

Theorizing Life: A Proposal for Definition and Division of Vitality

Abstract

Referring to the historical definition of biology which is considered as the scientific study of life, I will try to put forth some assumptions and explanations in order to give a basic definition of life or vitality. After investigating some relevant terms in the contemporary biology to improve them, I will mention the necessity of revision and distinction in accordance with the given explanations. The first is need for an update of the term known as “homeostasis” into “homeokinesis”. For this reason, I emphasize some propositions in order to clarify the distinction of meaning. The following three questions were repeated in the motivation and structure of this study: What is vitality? Does it have any degrees or grades? Then what is the fundamental state of life? As a result, considering the cell level as a base, in the hierarchy of the biological organization, I put forth a threefold-vitality-view as emergent in the levels of the cell, the organ and the organism. I also count consciousness and memory immanent in every level of the proposed multi-layered model.

Key Words: Vitality, Cell, Homeokinesis, Consciousness, Emergentism

1. Introduction

A biologist acknowledges the postulate that, the physical realm in which we live is composed of intelligible and explicable facts and phenomena. In doing so, s/he begins any scientific activity, otherwise it would become entirely impossible to activate and motivate rational studies on different subjects under scientific disciplines, and to deduct universal and/or holistic explanations. Since science is actually an activity and product of human intelligence, it is also assumed that science is open and subject to continuous renewals, updates better to say changes. In the realm of science, we should always keep in mind that: by the nature of things, we have limitations on the *quantity* and *quality* of sensory organs as well as those tools which we use to observe or measure the natural phenomena. Thus, this limitation effects our understanding of the universe and perspective of the reality.

Consequently, no scientist ever can claim that s/he has reached the exact reality by all means or the absolute truth. Every time we try to get, we catch a limited portion of reality, depending on our perspective(s). Therefore, we always leave the result of observations or measurements within a lower and upper limit range, in other words, within the limits of *possibility*. from the vast world of biology, for instance the level of glucose in the human blood, the pH level of human saliva, the frequency interval of sound heard by ears, wavelength of the colours better to say the frequency of light detected by human eyes, are certainly in a *range* limited with a lower and an upper limits. Mitchell (2020) discusses how our five senses -sight, sound, taste,

hearing and touch -permit us to acquire information about nature, considering these different modalities detect different aspects of a given phenomenon.

Regarding all these examples, it should be noted that we humans created tools as products of technology and in this way, we enlarged our view of natural phenomena, hence the image of the physical world. In any cases, we have a limited auditory world, a limited visual world, a limited olfactory world and so on. By all these, we create a limited world of sensation closely attached to our limited understanding of the universe. In case if we have limited sensory organs and tools, it is not wise to manifest an unlimited understanding, and an unlimited imaginary world. In addition, any tool or method that we use to increase our knowledge on any object, dramatically limits it. In other words, the better tools we invent, the more we enlarge our limits of knowledge on objects, but to what extend? Can we reach the very information and knowledge on the objects in physical universe? Then how to get mingled in this tangled universe? Better not to forget our limited physical capacity and use it in an optimum degree in order to understand and explain the physical facts and phenomena.

Being one of the natural sciences, biology is generally based on experiment(s) and observation(s) by methodology. As it is understandable from the origin of its name, biology is an inquiry on living entities which show the diverse manifestation of vitality.¹ From its name, it can be concluded that biology comprises every object that has the ability to live. It is distinguished from two neighbouring sciences, physics and chemistry sometimes by its method, often by the more complex order of its object. In this regard, the latest work given by the famous biophilosopher Mayr (2004), emphasizes that the philosophy of biology must be dealt with separately from the traditional philosophy of science in due to the difference of conceptual frameworks between physics and biology.

Vitality, in the shortest and simplest sense, is the thing that a living entity bears or shares. By definition, vitality is *other* than a living entity, but they are related to each other. About vitality, there are two questions that have been asked and discussed since the antiquity. The first is *What is vitality?* and the second is *How vitality originates?* Everyone who discusses the notion of vitality has a different definition of it according to his or her intellectual background. The vast diversity on the answers of such questions is because such topics are subjects to human intelligence. However, the issue of vitality -although it should be dealt with in the introduction of general biology books- is unfortunately neglected by only listing the common characteristics

¹ In this paper, I will use *life* and *vitality* interchangeable.

of living things, perhaps because we cannot go beyond providing speculative information about it. The continuous state of living or vitality cannot be defined by referring to the common characteristics of living things, as given in the textbooks. This is because the definition of life, in other words, the state of being alive, is not the same one thing with the *common characteristics* of living things, since these characteristics are functions of life. These *common characteristics* -although they are not clear to whom and to what extent they are common- are only signs of vitality that we can name: *symptoma vitæ*.

Common characteristics of living things should be discussed further because we need a division and distinction between the common characters which are immanent in the idea of vitality and those which are not obligatory, but common. Before giving a definition of life and suggesting the correction of some terms being used in the terminology related to living things, below I will mention three different issues related to the topic. The first is that either vitality has emerged in a system or it represents a systemic appearance. This is the first issue I will discuss below, under the next title. The second is that, vitality itself having a purposive (teleonomic) aspect, as the living things do. I will discuss it under the teleonomic view and put forth a telos (τέλος) for vitality and another one for living things. The third is that, chemistry offers a very convenient example for the basics of my statement on vitality. Thus, we will find an ease to remark that chemistry and biology are not far away, but they are neighbouring disciplines of science.

2. Living Things as Systems

A biological system consists of elements and different levels of sub-elements, that constitute it. Appearing at different levels all these elements and sub-elements, can be called as *units* according to our choice of *scale* or level and *purpose*. For instance, the cell is regarded as the basic unit of ‘the living entities’, while atoms or sub-particles are those of ‘the matter’. This is a subject of a *scale* and a *rational purpose* as in the pedagogical case of “limiting the explanations on vitality, by starting it at the cell-level”. As des Jardins (2006) states in a succinct way, some elements can be effective in the form of self-contained units, while others are meaningful only within a whole or in a system. Just as in the case that a textual expression is sometimes only meaningful within its context, especially in multicellular organisms, a number of cells that are separated from the organism do lose their vitality. Usually, with a holistic view, although a system is composed of different elements, we attribute meaning to these elements if they are part of a system, not as separate entities. Whenever we talk about organisms, it should be taken into consideration that organisms are open systems as stated by von Bertalanffy (1968),

and that they establish different contacts and relationships with their environment. At this point, the fact that a single-cell continuing to exist independently and does not seem to be part of a system, is not a contradiction. Because, since unicellular organisms are “*organisms on their own*”, they can be considered to be composed of systems, implicitly.

In fact, there is no concept of discrete or self-contained organisms in the biological universe. Because all kinds of individuality, are our preliminary supposition. For example, in a biological sense, it is impossible to think of human body as sterile of bacterial flora in the mouth, or in the intestine. Although this situation raises the question on *where the individual ends and where the environment begins*, I agree with the idea that there is no environment itself (per se) and there is no environment for a living entity that is not shared with other living entities (Lewontin 2015), in addition, environment is built by living things, every moment. From this point of view, I put forth the idea that *building the environment and being built by the environment* are among the very common characteristics of living things.

A question that might arise here is “why systems are needed in the biological world”, or “what the meaning of the biological world is to be made up of systems”. At this point, it must be noted that *there is no prerequisite in nature to be meaningful* and any kind of expression regarding the *meaning* is our accommodation and attribution. Every kind of scientific activity is in fact a human activity, that is to say, humankind searches for meaning through data that falls within the category of *scientific knowledge*. Therefore, the change of data over time, can also cause a change of the meaning. In fact, one of those meanings that we will draw from this point is that from the units’ level towards the systems’ level, different types of units are included in the system. The increase in the diversity of units and the increase in the complexity are the yields of a system. Therefore, from the cell level (diversity of molecules, organelles) to the organism level (diversity of cells, tissues, organs, systems, etc.) there is an increase in diversity and complexity, due to the returns of systemization.

3. The Inevitability of the Teleonomic View

The concept of natural selection, as given by Darwin in his grand opera ‘On the Origin of Species’² can be summarized into a sole principle outlined as *survival of the fittest*. Although the words *the fittest* and, *to fit* are left vague by Darwin, the expression of survival of the fittest

² For the title of the 4th chapter, Darwin uses “*natural selection*” in the first edition (1859). However, in the revised 5th edition, he uses “*natural selection and survival of the fittest*”, equivalently.

organism (or fittest population) covers every process of change under the terms: *variation*, *modification*, and *adaptation*. In this context, as a postulate for all living beings subject to natural selection, I put forth a sole basic purpose (telos): *surviving*. In fact, the first of two different *telos* to be suggested for the living things is to *survive*; the second may be to *evolve*. However, since there is no necessity for every living thing to evolve at all times and circumstances, the first one seems to be more logical. Within this text, I use *surviving as telos of living things*, and *continuation as telos of vitality*. In this way, the topic of telos makes a new sense for me. Because, referring to Aristoteles (199a25): “...it is plain that this kind of cause is operative in things which come to be and are by nature” I understand that he attributes one or more purposes to every living entity. However, in this paper I argue that instead attributing a telos to every living entity individually, I attribute a sole and universal telos to vitality, that is *continuation* and it causes every living thing to have a telos of *surviving*.

Given the explanation from the chemistry I provide in this text, it seems as if *the vitality endeavours to continue, therefore the living things to survive*. Since each cell and each organism will be in continuity as long as it can survive, a number of actions and reactions must continue as long as they support the vitality process. In this spatio-temporal space that we try to explain things by causality, surviving is not only an instant event or an image of a moment and it is not towards a single moment or place or to a final position. It is not just *to survive*, but *surviving*. Surviving is an essential and dynamic part of the vitality process that requires time and space. It is not only a single state, but rather a whole of states, even it is not a *stasis* but *kinesis*. Within this regard, the idea and suggestion of using the term homeokinesis, instead of homeostasis (Macklem 2008, Thamrin & Frey 2009) is very meaningful for us. While using the term homeostasis, it is meant to balance the external and internal conditions of an organism; the idea of a *static state* is actually given by implication. However, there must be an *ongoing flow* at every point and moment of life. Different examples from different systems or organs in the human body such as feedback mechanisms that are already present in the body, in fact, indicate that the equilibrium with the homeostasis in the macro scale is a continuous motion in the micro scale. In other words, even if the two scales of an arm-balance (with equal arms) appear to be fixed or static when observed from a distance, they are actually oscillating even at a minimum frequency. This oscillation originates from the fundamental properties of substance. Because living things are a part of the material universe, the factors that effect on the substance can also effect on the living things.

4. A Proposal Definition of Vitality

Vitality is the most important issue on the difference of biological world from the physical world. In other words, vitality is the main difference between biological organisms and the unanimated things. However, how this significant issue will be defined and processed in the modernization progress of science has itself become a problem. Because, according to the relevant literature given by Popa (2004), starting from 1855 until 2002, there is a total of 97 books or papers dedicated to the discussions on the origin or definition of life. The dramatical increase in the number of papers dealing with vitality in this millennium, in one hand indicate that the debate on solving the life-puzzle has been popular among scientists as well as philosophers, and in the other hand, there has not been consensus on a single, comprehensive and valid definition of vitality, yet. However, all these *life-authors* agree that: ***Life cannot exist without a living-entity***. That means, when we mention vitality or life, we have to consider the living things as well, since there is no concept of vitality per se, excluding living entities, in the natural world. Regarding the relevant literature, I can assure that sometimes the terms *vitality* and *living things* have been used interchangeably, as a mistake. However, I must highlight that *life* \neq *living thing*, because obviously, ***living entity is locus of life***. Again, the idea that “living things are different from life” is based on a human intellectual activity. It is essential that this intellectual activity also fits the current facts and phenomena in the biological world.

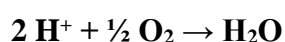
Since there is not a common understanding on the answer of the question “*what is life?*” despite that of the question “*what are mechanisms of life?*” I take this as an opportunity to suggest and put forth a new consideration including a definition of life: ***“Life is the coordination of the process of flow between the internal and external loads of a cell”***.³ The expression of *internal load* in the definition is comprised of organic substances that constitute the cell, transferred from the parent cells to the offspring, which are potentially present in the cell or is activated in a specific moment of the cellular time. The *external load* consists of everything affecting on the cell except the cell itself, which basically means the environment in which the cell lives. ***“Vitality is mechanised by a metabolism to balance the homeokinetic range between the minimum and maximum degrees, and is characterized by a reticular structure”***. In this description, metabolism is an instrument of vitality between the inner and the outer potentials. According to the second article of the Cell Theory (Schleiden, 1838 & Schwann, 1839), cell is the most basic unit of structure and order in the living beings. In this article of the theory, it is

³ Historically speaking, the definition I give here is very similar to that given by **Spencer (1884)**: “*The continuous adjustment of internal relations to external relations.*”

possible to make an update as follows: “*the cell is the most basic unit of vitality in a living entity*”. Therefore, according to my claim, the cell contains the most basic form of vitality. In the light of any definition of vitality, the cell theory itself suggests as a postulate that the cell is at the first level, we can observe vitality. Since I do not accept the hierarchical subcellular structures as living in any way whatsoever, therefore, the emergence⁴ of vitality is seen for the first time at the cell level, and it continues emerging gradually in every level.

5. Chemical Remarks

Pross (2016) in his work, which he started by questioning the possibility of introducing chemical explanations to biological phenomena, tries to find the answer to how the inanimate matter is transformed into a living organism, while at the same time trying to establish a viable connection and a valid principle between chemistry and biology. According to Pross, current discoveries in the replication chemistry can help us understand how biological processes begin. Again, he claims that a thermodynamic instability implies *dynamic kinetic stability*, and that this is the only stability that can be seen in the world of biology. According to the current rules of replication chemistry, in the self-replicating systems, the substance maintains its stability by reacting to copy itself, so that ‘replication provides the material with retention’. Moreover, a self-replicating system -since the dynamic kinetic stability tends to increase- will be more complex by time. Thus, I can conclude that the characteristics similar to the specific features of the organisms that make up the biological world already exist in the chemical world, in a manner. Chemical elements, as a function of their atomic configurations, exhibit a state of stability that we can call *elemental stability*. This element stability permits different types of reactions in an upper level of the functional configurations, to yield compounds. As a result of some reactions, compounds have very different properties than the elements that form them. That is to say, chemical reactions can take place in some cases to yield a compound which has emergent properties. In addition to the opinions and explanations by Pross (2016) mentioned above, I think -as an example for the subject-, we can consider a commonly known chemical reaction, the formation of water in our planet, as it is a necessity of vitality.



⁴ A recent review on emergence is authored by [Herring & Radick \(2019\)](#)

In the above chemical combustion reaction -according to our level of observation and idea of naming facts and phenomena- H is *flammable*, O₂ is *combustor*. However, as a result of the reaction, H₂O is neither flammable nor combustible but *extinguisher*. Such a reaction that yields water which is absolutely necessary for the process and emergence of life, has also given a quenching characteristic which is not present in both elements but it appears only in the compound yielded by the reaction. From the vast world of chemistry, many other reactions like this one may be examples, however I preferred the most clear and well-known one. In brief, the extinguishing or quenching feature of water is emerged in the above reaction.



Figure 1. A whole



Figure 2. Sum of parts

I have an addition or annotation to the Gestalt view (Koffka, 1935) articulated as “*the whole is different than the sum of its parts*”. In fact, Aristotle’s notion that a whole is not the sum of its constituent parts (and thus the order of the parts is also important) is expressed in the following way: “*we find that the syllable does not consist of the letters + juxtaposition, nor is the house bricks + juxtaposition*” (Metaphysics VIII.1043b5). In this case, by the view that “*the whole is (not only different but) more than the sum of its parts*”, we can explain the emergence of vitality. Because there can also be a configuration relationship between the whole and the part (or piece). As can be seen in the above chemical reaction, depending on the quantity and qualities of the components that make up a whole, the emergent characteristics can appear in the whole. I can give an example from my daily life as well. As shown in Figure 1, I used my daughter’s LEGO® bricks to build something similar to an Ionian Temple, in which many parts are arranged and ordered in a special configuration. However, as visible in Figure 2, sum of the parts is not in the same configuration although these parts are in an order. Thus, a eukaryotic cell is more than the sum of all its organelles, cell membrane and cytoplasm that constitute it up. Since, the cell is also the level in which the phenomenon of vitality appears in the hierarchy of the structure, for the first time and in the form of emergency. Probably some emerging

entities that we cannot detect at the level of the elements, however, come together at the level of the molecules, resulting in the vitality that we cannot see at the subcellular level but only at the cell level and above.

As in the form of replication chemistry, vitality is transmitted from the parent cell to the daughter cells by replicating itself. In this way, vitality gains continuity in *time* by keeping the cell as *locus* or *seat*. The fact that the vitality is transferred from one cell to the other cell or from one organism to another in the reproduction mechanism becomes more meaningful when it is considered together with the notion of sole telos: *surviving*, as mentioned above. In the discussions about telos, I agree with the view that the living things are distinguished from the lifeless things with existence of *teleonomy* and that *the autonomous design (telos) in living beings is the continuation and preservation of the species* (Monod, 2012).

6. The Relationship Between Consciousness and Vitality

Another topic that I need to address is consciousness. If I can reduce the definition of consciousness to *the idea or thought of movement or motion that a living entity should perform in order to preserve the integrity and continuity of its body or structure*, then I can claim that consciousness is already embedded in the phenomenon of vitality. I also find it reasonable to exist different levels of vitality, or different aspects of vitality that emerge at different levels, as well as having different levels of consciousness embedded in those levels of vitality. While it is certain that an organism will perform various actions to keep homeokinesis at different levels of its organization, these actions sometimes appear as conscious actions, that's why we sometimes attribute a state of consciousness to animals or even to plants. In fact, it is incorrect to see and treat other living things as '*the objects*', using the advantage of being human. Therefore, it is essential that we should see and treat every living thing as '*the subject*', because living things are not only passive objects, but rather subjects that always interact with their *environment*, by means of affecting on it or being affected by it.

Especially the recent increase in the number of publications asserting that plants have known themselves and their environment, been perceiving environmental changes, and been performing activities in order to protect their organismal integrity and functioning in the context of a response to the environmental changes, introduce the idea of a vegetative consciousness inherent in plant vitality. We can also consider the very activities that plants perform, for the sake of providing *homeokinesis*, as a function of this inherent consciousness. Thus, the fact that

plants are treated as individuals or subjects in the books like *What a Plant Knows* (Chamovitz, 2018), will be significant. In the context of the possibility of a gradual consciousnesses related to gradual vitality, the different consciousnesses and the different types of memory matched by Tulving (1985) in his APA award-winning work are quite noteworthy. Accordingly, Tulving posits procedural memory as associated with anoetic (non-knowing) consciousness, semantic memory with noetic (knowing) consciousness, and episodic memory with autonoetic (self-knowing) consciousness. Among these, anoetic consciousness provides organisms the opportunity to preserve the learned connections between stimuli and reactions, in the procedural memory. As quoted by Chamovitz (2018), the lowest level of consciousness (anoetic), coupled with procedural memory, indicates the capacity of organisms to perceive and react to the internal and external stimuli. From this point of view, I claim that at the cell level there is a “cellular memory” associated with “cellular consciousness”. An example to one such memory is T (Thymus) Cells in the human immune system. These cells recognize the microbes that are detected to be harmful to the body introduced to an infectious disease (or vaccine in many cases) and they contribute to the expulsion of the microbe from the body in a shorter period of time, if the body encounters the same germ in the following period of time. Therefore, T-Cells are also known as memory cells of our immune system. In the very interesting book authored by Mancuso and Viola (2017) on plant intelligence, ‘*intelligence is considered as a feature of life as an element that even the most modest single-cell should possess*’, elucidating the idea that *biological intelligence is a sine qua non for vitality*. The definition of biological intelligence given by the authors above coincides with the principle of minimum vitality in the anoetic consciousness and procedural memory proposed by Tulving (1985). Then, it is possible to make a synthesis by evaluating the two inspiring works together: ***Vitality means not only coordination but also and emergent consciousness and intelligence.***

Two different mechanisms in the living things have become the focus of attention with the increasing work in the recent decade. One of these, proprioception, is known as the perception of the position and posture of different organs, by the body, especially in mammals (Jones, 2001). Moreover, Chamovitz (2018) considers proprioception as the sixth sense, and lists a number of evidences on the matter that proprioception exists in plants. The other mechanism in living organisms, *quorum sensing*, is being investigated by an increasing number of scientific studies in the milieu. Using a signal-response system, individuals in a population can synchronize their behaviours at the population level and act as a sole multicellular organism (Kaya & Yardımcı, 2014). This means that a unicellular bacterium engages the very common

actions with its *peer-group* of bacteria. In such cases, it is seen that the *particular* organisms, together with their peers who share the same spatio-temporal network, hypothetically behave like a single, *universal* organism. Just like a flood of applause, initiated randomly by the audience in a theatre, turns into a single co-applause process with synchronized rhythm after a short while.

When these two features, proprioception and quorum sensing are considered together, it is obvious that *a living organism is open to interaction with another individual similar to it, but in order to perceive similar living things it must first be aware of itself*, and in order to achieve these two actions, I conclude that, *it must be accompanied with a level of consciousness and a memory type even at a minimum degree*. Because features like proprioception as well as perceiving “the other” and selecting the ones like itself, seem to be necessary for the survival of the organism. In sum, all living things have a perception of *the self* and *similarity to the self*, which necessitates a type of consciousness.

In this case, while I claim that a biological consciousness is embedded in the phenomenon of vitality, I mean a cellular consciousness inherent in the vitality at the cell-level, an organistic consciousness inherent in the organ-level, and finally an organismal consciousness inherent in the organism-level. Given the example of the fact that organ transplantation is possible from the bodies of individuals with brain-death. Since not all of the organs *die* at the same time with the brain, it turns out that *organ vitality and organism vitality are not one and the same thing*. Therefore, if to repeat it, I propose a *multi-layered model of vitality*, with at least 3 different but inter-connected layers, as shown in Figure 3.

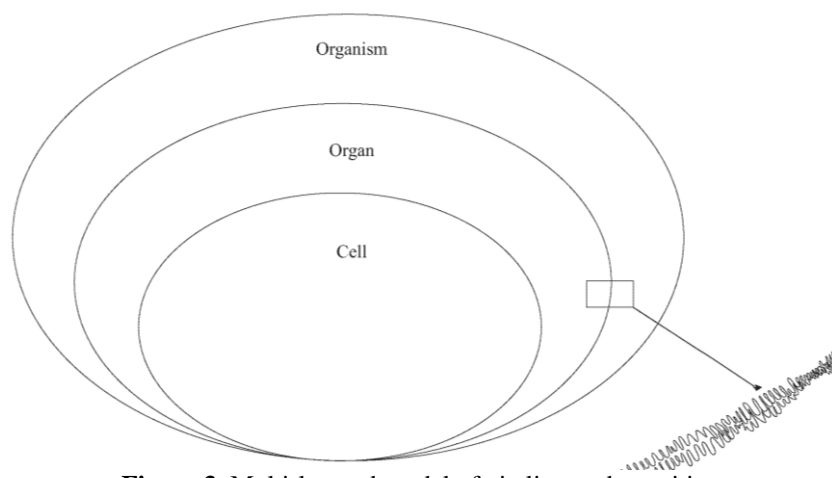


Figure 3. Multi-layered model of vitality, and transition

In this multi-layered model, since an organism consists of organs and an organ consists of cells, I propose the cellular vitality in the centre or in the base, then comes the vitality of the organ(s)

and then the organism(s). The transitions or the neighbouring between levels are like the membranal junctions, allowing a slight fuzziness. This model can be formulated as below where $\text{Life}^{\text{cell}}$ is possible and $\epsilon!$ is emergence.

$$\text{Life}^{\text{cell}_1} + \text{Life}^{\text{cell}_2} + \text{Life}^{\text{cell}_3} + \dots + \text{Life}^{\text{cell}_n} + \epsilon! \rightarrow \text{Life}^{\text{organ}}$$

$$\text{Life}^{\text{organ}_1} + \text{Life}^{\text{organ}_2} + \text{Life}^{\text{organ}_3} + \dots + \text{Life}^{\text{organ}_n} + \epsilon! \rightarrow \text{Life}^{\text{organism}}$$

In a sense, the three types of consciousness given by Tulving (1985) coincide with the tripartite soul view that we see in the history of ancient and classical natural philosophy. Tulving's types of consciousness and memory imposed on plants, animals and humans, respectively; are suitable for vegetal, vital and animal spirits. Another point is that both the Tulving-type of consciousness & memory and the classical soul types are necessarily woven in a mono-hierarchical block, that is to say, the upper self or the state of consciousness encompasses the lower one, totally.

As for the absolute result of life, it is the loss of vitality, that we call death. So far, I have dealt with three different levels of vitality, but in fact, I necessarily suggest death on three different levels as well. The vitality at the cell level should be compared to cell-death, that of the organ level to the organ-death, and finally the vitality at the organism level should be compared to the death of the organism. The three-layered death is countered by the three-layered vitality, via two different mechanisms. It is through these two fundamental mechanisms that vitality tries to postpone or eliminate death by defying it. More precisely, the existence of two mechanisms in the biological world maintains the vitality of species despite the death of individuals. The first of these mechanisms is *biodiversity* brought about by differentiation at the cellular, organistic and organismal levels, and the second is *reproduction* in any form. According to the first mechanism, the adaptation of the individuals to the new environments creates the possibility and opportunity of *living more*, in a *horizontal plane*. Therefore, as a result of biological diversity, different living things can be accommodated in different substrates and habitats, while the possibility of the vitality of an organism composed of different systems, organs and cells enters the process of transition from *the potential to the actual*. According to the second mechanism, in order to maintain the vitality and spread surviving -which is the unique telos of living things- to this spatio-temporal universe, living things produce new living things similar to them and transfer the vitality from one generation to the next, in a *vertical plane*. As a return of reproduction, biodiversity is sometimes promoted (e.g. by sexual reproduction), but it is always possible to transfer the vitality from one organism to the next, from one generation to

the next. Thus, the second generation derived from the first generation maintains vitality and in this way the chain of vitality flows.

7. Conclusion

Since the scientific understanding of our age presents a concept of the universe constructed of particulars, arguably we are approaching the facts and phenomena with a universal perspective. In particular, the data obtained in our century via any branch of science are extended to the whole, virtually with a universal or inductive perspective, and the claim of reaching to the truth(s) of the universe seems quite attractive to us. Nevertheless, other possibilities should not be ignored, and a scientist must assert the claim that approaches the truth, rather than the claim that comprehensively encircles the absolute truth. Because not every point of the universe is homogeneous or uniform. The existence of the living world (animate world) provides an example of the heterogeneous universe model when compared to the inanimate world, while the biodiversity seen in this living world suggests that vitality may be concentrated in different ways, in different living things. For this reason, studies on the world of living things should be carried out with an interdisciplinary perspective.

Yılmaz (2013) in her inspiring and splendid work discusses the three of Aristotelian causes (material, formal, efficient) blended with examples from the contemporary biology, and quotes from Aranda Anzaldo (2007): “...*molecular biology must leave behind the narrow-minded notion of causality that permeates the neo-Darwinian gene-centred view, and recover the spirit of classical natural history and its four types of causation: material, efficient, formal and final, in their original non-theological but Aristotelian fashion*”. The holistic view is actually the point of inspiration for this article. However, to the context that Yılmaz (2017) notes: “*According to contemporary science, there is no telos in biological phenomena. Living things and their parts are not moving toward some specific end*”, I propose a contribution, that is, the telos I give or intend to give in this paper means not only a final state but a process whole of states. Ultimately, just as living things are dying, vitality can end and disappear.

Although it is a general approach in text-books, to take living things by mentioning a number of their common characteristics, describing the properties of an object cannot be considered as the exact definition of an object, and I do avoid repeating such an approach here. In addition, as discussed especially in the philosophy of medicine (Virchow, 1958), that we distinguish between the disease itself (*ens morbi*) and the cause of the disease (*causa morbi*), likewise, in

my view, the signs of vitality (*symptoma vitæ*), the causes of vitality (*causa vitæ*), and the vitality itself (*entitas vitæ*), should be distinguished. The cause(es) of vitality can be demonstrated by information obtained from disciplines such as replication chemistry, biochemistry and molecular biology, which are briefly pointed in this paper. As the signs of life, the common characteristics of living things can be discussed under various titles. However, it should be noted that these common characteristics may sometimes be subject to exceptional circumstances. We can define life itself as it is given in this paper and consider it as an emergent phenomenon that becomes increasingly different and complex at the levels of cells, organs and organisms.

The physical realm that we are in and are a part of, consists of *continuants* and *occurents* (Simons, 2018) that both groups are remarkable by being conceivable and understandable. Therefore, the fact that there are problems that have not yet been solved and questions that have not been yet answered by science(s) should not mean that they will remain in this way forever. The notion of vitality, as discussed in this study, is also included in the *continuant* category. For instance, while the vitality of one fish at a single moment in the spatio-temporal network is an *occurrent*, the vitality of all fish is a *continuant*. As fluently articulated in a recent work (Dupré & Nicholson, 2018) the postulate of “*the existence of things is conditional on the existence of processes*” with a reference to Heraclitean doctrine of flux, asserts that biological facts and phenomena are *dynamic stable processes existing in various period of time*. Thus, Dupré and Nicholson (2018) consider an organism as a *hierarchy of processes* rather than a *hierarchy of structures*, which becomes even more meaningful when considered together with the notion of continuants mentioned above.

In this study, without neglecting the possibility of explaining biological phenomena and events based on a language of either physics or chemistry (or a mixture of the two), rather than *reductionist* point of view, since biology -as the study of living things-, has some unique methods, definitions and principles, I claim that life (vitality) is an emergent process, therefore I support an *emergentist* view. As it is the often case in the world of living things, I assume that new features may emerge as a result of the interaction of the parts that make up the whole, so I consider that life itself is a process rather than being atomic entities or partial process propositions. The two premises of my proposal are:

- a. the cell is the most basic unit of vitality in a living entity
- b. the whole is (not only different but) more than the sum of its parts

Having in consideration with these two premises, as a result, I put forth a multi-layered model of vitality that can be theorized as below:

- 1) In its simplest definition, vitality is the regulation of the flow process between the internal and external loads of a cell, organ and organism.
- 2) Vitality is mechanized by a metabolism to balance the homeokinetic range between the minimum and maximum degrees at the cell, organ and organism levels and it is characterized by a reticulated structure.
- 3) Vitality is not only an emergent coordination, but also immanent a type of consciousness and memory in each level.

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