

# ON LIVING BEINGS: BIOLOGICAL AND PHILOSOPHICAL ASPECTS\*

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**ABSTRACT:** This is an interdisciplinary work (biology-philosophy) product of reflection on the challenges today presented by a biological vision of the world regarding questions, concepts and notions of cosmology (Philosophy of Nature). Based on and in dialogue with the current state of biological research, this work deals with certain cosmological problems such as that between the living and the inert, the traditional division between the soul or the vital vegetative principle, sensitive or intellectual; the problem of individuation and the concept of species, among others; the solution found within classical philosophy in this paper takes into account the latest discoveries findings of modern biology.

**KEY WORDS:** Biology; Cosmology; Living beings; Species; Evolution; Essence; Evolution.

## *Sobre los seres vivos: aspectos biológicos y filosóficos*

**RESUMEN:** Este es un trabajo interdisciplinar (biología-filosofía) producto de la reflexión sobre los desafíos que presenta hoy una visión biológica del mundo en torno a cuestiones, conceptos y nociones de cosmología (Filosofía de la Naturaleza). A partir y en diálogo con el estado actual de la investigación biológica, esta obra aborda ciertos problemas cosmológicos como el de lo vivo y lo inerte, la tradicional división entre alma o principio vital vegetativo, sensitivo o intelectual; el problema de la individuación y el concepto de especie, entre otros; la solución encontrada dentro de la filosofía clásica en este artículo tiene en cuenta los últimos descubrimientos de la biología moderna.

**PALABRAS CLAVE:** biología; cosmología; seres vivos; especie; evolución; esencia; evolución.

### 1. LIVING BEINGS

«The end is the chief thing of all», Aristotle states in *Poetics*<sup>1</sup>; we begin then following the wise affirmation of the Philosopher by declaring the end we seek in these pages; that is, to outline the interpretation the biological sciences give to the fundamental facts of living beings and consider the challenges that the natural sciences in general, and biology in particular, today pose to philosophical knowledge in its perpetual mission to form an idea of the universe.

As metaphysics teaches, the universe is not homogeneous; it is constituted of a multiplicity and diversity of beings participating in a gradual process of being and perfection. Mankind occupies a middle position, as a link between

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<sup>1</sup> *Poet.*, 1450a, 23

spirit and matter. Even in antiquity Democritus referred to a *microcosmos*<sup>2</sup>, encompassing all manner of being (*Physis, Bios, Psyche, Nous*) and thus, can be accessed in *ascendant* or *descendant* terms. The former, which is of primary interest in the present work, both in terms of human beings and other living beings in general, is based on the conclusions of the natural sciences, approaching philosophy by way of cosmology or the philosophy of nature towards anthropology on the one hand, and towards ontology on the other.

As W. Pannenberg states: «a conception that takes interest in what I call the uniqueness of humanity (the unique and outstanding position of Mankind in nature), cannot be defended with the arguments of antiquity on the metaphysics of the soul»<sup>3</sup>. Ancient and medieval philosophy, perennial philosophy, has amply dealt with the subject of Mankind, producing anthropological theses that contain great truths about the *origin, nature and purpose* of human existence; but the current crisis of knowledge (fragmentation, hyper-specialisation, criticism of the foundational knowledge, metaphysics and theology, and the consequent occultation of the totality and purpose of contemporary man) requires an extension of philosophy which critically assimilates the results of experimental sciences on living beings in general and human beings in particular (specific anthropologies and, especially, human biology and paleo-anthropology). Current *philosophical anthropology*, which arose from the separation of classic *rational psychology* in the work of Max Scheler *Man's Place in Nature* (1927), is pursuing a fruitful path by the hand of its pioneers (M. Scheler, H. Plessner, A. Gehlen) towards the so-called *biological anthropology*, the central idea of which is that Man is a being whose corporeality, and not only his faculties and advanced psychic operations (intelligence and will) patently demonstrates the presence of rationality (or the spirit)<sup>4</sup>.

We believe that the notion referred to as *ascendant* philosophy, in dialogue with general biology, human biology and paleoanthropology makes it necessary to consider the incontestable fact of the *current* scientific panorama and the moral responsibility inherent in the dissolution human nature is undergoing in contemporary culture and society and its practical consequences. Consider, for example, the animal rights platform known as the Great Ape Project, founded by Peter Singer, and its rejection of the *principle of the sanctity or holiness of human life*; and the inhuman practical consequences it justifies and promotes<sup>5</sup>. These

<sup>2</sup> DIELS, H., *Die Fragmente der Vorsokratiker*. Berlin: Weidmunsche, 1954, DEMOCRITUS, Frag. B. 34.

<sup>3</sup> PANNENBERG, W., *Antropología en perspectiva teológica*. Salamanca: Sígueme, 1993, p. 36.

<sup>4</sup> Cf. PRIETO, L., *El hombre y el animal*. Madrid: B.A.C., 2008, pp. xx, xxi.

<sup>5</sup> The Great Ape Project aims to extend the community of equals to include the great apes, basing its reasoning on «the evolutionary proximity and genetic similarity we share with our ancestors, the great apes and the cruel reality of our treatment of them, which is endangering their survival», according to the defence of an initiative presented before the Spanish parliament in 2006 by the Green Party MP, part of the Socialist parliamentary group, Francisco Garrido Peña. Cf. «Non-legislative motion to join the Great Ape Project» (161/001625), in the *Boletín Oficial de las Cortes Generales: Congreso de los Diputados*, VIII Legislature, series D, number 369 (114-2006), pp. 23 ss.

and other similar ideologies are presented as legitimate scientific conclusions and occupy in the collective imagination the place legitimately corresponding to foundational knowledge.

The word «life» is one of those fundamental words whose meaning is impossible to fully define or circumscribe in any precise way. With these words, it is wise to be dubious of suspiciously exact and simple definitions. The amplitude of its meanings is evident in spoken language. We speak of «life» to refer to certain beings in the universe, wildly diverse, which constitute the astonishing variety of the biosphere. «Life» is also used to refer to the duration of these beings or things in general. In the scope of human action, «life» can refer to one's professional life, moral conduct, a description of the notable actions of a person (biography), etc. We can hear references to academic, cultural, romantic, social, artistic, political and economic aspects as well. It is surprising that common language uses the same word to refer to such a range of different things, beings, aspects or activities as distinct from one another as if in a melting pot or the mind of a poet.

Why do we use the same word to identify such a diverse range of things? What do people mean when they say «life»? The first question requires us to recognise that the term «life» is not univocal; that is, it does not have the same meaning to all people but is used to describe a wide range of realities to the point where the only thing in common is something metaphorical. It is analogous, that is, the realities and concepts expressed using the word «life» are similar but are also very different. It is important to take these nuances into account since the abstract concept of “*life*” means or refers to a series of acts and operations that are performed by various beings called living or alive. Anyone in their sound judgement knows what life is when distinguishing between something that is alive and something that is not; for example, a cat and a stone, and this is expressed in speech. Paraphrasing Saint Augustine referring to time<sup>6</sup>, one can say that we know what life is until we are asked what it is.

It is important to note that scientific knowledge is based on the spontaneous knowledge and reverts to it. Although one can distinguish between common knowledge and closer study of the phenomenon, the object of study, in this case the nature of living beings, is determined by this immediate common knowledge.

The question of life arises, as with all scientific questions, from admiration: it is admirable to contemplate the universe in all its unimaginable dimensions, immeasurable in its greatness and ineffable in its order and beauty.... Billions of galaxies formed by countless stars and within one, the spiral galaxy of the Milky Way, at one of its extremes there is a star with a group of orbiting planets: a solar system which includes planet Earth, where we find an incredible diversity of living beings. Approximately ten million species live on planet Earth; and it

<sup>6</sup> *Confesiones*, XI, 14, 17

is even more astounding to consider that, *ad intra*, this entire universe takes on consciousness of its existence and beauty in Man, the intelligent living being.

To pose the question of life in its proper terms and to attempt a coherent answer, we must firstly consider the epistemological scope of the question itself. In scientific terms, the question of life falls within the scope of biology and philosophy<sup>7</sup>. The harmonious set of biological sciences, commonly referred to as biology, studies the form, structure, function and composition of living beings, their behaviour and interaction with their environment, etc. In turn, empirical psychology differentiates living beings that, through their cognitive, tendential and affective actions manifest a psychic life and, thus, deals with animals and human beings<sup>8</sup>.

Secondly, one must note that the notion of life (noun) is itself an abstract of to live (verb); thus, the question «what is life?» is very different from «what is alive?» or «how is a living being?». The first question falls within the scope of philosophy, the other two are questions of biology. From this distinction, we can affirm as an initial philosophical approximation that «live» is a manner of existence: not everything that exists is alive, although everything that lives exists, and what exists is a specific and singular thing. The universal and abstract, despite what Platonists believe, does not extend beyond its reality, the confines of the mind: life does not have a real existence. Living beings exist and, through biology, can be delimited and described by their characteristics. Therefore, we will proceed firstly by indicating seven characteristics of living beings as the basis for the philosophical question of life.

## 2. CHARACTERISTICS OF LIVING BEINGS

1. Organisation. From this is derived the word *organism* with which we refer to living beings. The organisation of the living being cannot be defined as crystalline nor as amorphous. In the living being we find isolated and interrelated parts and extra-parts, forming a unity. In the domains Archaea and Bacteria, the organism is unicellular, possessing a set of physiological functions proper to all living beings: that is, a) ATP (adenosine triphosphate), the molecule of energy exchange which provides the energy contained within the chemical link of phosphate

<sup>7</sup> The holy sciences also address the question of life; in fact, the consideration of the degrees of life leads to the contemplation of the essence of life: God and transcendence (see Saint Thomas Aquinas, *In de Div. Nom., cap. VI*).

<sup>8</sup> Regarding physiological life, psychic life is characterised by the sensibility and growing interiority to human self-awareness. Psychic activity is divided into two irreducible levels we may call inferior (organic cognoscitive, appetitive and affective acts) and superior, when these same acts are intrinsically independent of organic factors, such as human psychic acts. Thus, the conclusions of experimental animal psychology cannot, ipso facto be extrapolated to humans.

(ADP producing respiration. This molecule is found in all metabolic activity. b) The production of ATP, or respiration, can be suspended at low temperatures, and with it the rest of vital operations, allowing the organism to enter an inactive state while remaining alive. c) There is an organisation structure with bacterial hyper-structure such as chlorosomes, carboxysomes, cytoskeletons, nucleoid, ribosomes, etc. d) In the Eukarya domain we find cellular organelles delimited by membranes and, in multicellular organisms, we find interrelated tissues, organs and systems.

2. Living beings store information in five aspects that are the origin of all activity: metabolic, motor and replication. Each living being preserves highly complex information regarding its development, structure, metabolic activity and exchange with the environment. This information is codified in hundreds and thousands nitrogenated bases that constitute their DNA and form their genes. These genes express an ARN in the ribosome leading to the production of proteins. DNA consists in the double helix of these sequences accompanied by proteins are contained in the chromosomes. This information is duplicated at the moment of reproduction and is present in all cells of the multicellular organism. The information, protein activity and cellular environment determine the sequence of embryonic development of the individual. It also contains information concerning the activity, growth and reproduction of each cell of the tissues and organs of the living being. Comparative study of DNA can identify genetic interrelationships between individuals and with these establish phylogenetic relationships to determine the common origin of species: LUCA (*Last Universal Common Ancestor*).
3. The living being is dependent on its environment but separate from it. Every living organism has an organisation which makes it both independent and dependent on the environment in which it lives. This separation of the living being from its environment is achieved in unicellular beings through cellular membranes; and in multicellular beings through surface organs such as skin, shells or exoskeletons. The levels of organisation: cellular, tissue, organic (in the sense of organ), system and complete organism. Both the membranes of unicellular organisms and the tissues, organs and functional systems in multicellular organisms permit the organism to maintain its internal structure and relate with the external environment.
4. Stability of the *internal environment*<sup>9</sup>. In a certain sense, the stability of the internal environment of a living being is proof of its separation from its external environment and of its vitality. One of the most notable characteristics of the living being is the constant dynamic of the internal

<sup>9</sup> The expression «internal environment» was coined by C. Bernard in 1865, although its use in physiology was popularised by W. Cannon in 1926.

environment, both at the cellular level and in terms of tissues and organs. The regulation of this internal environment depends on the capacities of each organism and when this regulation is lost, death normally follows. We have seen in the previous characteristic that a living organism is an open system in continuous relation with the environment in which it lives. This environment may be constant but generally varies in time and space; in the face of these changes, living organisms react by means of adaptation through regulatory systems; these are never absolute, but operate within certain tolerable maximum and minimum limits. The stability of the internal environment depends on a dynamic equilibrium regulated through sensorial processes of the regulating parameter (temperature, pH levels, CO<sub>2</sub> oxygen, blood pressure, ions, etc) establishing a feedback system with the organs performing this regulation. The physiological functions found in animals, such as respiration, digestion, excretion, etc, constitute regulatory and exchange systems between the internal and external environment. These regulatory systems are highly complex and involve processes that depend on the nervous system and hormonal regulation.

5. All organisms are related to their self-centred<sup>10</sup> or meaningful world. Von Uexküll expounds in his theory that each individual animal corresponds to its own biological or self-centred world (*Umwelt*), constituted by the internal organisation of the animal and formed, not by all beings in its environment, but by those with a biological or vital meaning for them. Additionally, according to the theory of von Uexküll, the animal possesses an interior world (*Innenwelt*) of a psychic nature which includes and unifies significant information from the exterior world<sup>11</sup>. In contrast to the notion of perfect adaptation of the animal to the environment in which it lives, it should be noted that there is a form of semi-adaptation or hysteresis regarding certain variations of the environment allowing the animal to live in similar, nearby environments and compete with other animals. On the other hand, this nearby environment is not always constant, as the animals have a degree of learning or adaptation through which they incorporate aspects of behaviour derived from its relation to the environment. It is precisely due to this environmental variability, and because offspring are also variable, that there is adaptation and, ultimately, evolution, understood as microevolution. However, animal behaviour is instinctive: stimulus and response, where responses may be highly complex or elaborate as, for example, the actions of a predator.

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<sup>10</sup> The concept and theory of animal worlds was developed by Jakob von Uexküll (1864-1944). Cf. VON UEXKÜLL, J., *Umwelt und Innenwelt der Tiere*, Verlag von Julius Springer, Berlin, 1909

<sup>11</sup> Cf. PRIETO, L., *op. cit.*, p. 119 y sig. y JORDANA, R., *La ciencia en el horizonte de una razón ampliada*, Unión Editorial, Madrid, 2016, p. 130 ss.

6. Law of increasing complexity. An integral characteristic of evolutionary processes is *increasing complexity* found in all Phyla. In effect, all of these show an increasing complexity of the nervous system from an anterior brain. In «hyponeural» invertebrates, which have a nervous system in the ventral position consisting of a chain of metameric ganglia, as is the case in molluscs, annelids and arthropods. It is observed that from the most ancient to the most recent, the brain is augmented through an increased connection of ganglia, and that this augmentation is not only in organic complexity but also in behaviour and learning capacity. Many authors have attempted to explain this aspect of evolutionary biology. Fossil remains appear to indicate that many fossils were not primitive states of organisms which evolved towards more complex forms (Gould)<sup>12</sup>. From this, one can suppose that these organisms evolved to a certain degree of complexity and were extinguished due to the disappearance of the environment to which they had adapted due to the constant geo-climatic changes undergone by the planet. One must remember that evolution produces and extinguishes species at practically the same rate. Thus, the future of living beings appears a succession of massive elimination followed by the differentiation occurring within the few groups of survivors, as a constant process of improvement in complexity, diversity and excellence. Gould affirms that life is similar to a bush with copious branches, pruned by extinctions rather than a scale of predictable progression. In this regard, the notion of perfection is certainly unusual in biology given that the survival of the individual and the species is the *telos* (as a meta-biological affirmation); and survival goes to those best adapted or semi-adapted to a specific ecological niche. What is more perfect? A bacteria or a leopard? Of course, the feline is much more complex, but both are adapted to the specific niche they exist within. «Life», and considering that, as noted above, only the «living» really exist, is therefore rather than a growing bush is a collection of dried branches, terminals of a trunk manifesting an *increasing complexity*. It is also notable that among the three domains in which living beings are divided (Bacteria, Archaea and Eukarya) only those possessing a cellular nucleus give rise to this complexity. Bacteria and Archaea do not pass from the cellular state or the formation of colonies but do not produce a metazoan or metaphyte. To say that this difference is due to the fact that there are more transcription factors leads us to ask ourselves: Why are there a greater number of transcription factors?
7. Every organism originates from generation from its predecessor. *Omnis cellula ex cellula* (Virchow). In reproduction, as in other vital functions or operations of living beings, we can distinguish between content and

<sup>12</sup> Cf. GIBERSON, K., ARTIGAS, M., *Oráculos de la ciencia. Científicos famosos contra Dios y la religión*, Encuentro, Madrid, 2012

function. The content is the goal of the function which, in the case of reproduction, is the generation of a new organism with its own individuality; function refers to the manner in which this is carried out. In the case of the reproductive function we find enormous diversity in nature in its forms of reproduction. There are two types of reproduction: asexual and sexual. In its various forms, the first may be described as the independence of one or several cells of the physiological control of an ordered organism. Logically, from an evolutionary point of view, asexual reproduction offers limited scope for variation. The second, sexual reproduction, can be defined as a phenomenon by which two more or less differentiated cells, gametes (or simply two nuclei in some cases) join and fuse together. The essence of sexual reproduction refers to this fusion or mitosis of two haploid nuclei (with half of the chromosomes) to produce a zygotic diploid in which chromosomes are taken from two distinct individuals. This type of reproduction offers increased variability resulting from this dual hereditary material which results in the appearance of a new individual organism similar but not identical to its predecessors. It begins embryonic development which may be verified by various means: in water, in the internal environment of another living being (parasites), within one of its progenitors, etc. Thus, the form of production and transference of gametes is highly diverse.

### 3. PHILOSOPHY OF LIVING BEINGS

What have explicitly considered from a biological point of view, and other implicit or concomitant questions within the scope of the biological sciences, pose a series of meta-biological questions which are necessarily epistemological. Firstly, based on the above, there are certain questions: that is: the difference between living beings and inert beings; the distinction between the activities of life and living, considering the verb *to live* as the act of being; the critical consideration of the degrees of life (vegetative, sensitive and intellectual) as metaphysical principles of the traditional kingdoms: vegetable, animal and human. Secondly, there are other questions: the problem of the one and the many, that is, individuation and the philosophical notion of species in terms of current conclusions in the field of biology.

The characteristic revealed by biology of living beings are not by any means a definition, but a description. It is to philosophy we must look to understand material beings and their ontological structure and to distinguish, where appropriate, between living and inert beings.

### 4. MECHANICISM AND VITALISM

Simply put, the history of philosophy has offered two opposing positions regarding the question of life: mechanism and vitalism. «Mechanicism can be defined as the theory that affirms there are no qualities in bodies which



in fact belong to them, perceived qualities are only the affectation of the observer, while all behaviour derives from geometric figures and their local movement. There is not, therefore, substantial nor accidental forms. Material is defined solely according to its constituent characteristics, their extension and, in terms of movement, limited to the quantity of space occupied»<sup>13</sup>. This theory denies the substantive difference between living and inert beings. The living being is nothing other than a more perfect machine. Among organic and inorganic beings there is no essential or qualitative differences only accidental or quantitative differences. Contrarily, vitalism maintains that there are within nature living and non-living beings and there is an ontological difference between them. Thus, there must be something which constitutes the cause of those characteristics which are exclusive to living beings.

Thus, for example, it is obvious that with regards to a material cause, there is no difference between living and inert beings since both are composed of the same elements found in the periodic table of chemical elements. One can affirm that, given that the chemical elements composing living and inert beings are the same, life is the result of a conjunction of these elements and nothing more. This «*and nothing more*» is not a sufficient explanation of the new properties of the material of living beings, that the spontaneous notion of life distinguishes perfectly. The affirmation «life is no more than a certain conjunction of chemical elements» is, in reality, a philosophical affirmation that, while not being strictly scientific-positive, is widely held among members of the scientific community.

One can ask if such an affirmation is sustainable: what is the cause of this certain conjunction of elements that produces life? This question points to another cause distinct from the material cause. It points to what, since Aristotle, has been known as the formal cause. This is an object of philosophical study.

## 5. ARISTOTLE'S TREATISE ON THE SOUL

The first great philosophical treatise dedicated to this question is Aristotle's *De anima, On the Soul*. This treatise merits an analysis both as an essential historical source and due to the systematic nature of its reflections.

The first rational exercise for the proper understanding of Aristotle's thought on life consists in disregarding any religious connotation to the term *soul*<sup>14</sup>.

<sup>13</sup> PETIT SULLÁ, J. M., PREVOSTI, A., *Filosofía de la naturaleza*, PPU, Barcelona, 1992, p. 161

<sup>14</sup> The religious connotation of the term (from Latin, *anima*) in Western tradition dates to Antiquity. Pythagoreanism and Platonism offered an elegant anthropological solution to Christianity by affirming the immortality of the soul. The influence of this dualist doctrine is well known in Saint Augustine, who writes: «man is a reasonable soul which serves of an earthly and mortal body» (*De moribus ecclesiae*, I, 27, 52. *Patr. Lat.*, vol. 32, col. 1332. Cited by GILSON, E., *El espíritu de la filosofía medieval*, Rialp, Madrid, 1991, p. 182.) and the long Augustan tradition in Christian thought; despite the fact this dualism represents an obstacle

Aristotle seeks the appropriate reference for a term (*psyche*), pre-existing in Greek philosophical tradition in relation to the phenomenon of life. In this way, Aristotle does not separate biology from psychology. The treatise *On the Soul* is in fact a treatise on all-natural beings that are alive; the soul refers to the vital principle giving rise to those activities exclusive to living things and that offers sufficient evidence of the radical difference between the living and non-living beings. Aristotle deals with the question of life using a powerful conceptual framework of substance-accident, material-form, power-action. The result is a solid theory which inaugurates a fecund line of anthropological thought which emphasises the biological-psyche unity of man.

Aristotle asks: What is the soul and what is its nature? His thought opposes the habitual meaning we today give to the notion of *soul*, which refers to internal aspect of the person as opposed to the body. A limited understanding of human life, containing an implicit anthropological dualism. The Aristotelian notion is fundamentally biological and names the specific form of living beings (*eîdos*). Regarding inert natural entities, living beings are characterised by a series of operations (vital operations) which, in an abstract manner, we call life. Initially, one can define life as an immanent action of self-perfection. Thus, «the action of any potential force must also be action»<sup>15</sup>. The meaning is not nominal but verbal; rather than *life* we should understand *live*, and this action of living is not transitive but immanent, that is that the executed action ends with the agent of the action. Finally, it is an action which perfects or enriches the agent of the action. For example, nutrition consists of an admirable exchange in which the living being assimilates and transforms material from its environment into its own organism and energy for its vital functions, such as automotion. The soul is neither exclusively human nor opposed to the body since there are non-human living beings and living material is a corporeal entity. The living being, be it a plant, animal or man, is not a body plus a soul (dualism) but an animated body, and the soul is nothing more than the «cause and first principle of the living body»<sup>16</sup>. The question then is not where the soul is since it is not a physical fact and therefore not localisable, nor is it an immaterial component of the living being, but a principle which unifies all elements and components of the living being with a specific form or organic structure. Although it may appear strange to common usage, all living beings, human or not, possess a soul, or rather, an animated. In fact, philosophy habitually refers to the vegetative, sensitive and intellectual soul to refer respectively to the specific forms (*eîdos*) of plants, animals and human beings.

We will have a better understanding of the soul if we analyse the definition that Aristotle himself proposes in his treatise: «the soul is the first entelechy

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to the revealed truth regarding the resurrection of the body which invites the notion of man as a unity of body-soul, and the philosophical dilemma posed by the Christian doctrine of the immortality of the soul.

<sup>15</sup> ARISTOTLE, *Phys.*, III, 1, 201 a

<sup>16</sup> ARISTOTLE, *De anima*, II, 4, 415 b

(act) of a natural body with the potential for life»<sup>17</sup>. Among natural bodies there are those that are living and those that are not. Every natural body is an *entity* in the sense of a composite entity; that is, an individual composed for material and form. The hylomorphic composition of the first entity (individual) is the result of the question why these material elements are organised in such a way as to compose this entity, vg., a man. The answer is found through a set of functions which serve for this material organisation. The question is the cause for which the material is something specific, and this is the specific form. The *soul* is the *specific form* of a natural living body. The specific form is the set of functions or vital activities of this living being that so defines it. The content is the *essence*, while the formal immanent cause is *entity*. The *eîdos* or specific form is not only the essence and immanent cause of the natural entity (living being) but also its final cause or purpose (*telos*). Thus, we arrive at the Aristotelian thesis of the purpose of nature, which illuminates the biological explanation with a light of final causality which dispenses with scientific biology as a methodological imperative. Furthermore, because the specific form is the purpose, this implies the actions of the vital functions: this the specific form (*eîdos*) which is the entity, is also the entelechy or primary act of the living being.

The soul is therefore the primary act of the living being. For clarity, it is necessary here to distinguish between the soul and the vital functions which we habitually call life. Life is activity, act and the soul, which is not identified only with life but also with action. All action is finite, and thus the vital functions (life) implies the finite existence corresponding to the acts or operation of said functions. These finite actions are the faculties of the soul. Thus, for example, life is distinguishable from the faculty of sight, the organ of vision, the eye and the act of seeing. This is demonstrated by the simple fact that some living beings are without this visual faculty or that some possessing this faculty are without sight due to blindness or any other circumstance. Faculties are thus distinguished from the operations of the soul. The soul is the ultimate principle of operations, while the faculties are associated principles. Operations and faculties are accidents, while the soul constitutes the living being as substance. This distinction, which may appear too subtle or contrived, is demonstrated by the simple fact that the living being is not always performing these operations; vg. A dog is not always walking although it has the motive faculty to do so. Additionally, this is a decisive distinction from the bioethical point of view since not all vital categories are on the same level: some are accidental and other are substantial. Just as a dog does not cease to be a dog because of a loss of its motor skills, man does not cease to be man for the pathological or traumatic loss of his reason. Nor does he cease to be so due to temporal organic development in terms of the ontological priority of the faculty or faculties he makes use of, as in the embryonic state. This is decisive in terms of bioethics

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<sup>17</sup> *Op. cit.*, II, 1, 412 a

and the embryonic human condition which is a person in act although the rational functions remain potential.

We have seen that, according to Aristotle's definition, the soul is the first act of the natural entity that has the potential for life. What does it mean that a body has potential for life? The body is the material causality of the living being, which means that the body exists according to the potentiality of life. Although common language in referring to a living being tends to use the term «body» as a synonym of the constituted organism, the body is not properly this living organism but the set of organs which constitute it. The body is possibility, while the soul is actuality. This distinction must be understood given that the soul and body are not substances as maintained by dualist anthropologists, but two metaphysical principles constituting a material living being; the manner in which the human body is constituted is, in reality, the man himself; I am my body.

For Aristotle, the explanation of the soul consists in the explanation of its faculties. Given that to be a living or animated being is to have certain capacities, the study of the soul consists in exploring these faculties, Psychology is thus understood as a theory of faculties, correlated within the field of biology as the anatomy and physiology of organs and systems. An appropriate philosophical conception of life is essential to establish a fruitful dialogue between the diverse sciences dealing with life and its phenomena, and thus achieve a synthesis of knowledge superior to the unjustified and unjustifiable extrapolations that lead to partial conclusions and their practical consequences and manifestations.

Considering what we have seen and its anthropological consequences, Aristotelian theory of life rests on solid foundations for the proper understanding of the living beings, and singularly of mankind, that eschews both dualism and materialist monism. Dualism postulates a separation between physiological phenomena and psychological events; a separation derived from evidence of human actions that are incomprehensible in exclusively physiological terms. In turn, materialist monism supposes that all psychological phenomena are identifiable or reducible to neurophysiological causes.

The treatise *De anima* of Aristotle is not our destination, but it is no doubt a point of departure and an essential reference in exploring the question of life.

## 6. THE QUESTIONS POSED

Above we posed some meta-biological questions in line with current biological science: the question of living-inert beings, the differentiation between life and the activity of living; the critical consideration of the traditional division between the philosophy of the soul or the vital vegetative, sensitive and intellective principle; the problem of the one and the many and the notion of species in the double biological and philosophical consideration related to the notion of *essence*.

At the heart of these questions we find the origin and beginnings of philosophy itself. We distinguish with Karl Jaspers between «origin» and «beginning» since, the former refers to man himself («All men wish by nature to know»<sup>18</sup>), whose capacity to understand what things are beyond his utility for survival; to know the real as real, causing passive or active admiration before the world and his place within it. This anthropological origin of philosophy allows us to understand that we are all philosophers, and that philosophy is the most natural activity in man; thus, to understand with benevolence the unjustified and unjustifiable extrapolations of the conclusions of the positive sciences regarding the totality of reality by the various sciences and their scientific theories in order to create a metaphysics; as is the case with evolutionism. In truth, these are philosophical visions of the world that have great practical (ethical) consequences. «In reality, the theory of evolution (Darwinism and Neo-Darwinism<sup>19</sup>), aims to expand to become the *philosophia universalis*, also now establishing a new *ethos*, of an evolutionary nature. But evolutionary *ethos*, undeniably founded on its key concept of selection, that is, in the struggle for survival, the survival of the fittest, in successful adaptability, has little consolation to offer»<sup>20</sup>. Secondly, the origins of philosophy, the historical period of Ancient Greece, and two problems of an ontological nature (what is reality, the basis of all existence?) sustain the development of the History of philosophy. The problems, ultimately, are the same to be found underlying those posed above, that is: the problem of the future, the problem of the one and the many, and the question of the being as being (ontology). In effect, there are two contradictory or contrasting human experiences: firstly, the senses that inform us of a world in which no two things are alike a world consisting of distinct individuals, singular, specific, (no sparrow is the same as another sparrow); a world undergoing constant change. Heraclitus underlined this diversity and constantly changing reality (*panta rei*). In turn, our intelligence informs us of a world of concepts, ideas and laws invariable and universal. Parmenides fixes his attention on immutability in constructing his vision of the universe. These problems are the constant subject of exploration throughout the history of philosophy and are posed again by the current conclusions of the biological sciences and palaeontology.

How to proceed in the search for truth? By reviving these problems we must be aware of our debts to the past. It is important to know the thought of those that precede us, not solely for information, but because there is very little, we must contribute compared to those who have considered these questions in previous generations. One learns from revealed truth, and from

<sup>18</sup> ARISTOTLE, *Met.* A I, 980 a

<sup>19</sup> The clarification in parentheses is an interpolation of the quote, appropriate given that the Darwinian struggle for survival does not explain the entire complexity of evolutionary theory.

<sup>20</sup> RATZINGER, J., *Fe, verdad y tolerancia. El cristianismo y las religiones del mundo*, Ediciones Sígueme, Salamanca, 2006, p. 159

the errors of others. «Tradition in philosophy has a peculiar nature. Because in tradition there is no authority other than reason and reason is guided by evidence. It doesn't matter who said what, but the truth of what was said. Thus, tradition, more than a series of names and affirmation, is a tissue of truths, an underground current that unifies diverse position»<sup>21</sup>. With this we return to the questions posed above.

## 7. THE LIVING AND THE INERT

When we pose this question, there are at the outset two significant facts: the fact that, beyond diverse speculations, we do not know how life began on planet Earth, and the fact that, today, the exobiology lacks any substance, that is, we know of no life beyond this planet, nor intelligent life elsewhere.

Regarding the origin of life and the striking ontological distance between the inert and living, we do not know how this occurred. Perhaps we shall never know. We do not postulate here however a supernatural cause, a special divine intervention as expressed by those defending the notion of *Intelligent design* (ID), a widespread belief in the Anglo-Saxon milieu of North America. Although the origin of life on planet Earth remains unknown, its origin can and must be explained through natural causality, as determined by a correct philosophical interpretation of the eternal Act of creation *ex nihilo* of the universe on the part of God<sup>22</sup>.

There is an ontological leap between inert beings and living beings. Evidently, this affirmation does not arise from scientific observation and experimentation but from philosophical reflection on natural events and facts. Thus, the complexity of the organisation of matter in living beings compared to inert matter; and the fact that the mineral world is characterised by general properties of state, density, ductility, etc corresponding to their chemical structure; living beings, in addition to their physical properties, show operations, actions that we refer to as vital operations, which point towards a real qualitative difference. Furthermore, these actions or operations are performed by organisms morpho-genetically configured in an autonomous manner; while inert matter the configuration is due to external factors. Perhaps it is here that the fundamental difference is found: *vita in motu*, closely argued and expounded by Aristotle in *De anima*, as discussed above. One is also forced

<sup>21</sup> LOBATO, A., *Ser y belleza*, Unión Editorial, Madrid, 2005, pp. 23-24

<sup>22</sup> According to Saint Thomas Aquinas, in *Suma Teologica*, God the creator means that all things were created by Him from nothing (q. 44-45), that there was nothing apart from God; He exists for himself and all else exists through God (q. 44, a. 1). All creation is called the world or universe and consists of three categories of beings: pure spirits; bodies; and the spirit united in the body (q. 47, a. 4). God instantly created the world of bodies at the same time created the world of spirits (q. 61, a. 3; q. 66, a. 4). The world of bodies was not in this first instant as it is today (q. 66, a. 1).

to consider than this immanent movement towards self-perfection in living beings is part of a project which is represented in the structures themselves and achieved in actions or operations: *telos*. Certainly, without considering *telos* living beings cannot be understood. As Jacques Monod stated: «Rather than reject this notion (as some biologists have attempted to do), it is perhaps essential to recognise this as an essential element in the definition of living beings. We can say that these are distinguished from all other structures of all other systems present in the universe by this property that we call *teleonomy*»<sup>23</sup>, which is a neologism coined by the author to avoid the classic term *teleology*,

Finally, common sense supports our philosophical reflections. The habitual use of language shows the distinction between the living and the inert; the comment of a professor of metaphysics that affirmed that philosophy must serve, both for academic life and for everyday reality, invites us to think that vitalism speaks the truth about the ontological constitution of the universe, as indicated by Jacques Monod regarding the position of Elässer, «no doubt the strange properties, invariance and teleonomy do not violate the laws of physics, but *they are not entirely explicable* with the help of physical forces and chemical interactions revealed by the study of non-living systems. It is therefore indispensable to admit that some principles *in addition* to those of physics are at work in living matter and not in non-living systems where, evidently, these effectively vital principles cannot be found. It is these principles (or biotonic laws in the terminology of Elässer) that must be elucidated»<sup>24</sup>. These biotonic principles are none other than the vital principle or *psyche* in Aristotelian tradition. The seven activities explained above which characterise living are simultaneous in the existence of living beings but none of them constitute a principle which is responsible a living existence. The identification between the act of being and the vital operations supposes a form of reductionism which ignores the fact and distinction between existence, nature or essence considered as the principle of vital operations of a specific living being, the potential or faculty of these operations which distinguishes the affecting organs and the act itself. Thus, for example, any living being with the capacity to see, the act of being (live) is present as a truly distinctive faculty (sight), from the organ (eye) and the act of seeing (vision) also referred to as the second act. Life is not reduced to its manifestations. In the opinion of Josef Seifert, life is undefinable in any exhaustive way. It cannot be defined in terms of any other property

<sup>23</sup> MONOD, J., *El azar y la necesidad. Ensayo sobre la filosofía natural de la biología moderna*, Tusquets, Barcelona, 2007, p. 22. This is a well-known classic text by the winner of the Nobel Prize for Physiology and Medicine (1965) and the contradiction it presents between the supposed objectivity of the empirical sciences and the objectivity of the purpose of the living being: «The central problem of biology is the same contradiction, it attempts to know if what is, is only appearance or to declare the radical insolubility of the question if it is truly so.» (*Op. cit.*, p. 33)

<sup>24</sup> MONOD, J., *Op. cit.*, p. 41. Monod classifies in this work the strange properties, invariance and teleonomy.

distinct from life itself. Life, he believes, is something definitive and irreducible. «That life is, finally, indefinable is not because of a weakness in our minds but because of the originality and irreducible simplicity that are characteristic of first principles and pure perfection. The term “simple” (or ultimate) simplicity, or *simpliciter simplex* introduced by Duns Scoto to designate “pure perfections” may be applied to all the fundamental and definitive (irreducible) such as, for example, red or blue, numbers, the self, knowledge, etc.»<sup>25</sup>.

## 8. DEGREES OF LIFE

Traditionally, the philosophy of nature or cosmology defines life as a movement and transformation qualified by three specific and exclusive characteristics of the living: nutrition, development and reproduction; and among the living, there are degrees of life: established by taking as a criteria the modes in which action depends on the living being<sup>26</sup>; and so distinguishes between physiological life or vegetative life and psychic life which in turn is divided into sensitive (material), characterised by sensible knowledge, instinctive tendencies and affectivity, and intellective (spiritual), characterised by intellectual knowledge, free will and affectivity. Thus, we arrive at the classic distinction between the three degrees of life: vegetative, sensitive and intellective life in referring to the three metaphysical principles or souls: vegetative, sensitive and intellectual. From this distinction arises the classification of living beings into kingdoms: vegetal, animal and human. Certainly, this conceptual framework is «clear and distinct», to use a Cartesian expression; however, in reality the limits are not so clear and modern biology no longer speaks of kingdoms but divides living beings into three broad domains: Bacteria, Archaea y Eukarya.

*Bacteria* are microorganisms a few micras in length. They are found on land, in water and in the atmosphere, forming part of the digestive tract of animals performing essential functions. Some are symbiotic, others parasitic or rather pathogens. Their number is enormous. Their cellular structure is simple, consisting of a plasmatic membrane encompassing the cytoplasm; they lack a nucleus and present rather a nucleoid which contains a circular molecule of DNA and plasmids, ribosomes (synthesis of proteins) and vacuoles. They have an external membrane or cellular wall, and some are enclosed within a capsule. Some develop spores, a latent resistance system able to survive extreme conditions. They may present pilus or flagellum that permit localised movement, a highly complex structure with motor ability that produces the turning of the flagellum. This motor is one of the biological motors that proponents of

<sup>25</sup> SEIFERT, J., *What is Life? On the Originality, Irreducibility and Value of Life*, Rodopi, Amsterdam, 1997, p. 16.

<sup>26</sup> Cf. LUCAS, R., *El hombre espíritu encarnado. Compendio de filosofía del hombre*, Sígueme, Salamanca, 1999<sup>2</sup>



Intelligent Design consider irreducible by a biological explanation. They also have a cytoskeleton.

*Archaea* constitutes a domain of microorganisms discovered in 1977 by Woese and Fox<sup>27</sup>. Initially, archaea were considered as extremophile bacteria, living in highly saline environments or at high temperatures. It was subsequently discovered that they live in all environments. Although their cellular structure lacks organelles, it is similar to that of bacteria, the eukaryote cells in the expression of the genome. However, the chemical structure of the membrane is different from many bacteria and eukaryotes, as is the source of energy they use. phototrophs (luz), lithotrophs (inorganic compounds) and organotrophs (organic compounds). They reproduce through bipartition and have a cytoskeleton that participates in the division.

Finally, *Eukarya* includes all organisms with cells having a nucleus enclosed within a membrane. This is the domain of protozoos, las protophyte, algae, plants, fungi, and animals. Within the Eukarya domain we find unicellular organisms, colonials, colonials with a specialisation function and multicellular organism with organic specialisation. In all of these, the cells have organelles enclosed within a membrane that perform various functions and a cytoskeleton.

As we can see, this division of living beings into domains is based on a basic cellular organisation and may lead us to conclude that this is incompatible with the classical philosophical classification of living beings into kingdoms. However, all domains show activities referred to as vegetative in philosophy, although these are performed in very different ways. Some living beings with local movement without a nervous system have certain capacity to seek nutrients through a method of chemical detection not very different from root growth of plants in any direction determined by the presence of water or nutrients or towards sunlight for photosynthesis; furthermore, it seems they also have a certain degree of learning capacity. However, it is doubtful we can speak of these living beings in the same meaningful way we observe beings with a nervous system. In these, perhaps from ctenophores and coelenterons or even some types of sponges, to these physiological activities is added sensible awareness in a wide range of degrees permitting a reaction to certain stimuli and a degree of learning capacity. Some of these animals lack the ability to move and their nutrition depends on the selection of materials that passes within their proximity or captured in their filters. In reproduction, the coordinated release of masculine and feminine gametes due to hormonal chemical stimulus is not far different from the coordinated production of pollen in many plants and the precise moment of flowering. These and many other singular features found in the biosphere lead us to conclude that living beings always have diffuse limits which present difficulties to understanding of philosophical categorisation.

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<sup>27</sup> WOESE, C. R., FOX, G. E.: «Phylogenetic structure of the prokaryotic domain: “the primary kingdoms”», Proceedings of the National Academy of Sciences of the United States of America, 74 (11) (1977), 5088-5090

## 9. THE ONE AND THE MANY

Something similar occurs in the consideration of what we know and observe in the material universe. In the mineral world (inert) what we ultimately find are subatomic particles; that is, physical combinations which in some way reduce the epistemological scope of the difference between physics and chemistry. Chemistry is the study of reactivity and physics of movement. Thus, the mineral world, more than individuation what we find is juxtaposition.

As Leonardo Polo affirms that hylomorphic structures have a striking resistance to corruption. The living being resists, endures the external world while also assimilating it. The relation with the environment does not transform the organism but the living being transforms it. That is, the natural reactivity found in diverse modes of production in the mineral world is here substituted by assimilation. According to the author «water outside the living being is water that wets, soaks or serves as an external medium for other living things, but within the living being water is basic to its activity»<sup>28</sup>. And it is precisely this relation of separation and assimilation of living beings that give them their individuality.

In the case of man, since Boethius individuality is understood through the notion of *person*, individual and rational substance where the principle of individuation is the material. However, this affirmation leads to a suggestive consideration of human individuality: that is, the resistance to corruption of a self-aware animal which knows itself as a person through the relation with others and constituted as such in relation to God in the act of creation. This human resistance to corruption and death transcends temporality due to its spiritual nature. The spirit is defined as immaterial and immortal; taking the form of a material body, to be restored to it after death.

## 10. THE CONCEPT OF SPECIES

What is commonly understood as «species»? Explicitly, the answer to this question coincides basically with the first definition found in the dictionary<sup>29</sup>: a set of elements or similar individuals who have one or various characteristics in common. Implicitly rather than reflexively, perhaps due to the Greek dimension of the European cultural synthesis<sup>30</sup>, the word species refers to an underlying *logos*. In common language we discover two dimensions or aspects within the notion of species: that is, the logical aspect, related to thought and language and another which is ontological, related to the being of things. In science,

<sup>28</sup> POLO, L. Course by Polo L. (1984-1996): *Curso de teoría del conocimiento (4 volúmenes)*, EUNSA, Pamplona, 2003 p. L. 7.1.

<sup>29</sup> Real Academia Española, 23<sup>rd</sup> edition, 2014

<sup>30</sup> Europe is a synthesis of three dimensions: the Biblical Judeo-Christian tradition; thought, philosophy and reflection originating in Greece; law, organisation and programming from Rome. These three dimensions generated a new and unique culture possessing immense creative force.

taxonomy (from the Greek *taxis*, ordination and *-nomia*) is the science of principles, methods and purposes of classification. In biology, this is applied for the hierarchical and systematic ordering, naming and grouping of animals and plants. The act of classification dates to the very origins of scientific rationality in Ancient Greece. In *History of animals*<sup>31</sup> Aristotle explores the structural and formal differences of animals in order to establish a general catalogue of the animal world. Living beings are thus situated within a scale, from human beings, considered the most complex and superior, to more inferior forms of life: that is, morphology and hierarchy. In his observation of animals, Aristotle refers to their origin and reproduction, anatomy and physiology, form of movement and feeling, environment and behaviour. From embryology to ecology and etiology Aristotle provides an analysis and classification of the typical characteristics of animals; that is, to order and understand; he begins with phenomena, looking for causes and ultimately concluding with a general theory. The Aristotelian system of classification was developed by Porfirio and, centuries later by medieval philosophers and naturalists such as Saint Albert the Great in the 13<sup>th</sup> century.

Modern systems of classification are based on the book *Systema naturae* by Linnaeus (1735), the tenth edition of which, published in 1758 continues to serve as a historic reference today. Linnaeus groups and classifies living beings according to their degree of similarity but does not give a scientific explanation or reason. The different categories are formed into increasingly broad groups and with the binomial denomination genus-species (always written in Latin and in italics), for example *Homo sapiens* corresponding to the family «Hominidae», order «Primate», class «Mammalia», phylum «Chordata» and kingdom «Metazoan». The purpose of this Linnaean taxonomy is pragmatic and nominalist; that is, while providing classification criteria (morphological similarities) it does not extend beyond nominalism. A merely nominal taxonomy is subject to great doubts and indefiniteness. But is it possible to have a concept of species that goes beyond mere nominalism? The notion of species is one of the most powerful within the life sciences, but its generalised use in multiple disciplines from microbiology to palaeontology with different needs in terms of study and techniques of observation and empirical evidence results in a dispersion regarding the true concept of species. Roselló-Mora (2003)<sup>32</sup> determines that there are more than twenty-two different concepts for species and De Queiroz (1998; 2007)<sup>33</sup> finds up to twenty four; this is a clear indication

<sup>31</sup> ARISTOTLE, *Investigación sobre los animales*, Gredos, Madrid, 2008

<sup>32</sup> ROSELLÓ-MORA, R., «Opinion: The Species Problem, Can We Achieve a Universal Concept?», in: *Systematic and Applied Microbiology*, 26 (3), (2003) pp. 323-326.

<sup>33</sup> DE QUEIROZ, K., «The general lineage concept of species, species criteria, and the process of speciation: A conceptual unification and terminological recommendations», in: HOWARD, D. J. y BERLOCHER, S. H. (Eds.) *Endless forms: Species and speciation*, Oxford University Press, New York, 1998, pp. 57-75

DE QUEIROZ, K., «Species Concepts and Species Delimitation», in: *Systematic Biology*, 56 (6), (2007), pp. 879-886

of the lack of consensus within the scientific community and the difficulty, if not impossibility, of arriving at a universal notion of species.

The most frequent concept of species is the biological concept of species (BSC) originating with Dobzhansky (1935; 1937)<sup>34</sup> and developed by Mayr (1942; 1963)<sup>35</sup> based on the notion of the reproductive barrier, defined as the set of interfertile individuals or populations whose descendants are fertile and are reproductively isolated from other populations. This reproductive isolation can be due to several factors: genetic, morphological, recognition or geographical isolation. This concept however is not without problems and exceptions that limit its universal application or validity given that it only refers to living beings with sexual reproduction which, as indicated above, is only one of seven characteristics of living beings (reproduction). Furthermore, the reproductive barrier can only be studied in common and current living beings; we cannot know the reproductive capacity of individuals today compared with those in the past. Species that are geographically widely dispersed or cosmopolitan, individuals that inhabit opposite extremes of a distribution areas may not be fertile between them or may be only through intermediaries.

However, from Darwin and subsequent studies of population genetics and cladogenesis which lead to Neo-Darwinism, the concept of species requires the introduction of the variable «time». We find ourselves before an indefinite succession of generations since the *Last Universal Common Ancestor* (LUCA) from which all others are derived in a profusion of life forms branching out in the form of a tree. Thus, arises the concept of the evolution of species (ESC) proposed by Wiley (1978) in reconsidering the work of Simpson (1951): «a species is a lineage of population of ancestors-descendants that maintains its identity independent of other similar lineages and has its own evolutionary tendencies and historical destiny»<sup>36</sup>.

Supposing the fact of evolution, what do we call a species? This is, without a doubt, a difficult question to answer which involves philosophical thinking: the problem we face in attempting to make compatible biological concepts (BSC) and evolutionary notions (ESC) of species is not just a problem of epistemology but of ontology. Dupré (2001)<sup>37</sup> in presenting the fundamental question of species as an ontological question, points to the fact that some species are real natural things or types while many others are not, concluding that with Darwin ends the tradition of considering species as natural elements which determine

<sup>34</sup> DOBZHANSKY, T., «A critique of the species concept in biology», in: *Philos. Sci.*, 2, (1935) pp. 344-355; y *Genetics and the Origin of Species*, Columbia University Press, New York, 1973

<sup>35</sup> MAYR, E., *Systematics and the Origin of Species from the Viewpoint of a Zoologist*, Columbia University Press, New York, 1942 y *Animal Species and Evolution*, Harvard University Press, Cambridge, Massachusetts, 1963

<sup>36</sup> WILEY, E. O., «The Evolutionary Species Concept Reconsidered», *Systematic Biology*, 27 (1), (1978), pp. 17-26

<sup>37</sup> DUPRÉ, J., «In Defence of Classification», *Studies in History and Philosophy of Biological and Biomedical Sciences*, 32 (2), (2001), pp. 203-219

real essences. Perhaps, he says, the work of Darwin should have been titled *The Nonexistence of species*. Which is another way of posing the question of philosophical reflection.

## 11. ON THE ESSENCE

From the point of view of philosophy<sup>38</sup> which studies reality from its first causes and principles, in opposition to Plato and with him all his more or less proximate or conscious followers, essences do not exist as such in reality. Only single and specific entities exist: this man, that zebra. According to the Latin aphorism *Quidquid existit individuum est ac singulare*, everything that exists is individual and singular. What we call essences are in fact universal and abstract concepts through which the human mind represents and expresses the ultimate reality of what is intrinsically constituted of singular and specific individuals which we group in a concept and which, certainly, perform a series of operations that we view as specific. Thus, for example, since ancient times man has been defined as the *rational animal* and this predication affirms that each man performs the same vital operations arising from his nature (the essence considered as the origin of these operations), both those considered as singular and specific or superior mental operations (conceptual knowledge, self-awareness and self-determination), and others of an animal nature which we share with many other animals (aerobic respiration, binocular vision, etc). If I carry out these operations it is because they are characteristic of a normal person, the «essence» of a person, the rational animal, or perhaps more exactly, the *ratioanimal*; since generic operations prove to be steeped or permeated with rationality, for example with bipedalism and the liberation of the upper limbs from the motor function and opposable thumbs which is a unique apomorphy that manifests practical intelligence as an essential means of survival of human beings: «naked and barefoot and without covering or arms» (Plato, *Protagoras*, 320c-322d)

With regards to substance, the term substance predicates what is in itself, as opposed to the term accident, which is a way of being in another. Substance is what remains, what subsists under the accidental changes suffered by the individual. In metaphysics the substantial changes of degradation are explained, for example, the living being whose death produces a change in substance: passing from a living being to a cadaver. Biological evolution invites us to believe in a continuous ascent towards growing complexity, which appears to be caused by accidental changes (addition of genes, suppression of others permitting adaptation to new ecological niches, etc). The consideration of the time variable indicating a succession and diversification of forms of life in a continuum from the *Last Universal Common Ancestor* (LUCA) to current

<sup>38</sup> VALVERDE, C., *Prelecciones de metafísica fundamental*, B.A.C., Madrid, 2009

forms of life supposes a challenge to philosophical thought and particularly the Aristotelian conception inviting us to consider seriously the possibility that in the created material universe we only find three substances: the inert, characterised by its properties, the living, characterised by its operations and man: the link between the material and the spirit.

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