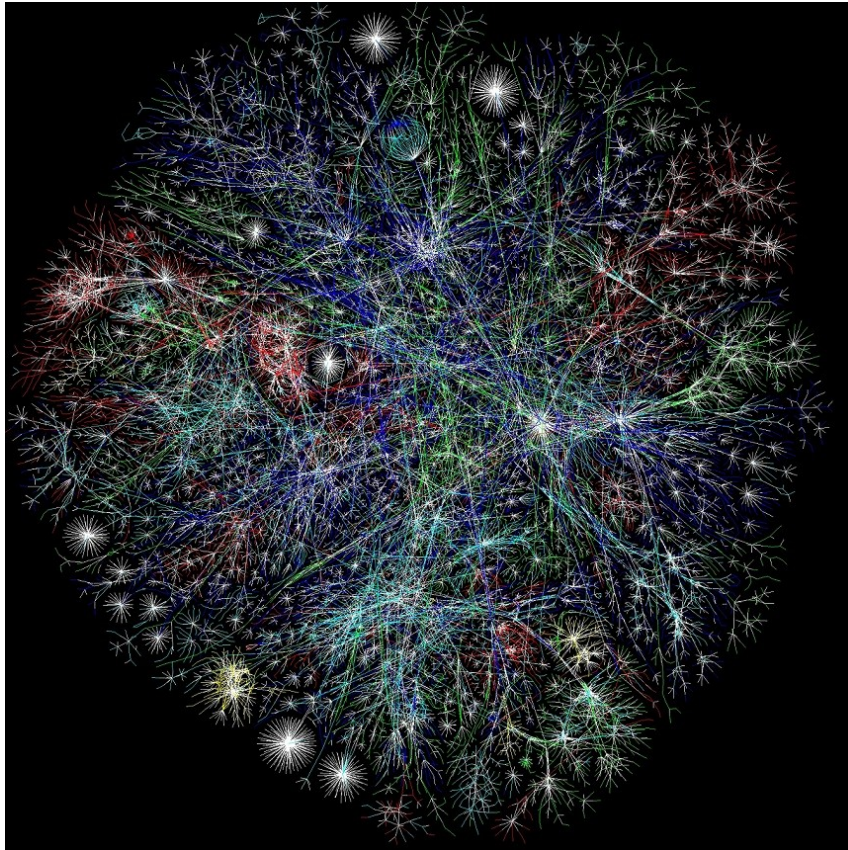
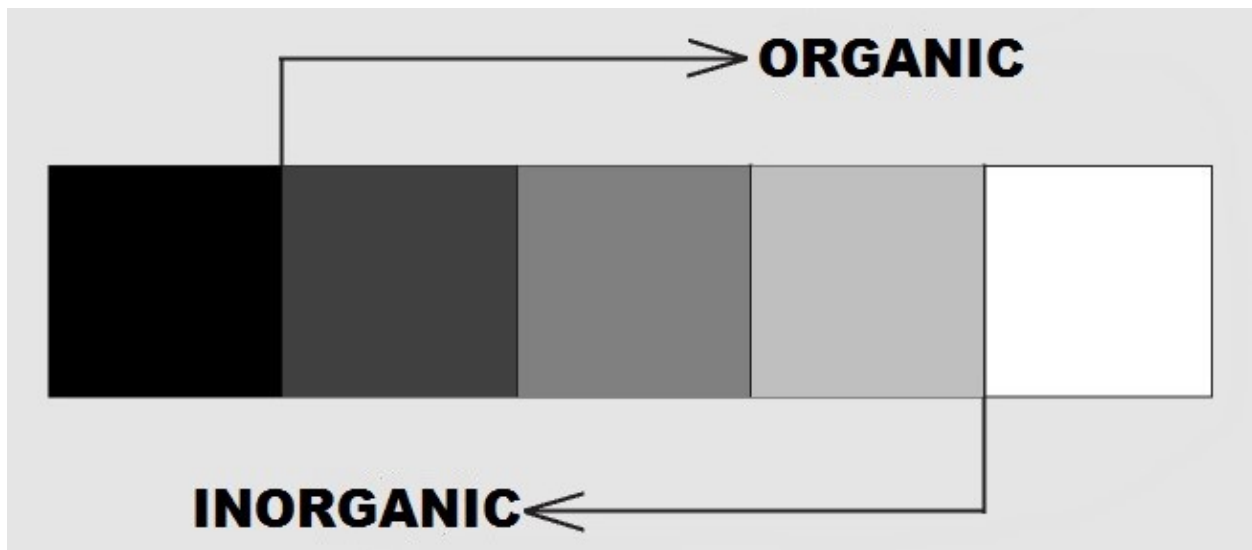


Fig.16 Internet web – is it a living or a non-living entity?

How certain local properties of space actually move through space seems not to be clearly understood/explained yet. Maintaining the flow of thoughts (consciousness) while moving is even more mysterious, since it is about keeping continuity of self-awareness while changing position like walking, or on a train, or traveling with Earth through the cosmos.

-Perhaps it would make sense to have more general categories like: organic and inorganic intelligence that would include AI, with some mixed stages between, since it seems it is not possible to define here a clear line of separation as well.

Organic can be both living and nonliving, while it seems, inorganic can be nonliving only, except if we do not take in consideration that on certain level all living is made of nonliving matter. Also, in principle, it might be possible to have nonliving organic AI, i.e. constructed of organic nonliving matter. On this diagram only black(dead) and white(alive) are clearly separated. Also, at very small scale (in relation to 1m/1s referential observer), on the level of atoms and simple molecules (H₂O, CO₂), we might consider that all the matter is inorganic. Interestingly, for a galaxy-size observer, the entire life on Earth would be a micro-phenomenon.



17. Organic-inorganic relationship

How the process/event of emergence might look like in case of the Biosphere if it ever takes place? When the elements/ parts of the emerging entity(fish in the school, bird in the flock , or ant in the colony) take part in forming the new larger entity, it appears that each individual part is not “aware” of this, they do not and cannot “see” themselves as a part of the emerging phenomenon from the “outside”. What is the tipping point in the process of moving from one stage (single bird) to another (flock), from a single entity (unit) to a much larger group formation with some very different properties? Is it something similar that was happening in the transition from non-living to a living matter and vice versa? Does the emergence processes in case of non-living and living matter (water and ants) have some similarities? It seems that in cases of non-living matter the tipping point is reached by the quantity of units. First, two gas atoms of hydrogen and one of oxygen are

producing a liquid molecule of water. Then a number of water molecules produce a droplet of water with its own emerging properties. Then a single water droplet joins many others in producing a river stream or an ocean wave. This example shows that same unit can take part in forming different types of emerging phenomena (stream, wave), and that it can even take part as a unit within another emerging event (droplet, wave). Also, the transition from a gas atom to a liquid molecule is not matter of large quantity, but from a droplet to a wave, it is.

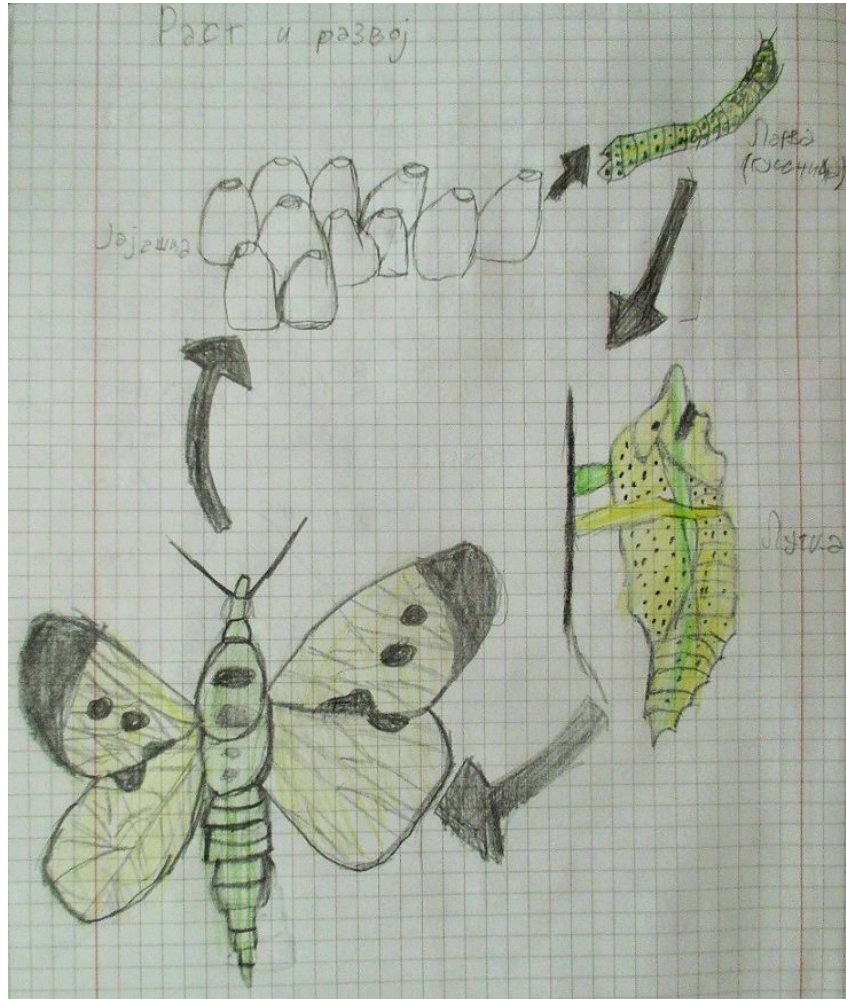


Fig.18 Butterfly life circle: egg->caterpillar-> chrysalis->butterfly

Another question relevant in case of the Biosphere is: how the emergence phenomena in case of the living matter are different from the non-living? How transition from one-cell to multi-cell organism differs from one fish and a fish school, or one bird and a bird flock? In case of higher multi-cell organism there is a specialization of cells and division of roles/labor, but the parallel specialization

appears among ants and bees. So, which of these two models of organizing living matter: bird-flock or ant-colony might be manifested/expressed in case of the Biosphere? Perhaps it might start as a bird-flock and morph into ant-colony model. At some point it might even become something closer to the complex living organisms with highly specialized cells and organs and with the brain as its central organ, where in case of the Biosphere the human (brain)network would be parallel to the single (human) brain.

-If the Biosphere ever emerges as a single being, what would be its main properties? Would it be able to “see” the world only from the inside out, or it might become capable to perceive itself from the outside as well? This seems highly unlikely since it would have to be a position outside of the (organic, DNA-based) life as we know it. One possible option would a view from some non-organic(AI) position, or from some alien, non-DNA based, life form. Another related question is if the Biosphere could or would ever reach the point of self-awareness, and how would that happened?



Fig.19 Spider web – is it a living or a non-living entity?

-The way astronauts are carrying with them a micro-biosphere into the space, resembles the first animals that moved from the sea to the soil all carrying within them a micro-hydrosphere.

-Your inside is out when your outside is in - your outside is in when your inside is out. (*Everybody's Got Something To Hide ... The Beatles*)

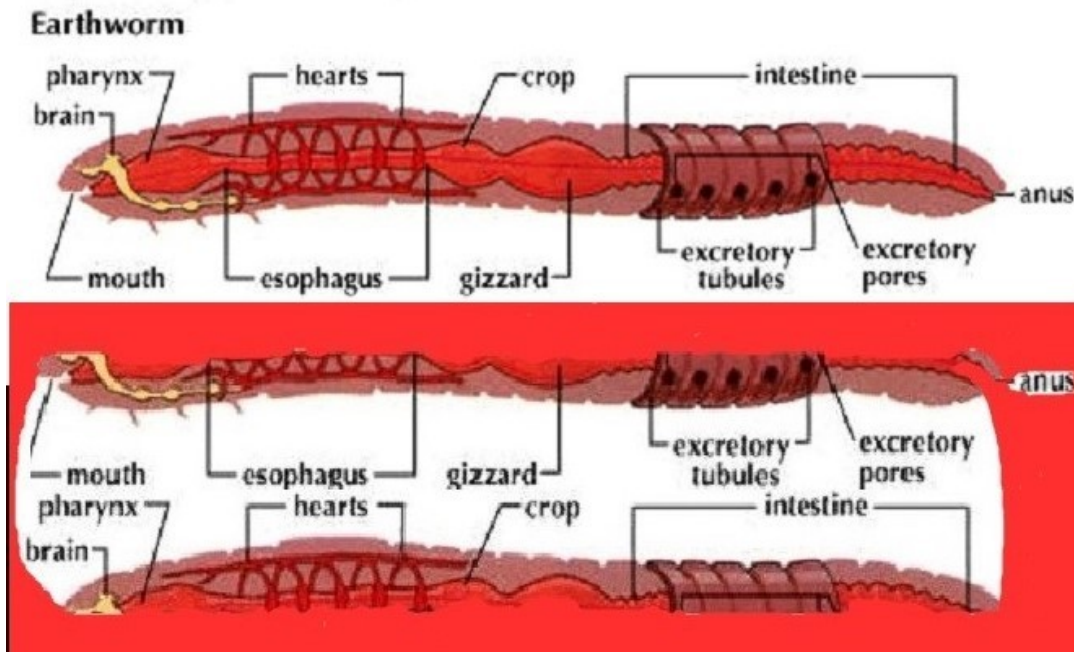


Fig.20 Earthworm metabolism-inside out/outside in

-What will be “The Next Common Narrative” relevant for the entire humanity? We now live in the “virus universe”. It is not story of a religion or history we are now submerged in, but the story of a virus pandemic that is reshaping our understanding of the world, our behavior, new customs and relationships with other people. Perhaps for the first time we have a narrative that encompasses all parts of the world. This is a story important to all people; we all understand it and try to behave accordingly. In case of previous collective identities, like those based on religion, race, ethnicity or tribe there is always the other. Our group is good, the other is bad. Now when we have all humanity on one (our) side, who/what is the other, the enemy? Is it just a virus or this mysterious virus is here a synonym for death? And virus itself is both dead and alive, like the Schrodinger’s cat, while all humanity is like a single cell organism attacked/infected by this strange enemy. We are inside and alive, while virus is outside and dead. Then, when the virus enters in, it becomes alive and starts to multiply, and we might die because of it.

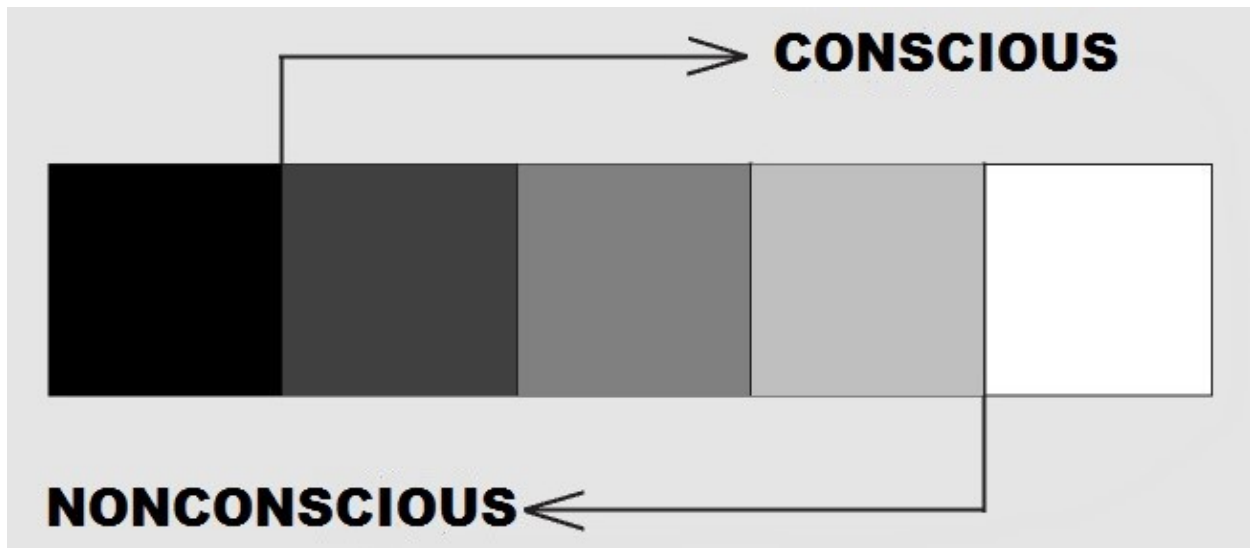


Fig.21 Nonconscious/Conscious - transition stages

-It might appear that this way imagined self-conscious Biosphere has certain godlike attributes, but no living being can live forever. Biosphere will continue to morph and most likely spreading beyond Earth into the cosmos indefinitely. However, even conscious Biosphere cannot be an immortal entity and will at some point most likely cease to exist, like any other living being. In other words, it would be natural, not supernatural entity.

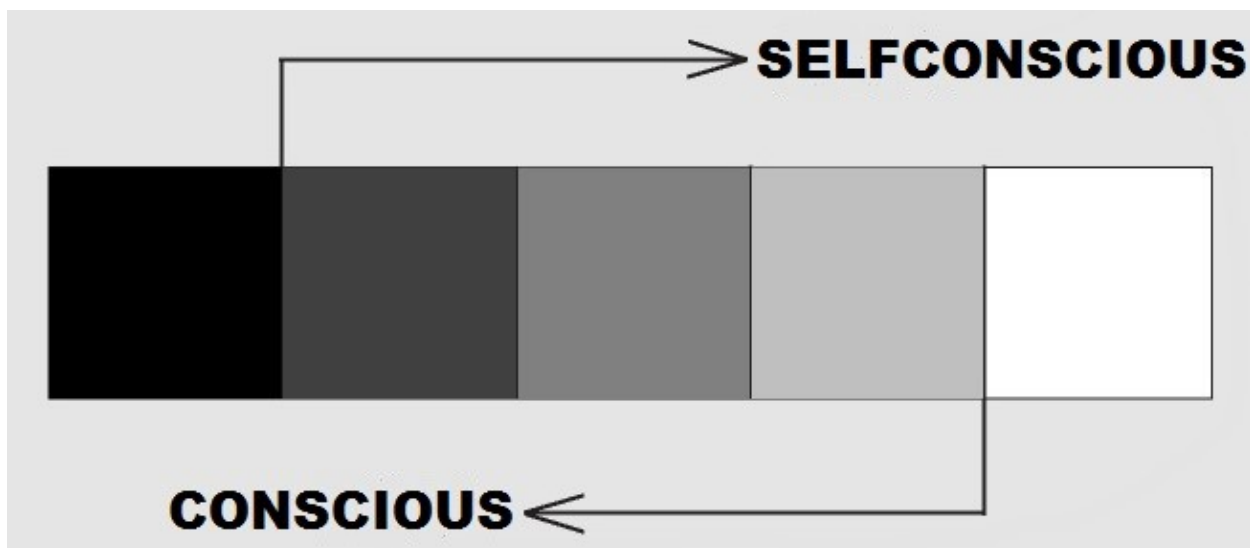


Fig.22 Conscious/Selfconscious - transition stages

If it ever happens, the transition of Biosphere from non-conscious to conscious state and then from conscious to self-conscious, will probably not take place in

some binary (off-on) jumps but rather gradually, perhaps in stages like shown on these five-value linear structure first introduced in my proposal for RNA/DNA visual representation many years ago shown in the beginning(Fig.01)

Gregor Mobius

Summer 2021

Fig.23 Evolution of Evolution Poster by 52 Weeks of Art

