

DOES PLATO OUTLINE A MATHEMATICAL-REDUCTIONIST MODEL OF THE PHYSICAL WORLD? THE CREATION OF THE WORLD IN THE *TIMAEUS* AND ARISTOTLE'S CRITICISM IN *DE ANIMA*

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ABSTRACT. *Aristotelian organicism as advanced by Biocosmology invariably treats Platonism and Aristotelism as thesis and antithesis. Plato figures as the forefather of the mathematical-reductionist model of scientific knowledge and Aristotle as the pioneer of the organicist model based on the four cause theory. In the paper I go back to the Platonic texts in order to find out whether they express the thesis ascribed to them by Biocosmology, which ultimately takes its origin in the Aristotelian corpus. In De Anima Aristotle compares his theory of physical beings with the Platonic theory of the cosmic and individual souls embodied in physical bodies, the cosmos and individual beings respectively. In the Timaeus, it is evident that far from being oblivious to the four cause theory, Plato has recourse to all of them in order to present his creation myth. Their function may be different from the Aristotelian theory, but their overall cognitive importance cannot be underestimated. On inquiry, Aristotle's criticism presents inconsistencies with Plato's theory as it has come down to us.*

Therefore it may be more appropriate to address the Enlightenment thinkers and foremost Descartes for the beginnings of a strictly mathematical-reductionist model of scientific knowledge.

KEYWORDS: *Biocosmology, the differences between Platonism and Aristotelism, the organicist model based on the four cause theory, the Enlightenment thinkers, the mathematical-reductionist model of scientific knowledge*

Contents

Introduction

1. The Platonic Theory of the Union of Soul and Body in *De Anima*
2. The Platonic Theory of the Union of Soul and Body in the *Timaeus*
3. Aristotle's Criticism Revisited
4. A Brief Summary of the Cartesian Theory of Material Bodies

Conclusion

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Introduction

Aristotelian organicism as advanced by Biocosmology develops a bipolar line of argument. Positively, it goes back to the Aristotelian original texts in order to determine an evolutionary, organicist pattern of knowledge/scientific research in tune with Aristotle's initial project based on the four cause theory. Negatively, it contests the current mathematical-reductionist scientific model. Plato figures as the founder or the father of this model. Invariably, organicism treats Platonism and Aristotelism as opposed, i.e. as if they were thesis and antithesis (Khroutski, 2013; Makolkin, 2013). The sincerity of seeking truth and reaffirming Aristotle's initial purpose – independently of his philosophy's avatars throughout Western scholasticism and the Enlightenment- needs to be counterbalanced by the same care to go back to the Platonic texts in order to find out whether they express the thesis ascribed to them by Biocosmology. The most urgent task is, therefore, to go back to Aristotle in order to find out the points of criticism or divergence from his teacher's theory.

The paper comports the following sections:

1. The Platonic Theory of the Union of Soul and Body in De Anima

In this section, I take up Aristotle's criticism of the Platonic theory as it is exposed in *De Anima*. Aristotle surveys his predecessors' views on the soul before proceeding to expose his own theory. The text is foundational to the organicist model insofar as it defines organicism and explains the relevance of the four causes in respect to animated, physical beings.

Significantly, Aristotle does not compare his theory with the Platonic theory of ideas, but with the Platonic theory of the cosmic and individual souls embodied in physical bodies, the cosmos and individual beings respectively (*Timaeus*). Aristotle refutes the Platonic theory in respect to its inability to explain concrete beings in their various modalities. He argues that the theory cannot provide a satisfactory explanation of differentiation among beings.

2. The Platonic Theory of the Union of Soul and Body in the Timaeus

Plato exposes his theory of the body-soul complex in the creation myth of the *Timaeus*. He makes subtle but crucial distinctions of vocabulary in order to express inalterable being in contrast to incessant becoming. The account of the creation first of the soul and then of the cosmic body by the creator sheds light to the theory of participation as it is illustrated in physical bodies. Further, the soul is made up of eternal essences, whilst the body is made up of the proportionate mixture of the four elements. Epistemologically, Plato gives a coherent account of cognitive phenomena. He stresses the finality and intrinsic perfection, beauty and goodness of the universe created in order to produce constant harmony at all levels.

3. Aristotle's Criticism Revisited

Aristotle's refutation is based on an inexact interpretation of the Platonic theory, insofar as it presents the Platonic soul as material, made up of the four elements. Far

from being oblivious to the four cause theory, Plato has recourse to all of them in order to present his creation myth. Their function and importance may be different from the Aristotelian theory, but their overall cognitive importance cannot be underestimated.

4. A Brief Summary of the Cartesian Theory of Material Bodies

A strictly mathematical-reductionist model of scientific research is first developed in the Enlightenment rationalism. Descartes reduces material bodies to extension, breadth and volume. The human body is like a clock or some other mechanical artifact created by God. The impenetrability of God's providence reduces the scope of human intelligibility to the production of natural things, whilst their finality pertains to divine transcendence. The metaphysical theory and point of view of the Enlightenment thinkers conditions their epistemology by limiting human intelligence to explore and intervene in the chain of productivity, either natural or artificial. This view still dominates our mode of thinking.

Conclusions

I have translated all relevant texts from ancient Greek to English by taking care to convey as much as possible the structure and phrasing of the original. This is necessary in order to understand the inner logic of Platonic and Aristotelian writing. In fact, we read a rigorous deductive or inferential reasoning – depending on the passage- implemented by abundant recourse to pronouns and participles. When the translation favors clarity – conspicuously ignored by our philosophers – by using short, disjointed sentences, the rationality of the texts is bound to suffer. Given the necessary editorial restrictions and the philosophical nature of the endeavor, I have skipped alternative translations and philological annotations.

1. The Platonic Theory of the Union of Soul and Body in *De Anima*

In *De Anima* Aristotle surveys his predecessors' views on the soul before proceeding to expose his own theory. The text is foundational to the organicist model insofar as it defines organicism and explains the relevance of the four causes in respect to animated, physical beings.

Aristotle surveys the views of the Atomists, Democritus and Leucippus, of the Pythagoreans and of Anaxagoras (*De Anima I 404a*). A lengthy refutation of Plato's theory prepares the ground for the exposition of his own ideas. In his criticism of Plato's theory, Aristotle has recourse to the *Timaeus*. His analysis is so thorough that we can easily find the relevant texts. Significantly, Aristotle does not compare his theory with the Platonic theory of ideas, but with the Platonic theory of the cosmic and individual souls as they are embodied in physical bodies, the cosmos and individual beings respectively.

The translation of the relevant text runs as follows²:

In the same manner and the Timaeus reasons in the line of the Naturalists [by advancing the naturalist explanation] that the soul moves the body; that is, by moving, she also moves the body, for she has been interlaced with it. After constituting her from the elements and dividing her according to the harmonious numbers, in order to possess the sense of harmony together with her nature and in order for the all to move in coordinated courses [conducive to concord], he [the creator] bent the straight line into a circle. And after dividing the one [circle] into two circles, attached together at two points, he again divided the one [of these circles] in seven circles, inasmuch as the celestial courses are the soul's movements.

So first it is not correct to say that the soul is a magnitude. It is evident that he [Plato] wishes to think that the all's soul is of the sort which is called intelligence, not of the sort which is the sensitive or the desiderative soul, for their movement does not follow a circular course.

Then intelligence, in the same manner as thinking, is one and continuous. Thinking then is the thoughts. Following each other in a sequence, the thoughts form thus a unity which resembles the unity attributed to a number, but not the one attributed to a magnitude. For this reason, intelligence cannot be continuous like some magnitude; it is either without parts, or it is continuous, but not in the manner of a magnitude. For how will it think if it is a magnitude? [In this case] one of two things will happen: either it will think by itself [as a whole], or it will think with some part. A part is defined either as a magnitude or as a point – if a point can be called a part. – If then the part is understood as a point – which points are infinite in number, – it is obvious that intelligence will never go through all of them. If again the part is understood as a magnitude, intelligence will think the same thing many or infinite times. However, it is obvious that it may think something only once. If again intelligence is able to touch things with any of its parts, why should it move in a circle or have magnitude at all? If again it must think by touching with the whole circle, what is [the point of advancing the explanation of] the touch with the parts? Further, how will it think the divisible by the undivided and the indivisible by the divided? It is necessary for this circle to be intelligence, for the movement of intelligence is thinking and of the circle is rotation. So if thinking is rotation, then intelligence would be the circle, whose rotation is thinking. Then it must think something for ever. It must, for rotation is eternal. Now, of practical thinking processes there are limits (because they all take place for the sake of something else), and the theoretical ones get their limits from reasoning as well. All reasoning is either definition or demonstration. So the demonstration starts from a beginning and has somehow for end the syllogism or the conclusion. If demonstrations do not come to an end [they are not conclusive], neither do they ever return to their beginning; by

² All translations are made by the author. Given the editorial restrictions, alternative translations as well as philological annotations are omitted.

getting always a middle and an extreme they proceed in a straight line. On the other part, rotation returns to the beginning. Besides, definitions are all finite.

Further, if the same rotation occurs many times, it will be necessary to think the same thing many times. Further, thinking resembles more some kind of tranquility and attentive examination than movement; and the same holds true for reasoning. Although, of course, whatever is both not easy and violent cannot be blissful. If the movement of the soul is not essence, then she would move against nature. Moreover, if, as it is usually said and many are of the same opinion, it is better for intelligence to be without a body, it must be painful and most avoidable to be intermingled with it without possibility of release.

The cause why heaven moves in circle is not evident. The essence of the soul is not the cause of heaven's circular movement, for it moves so by accident; neither can its cause be the body, but rather the soul in it. And it is not said that it moves in this way because this is the best movement. However, it should be said that god created the soul to move circularly for this, i. e. because it is better for her to move than to stay [immobile] and to move in this than in some other way.

As this reasoning is closer to other studies, let's let it aside for the present. The following absurdity occurs at this reasoning and at most reasonings about the soul, for they conjoin and place the soul in a body without determining at all for what cause and how the body is disposed. But it is evident that this is necessary; due to the communion, the one acts and the other is acted upon, the one is moved and the other moves. To accidental things nothing of these happens to each other.

They [the philosophers] only endeavor to say what the soul is without determining anything about the recipient body, as if it were possible, according to the Pythagorean myths, for any soul to invest any body; however, it seems that each body has its own species and form. They say almost the same as the person who would maintain that carpentry invests the flutes; for every art needs to use its instruments and the soul its body. (De Anima I 406b30-407b30)

Aristotle's main objection to Plato's and, by that matter, to all naturalist accounts, concerns the abstraction of reasoning. According to Aristotle's concrete, situational philosophy, Plato thinks of two separate essences, body and soul, as intermingling and interacting by virtue of their nature at an ideal indeterminate space and time. The mathematical treatment of natural substances creates a series of distortions insofar as it does not take into account their various modalities. First, it posits without further inquiry that the soul moves the body by virtue of its essence, but it does not explain why the soul is moving. In Aristotle's opinion, the soul may move or be moved by itself only by accident. "As we said, it is by accident that the soul is moved and moves as, for instance, it is possible to be moved in that in which she is [the body], and this to be moved by her; there is no other way for her to move in respect to location" (I 408a 35-38). Emotions and affections, such as joy and

sorrow, may give the impression that the soul moves. This is not necessary, inasmuch as the movement is caused by the soul to the complex body-soul; for instance, feeling anger or fear means that the heart is moved in such and such a way (*I 408b 5-9*). In sum, it is not the soul which feels, thinks, learns, etc., but man, the concrete person, by means of the soul (*I 408b 16*).

Then, the Platonic theory does not take into account the physical condition of the body, namely, whether it is inanimate or animate, human or animal, etc. By so doing, Plato cannot distinguish genera, species or simple genders. His account cannot determine how the appropriate form intermingles with the right body. The soul-body complex seems to result by chance without internal necessity.

Aristotle refutes point by point the Platonic thesis in order to clear up the ground for the exposition of his own theory. The cardinal point remains the ground upon which Aristotle chooses to refute Plato. His conception of concrete beings made up of matter and species or form, as exposed in *De Anima*, transposes the discussion from the *prima philosophia*, i.e. metaphysics, to natural philosophy and particularly to anthropology, or more precisely to organology, the science of organic beings. If Aristotle chooses this ground in order to expose the organicist theory against previous theories, it is evident that he does not consider the ontological status of things as directly relevant to organicism. Whether the visible world is created in the image of the perfect, immobile and inalterable transcendent world of ideas or it is as real as reality can be, it is of little consequence to the organicist project. Aristotle adopts the point of view of a scientist, of a physician or of an anthropologist. In his view, *prima philosophia* may exhaust the question of what is, but in the physical world ruled by its own laws, what matters the most is the compound of body and soul, the concrete being.

It is obvious that, notwithstanding a pronounced idealism, Plato exposes in the *Timaeus* a detailed sketch of all cosmological and anthropological preoccupations of his time. By its very nature and the popularity it has enjoyed throughout the ages, *Timaeus* is a foundational text in Platonic philosophy. It is therefore necessary to let aside the conventional assumption that Plato is mostly interested in the intelligible world of ideas and examine his theory of the world and of concrete beings.

Plato and Aristotle have held divergent views on metaphysics. However, they both rely on the soul-body component in order to explain the macrocosmic and microcosmic level, or, as they both appropriately name it, the visible world.

2. The Platonic Theory of the Union of Soul and Body in the *Timaeus*

In the *Timaeus*, Plato addresses these issues by having recourse to the myth of the creator. The creator is first of all a geometrician, building the world by drawing triangles and circles and mixing elements in fixed proportions. After the initial inspiration to create the visible in the image of the intelligible world, he proceeds to serious work without sparing efforts or means. Notwithstanding its creation according to a model, the visible world is regulated by its own laws with universal and compelling validity. Without ambiguity, Plato clearly states that this world is perfect, entirely good and therefore worth living and exploring (*Timaeus*, 29e-30a). By

describing the successive creational steps, he provides us with the necessary clues in order to understand our surroundings. Physical laws clearly differentiate physical phenomena from the *paradeigmata* by regulating their specific modes of determination. Therefore, it is important to describe the different steps of the creation.

The first remark concerns the originality and uniqueness of the created universe. The creator thinks carefully every step and proceeds ingenuously to reproduce some constant characteristics of the prototype. The eternity of forms is rendered in the physical universe by the constancy of movement, which is time (37e). Humans are further an entirely original creation, shaped by the gods in a later stage. Other physical specificities include sensible objects and foremost the embodiment of the souls in concrete bodies. The souls are also a creation out of a scientific mixture of eternal and perishable essences. Therefore, in no account are we entitled to close the discussion by simply affirming that the physical world is a copy or a “holotype” of the intelligible model. Besides, the theory of participation points to an original and complex process. Physical objects and, by that matter, living beings may ontologically be defined as copies, but in physical terms they are far from being simple copies of their celestial counterpart. The creation myth brings significant precisions in respect to Plato’s idea of what a copy may be.

Plato argues at length about the ontological status and the mutual relation of essence and becoming. If this is the best possible world, then the creator made it in the image of an inalterable, eternal and unchangeable exemplar (29a). The relation between generation or becoming and essence is the same as between belief and truth (29c). The first is changeable and impermanent, whilst the second is certain, permanent and unchangeable. Besides, Plato draws a line between “*what is the eternally being which has no birth and what is the eternally becoming which is never a being*” (27d).

Plato’s discussion of the difference between becoming and essence invites us to focus our attention on vocabulary. If we translate *to on* by *the being*, we cannot translate the *gignomenon* also by *the being*. *Gignomenon*, becoming, *symvan*, accident, *genesis*, generation are the Platonic terms designating the status of physical objects.

A few lines further Plato describes the nature of the physical world by using the different forms of the same verb *gignomai*. He says: “[*The physical world*] was generated; for it is visible and tangible and it has a body and all such things are sensibles, and the sensibles are comprehended by opinion with the senses and it has been obvious that [all such things] become and are born. Again we said that for a generated [thing] it is necessary to be born by a cause” (28b, c). The verb *gignomai*, one of the commonest in Greek language, means to become, to be born, to take place, to be produced. The contextual and pervasive significance reports to the different stages of the generational process: to generate, to be generated, and to be on the process of being generated or simply of generating. The fact that the root verb is alternately translated in English by a variety of heterogeneous terms produces a confusing effect which clearly obscures the Platonic purpose. If we retain the term of becoming, we need to keep in mind that it covers generative phenomena originating

ultimately in a cause. Plato further remarks that physical objects become and perish (lit. are lost, an appropriate verb in the Platonic perspective of the soul investing the body like a cloth) (28a 3), for they have a body and thus they can never be. In fact, the Platonic *gignomenon* corresponds to the Aristotelian *on*, inasmuch as it is composed of body and soul, of matter and form. Both philosophers use with clarity and precision, an unambiguous terminology which, in both cases, reflects precisely the ontological status of things. The Platonic becoming is a copy of the being and the Aristotelian being is the real physical object.

Plato turns next to the world of becoming. The first question to answer is why he explains it in a creational myth. First, becoming does not remain in a continuous state as such, but is always changing; therefore it has to be grasped in the changing process. Then, the creation myth represents the way humans understand and explore the world. Out of the cosmic “soup” sensory perception and bodily consciousness distinguish forms, objects within the vast reality canvas. The myth underlines the fact that our basic relation to the world is never solely rational. It is based on our physical presence; therefore it is a making, a construction as much as perception. It may further be argued that perception is fundamentally a creational process, a construction of things out of undifferentiated elements. Aristotle seems to understand the Platonic teaching in the same sense. At the lengthy aforementioned citation, he argues thus: “Always then it [intelligence] needs to think something. This is necessary because the circular movement is eternal.” Now, if, according to Aristotle, Plato thinks that intelligence is always thinking something, in the manner of the eternal circular movement, there is no consciousness apart from the thinking and perceiving process. The fundamental condition of consciousness is creating, putting order, finding laws along with arranging, shaping and constructing. These directions are not really separate, but form a continuous and permanent process of being and acting in the world. They are subject to universal and constant laws, exemplified by the creative activity of the mathematician demiurge. The creator has recourse to triangles, mixtures and building techniques in order to create the all, as well as particular beings. He proceeds in the manner of an ancient Greek scientist. At times he employs geometry, at times chemistry, at times mechanics and at times pottery.

More significant is the experimental aspect of the creation. Faced with multiple problems caused by the mixture of different materials, the creator thinks, ponders, calculates and proceeds with the solution he thinks best. In fact, creation is a vast experiment and perhaps the *Timaeus* describes explicitly for the first time in history the scientific method which in broad lines holds true even to our days.

Now, let’s turn to Aristotle’s refutation of the Platonic theory of the soul. Aristotle focuses on three points: The soul consists of the elements divided according to the harmonious numbers in order to create harmony. Then, the soul is moving and by so doing she moves the body. The soul follows a circular course produced by bending the linear course to a circular one. Last, she is a magnitude.

In the *Timaeus*, Plato makes the distinction between the creations of the cosmic body and the cosmic soul. The body is produced by the proportional mixture of the four elements (31b-32d), fire, water, air and earth. The proportion is necessary in

order to bind the elements together and avoid their dissolution. They are mixed in equal proportions, i.e. the ratio between fire and air is the same as the ratio between air and water and this is the same as the ratio between water and earth. *“For these reasons and from these such elements, four in number, the body of the world was born rationally accorded by proportion and it got from these attractive coherence (philia) and came to be one and self same by itself in order to become indissoluble by anyone except its binder”* (32c 1-5).

The cosmic body is *“smooth and even and equidistant from all points to the center, entire and perfect and [made] of perfect bodies”* (34b). It is spherical, without limbs, made up of the entire mass of the four elements. Nothing is left outside and understandably it is the unique universe. Its construction pertains more of a technological miracle. However, and perhaps for this reason, Plato does not think that the cosmic body is the world. Before its fabrication, the creator created its soul. If we learn about it after the production of the body, it is due to our comprehension, which first explores the visible and then ascends to the invisible.

The soul is placed at the center of the body, extended to all its parts and covers all around its outer surface. So the world is circular, one and alone, turning in a circular movement (*Ibid.*).

The creation of the soul proceeds in an entirely different way from that of the body. It is also made up of primary somethings, but these somethings are not physical elements, but intelligible essences. The creator took the indivisible and eternally inalterable essence and the divisible essence which exists/comes to be (*gignomenês*) around the bodies and by mixing them together he fabricated a third one pertaining of the nature of both indivisible and divisible or eternally sameness and becoming. By proportionally mixing and dividing, he created a new mixture, cut it in two in the sense of longitude and pasted these parts so as to form an X. He bent each extremity so as to join the one facing it, forming thus two circles turning in circular direction. The outer course was appointed to the nature of the eternally the same and the inner one to the changeable. The changeable was further cut in seven forming seven inner circles and moving circularly (35b-36d). These are the orbits of the seven planets.

After creating the soul, the creator proceeded to create the body within the soul and adjusted their middles in a tight union. *“From the center, the soul encircled heaven to the edges and covered it up all around and herself turning in herself, she began a divine beginning of an incessant and wise life in all time. And the body of heaven became visible, but the soul remained invisible, although participating to rational thinking and harmony, soul [participating to] the intelligible and eternal beings, the most excellent of generated things made by the most excellent”* (36e).

In virtue of its heterogeneous composition and during its eternal circular course, the soul comes in contact with all kinds of things, both eternal beings and transient existents. The contact is described in the following lines: *“... when she [the soul] touches upon something possessing a divisible or an indivisible essence, moved through her entire self, she reasons to which thing this essence is the same and from which it is different and, mostly, concerning the generated things, in relation to what and where and how and when each one happens to be and be affected in respect to*

everything and in respect to the eternally same. Self same and true reason, exercised about the other or about the same, heads without voice or sound towards the self moving [the soul]. When it [reason] is exercised about a sensible thing, the circle of the other reports it directly to the whole soul and certain and true opinions and beliefs are born. When again reason is exercised about something rational and the swift circle of the same reports it, then intelligence and science are necessarily brought to their ultimate end” (37a-c). Plato concludes that both opinion and science are born in the soul.

3. Aristotle’s Criticism Revisited

Now, if Aristotle argues against Plato, it is certain that he misunderstands his teacher’s most explicit positions. It is difficult to believe that Aristotle was not thoroughly familiar with the above mentioned Platonic theory. However, in the *De Anima*, he underlines that Plato conceives the soul as made up of the four elements, i.e. material, because, he argues, Plato thinks that “*the similar is known by the similar and things exist from causes*” (*De Anima*, 404a 18-20). The first remark concerns the validity of Aristotle’s criticism. Although he reports the theory accurately in respect to the soul’s movement and sensible knowledge, he ignores the entire section of the Platonic theory on the essential nature of the soul. The soul is made up of essences, so it belongs to the world of intelligible essences. The body is made up of the four elements, so it is perceived by reason and the senses. However, for Plato, the world is the mixture of the two. It is a living animal, endowed with reason and movement.

This major distortion makes the refutation of the Platonic theory a piece of cake. Aristotle has no difficulty in convincingly refuting a number of conclusions implicated by the four element soul theory. First he refutes the thesis that by moving, the soul moves the body. Here the argument is twofold: If there is something that comports self movement, then why this something must be the soul and not the body as well? A material soul as the principle of movement of the material body is arbitrary and cannot be substantiated by any reasoning. Further, the body may well include self movement. Aristotle sustains that movement is not always initiated by an external cause – as Plato does – but may be self moving without external cause.

The second objection concerns the (inaccurate) thesis that the soul consists in the elements and is divided according to the harmonious numbers. For Aristotle harmony cannot be the final cause explaining the division of the soul. In the organicist perspective, the three kinds of soul, namely vegetative, nutrient and rational share among them the different functions pertaining to organic beings. However, their modality depends on the animated corporeal substance.

Aristotle further criticizes the circular course of the soul. Why should we think – he argues – this direction superior to other ones, as, for instance, to movement on straight line?

Finally, he contests the idea that the soul is a magnitude. This conclusion follows the four element soul theory. If the soul were a magnitude, we should determine where it meets the visible objects, at what point and how many times. All this becomes absurd if we strain the argument to its logical consequences. Then we

should conclude either that the soul thinks always the same thing in virtue of its circular eternal course, or it randomly meets an object only once. In this case, repetition and memory are impossible.

The refutation is based on the small sentence cited above. According to Plato, “*the similar is known by the similar and things are born by causes.*” However, Plato makes an important distinction. The soul is intelligible and in virtue of the above rule, it cannot know visible and tangible things. Therefore, according to Aristotle, in order to have knowledge of bodies, the soul must be material and he concludes that it is made of the four elements. Plato thinks that bodies have no capacity of knowledge. Only intelligibles can be objects of knowledge. His soul, as exposed in the *Timaeus*, is made up of eternal and transient essences. Transient or not, they are all essences. During her permanent rotation, the soul meets not bodies but other essences, either transient or eternal. Her separate circles in their rotations meet and determine their similar essences: the transient essence other transient essences and the eternal one other eternal essences. It is all too evident, that for Plato everything pertaining to the world belongs to one of these categories. The soul’s consistence is such that it has the capacity to perceive not only transience or permanence, but all determinations of an external object in its relation to all else as well. This is an entirely different theory from the one presented by Aristotle as the Platonic theory.

The Platonic model may be based on geometry, but it cannot be taxed as reductionist. Plato affirms that the world is a living and rational being. It is created in order to achieve harmony as a whole as well as in its parts. Harmony results from proportion inasmuch as different things or again different essences are mixed or divided according to the harmonious numbers, as defined by the Pythagoreans³. Sensible objects, empirical things and material bodies in general are far from being neutral outer covers of immortal souls. They reveal the soul through their successive modes of being as the *Symposium* makes amply clear. Empirical bodies are the first step to the ascending intuition of transcendent ideas. First means necessary and standing at the beginning of dialectics. In this sense it is a cause and this status acquires a particular value in Platonic epistemology. Therefore, the body is never an entity *per se*. Nevertheless it acquires a pivotal status. It is the outer envelope of a transcendent essence. It is mortal and compared to a prison, but such prison also holds the key to escape. Therefore, the Platonic epistemological model is complicated and tortuous, inasmuch as it seeks to make room for the sense data as significant ground causes in our quest of their transcendent essence. For Plato the world is sacred, beautiful, the best and entirely good. It is impossible to read in the lines of the *Timaeus* or of the *Symposium* a mechanistic explanation of phenomena. Becoming is defined by generation and change. The world’s primary movement is spinning around itself. Other types of movement are appropriate to different bodies.

³ The Platonic theory of numbers constitutes another fascinating field of inquiry. Numbers are conceived as rational essences endowed with structuring functions. In this perspective, the Platonic model of science usually taxed as mathematical, abstract and reductionist, acquires a profoundly metaphysical significance.

4. A Brief Summary of the Cartesian Theory of Material Bodies

Turning to Enlightenment, we face an altogether different view of the body, its status and its relation to the soul. The Platonic becoming defined by birth and change is replaced by a mechanistic concept of the body defined in terms of extension, figure and depth. Descartes has exposed in clear and unequivocal reasoning the Enlightenment model of bodily reality. After explaining the nature of the soul and its union with the body, he proceeds to explore the material bodies. In the *Principia* he sharply rejects all finalism.

We shall not stop either to examine the ends which God has given to himself by creating the world and we shall entirely reject from our philosophy the search for final causes, because we should not presume on ourselves so much as to believe that God shared with us his plan: but, considering him the maker of everything, we shall only endeavor to find by the faculty of reasoning which he placed in us, how these [things] which we perceive by means of our senses could be produced (Principia, I. 28).

The rejection of any attempt to look for finality comes from the sense of being a finite creature incapable of comprehending God's providence. The final cause becomes a mystery which testifies to the finitude of human mind and to the humility of human will to penetrate divine plans. To Plato's harmonious world, made in order to produce harmony at all levels, an obvious mark of perfection, Descartes opposes the impenetrability of divine will and man's incompetence to explore it. The world becomes a mystery. It may have a purpose but this purpose remains out of reach of human intelligence. The only field compatible with our finite faculties is to find out and examine how things come to be produced. This corresponds to the material cause of ancient philosophy and leaves out of the scientific agenda the formal, efficient and final causes. It is true that Descartes believes that he safeguards for man's intellect the formal cause. Besides, "formula" means "small form." The mathematical formulas are supposed to explain the formal causes. However, both Plato and Aristotle, each in his own way, have seen things as an organic whole and particularly as a constantly changeable entity in reaction and relation with other equally changing entities. Plato has integrated the final cause in both material and formal cause: The four elements are mixed according to the harmonious numbers and so are the essences composing the soul.

Descartes defines the nature of bodily substance as "the expanse in length, breadth and depth" whilst that of the soul is thinking (*Principia*, I. 53). In the *Treaty on Man* he introduces the subject matter by announcing that in order to describe man he will first describe his composing parts, namely body and soul and then will proceed to show how these two parts are joined together and united. The description of the body begins in the following words:

I suppose that the body is nothing else than a statue or a machine made of earth, which God forms on purpose, in order to make it as resembling as possible to us: so as not only to give it externally the color and figure of all

our members, but also to place inside all pieces necessary to make it walk, eat, breathe and imitate all those of our functions which can be imagined to come from matter and depend solely upon the disposition of organs (Traité de l'homme. Oeuvres, p. 807).

And Descartes goes on to make a comparison between the different movements of clocks and human artifacts with the variety of movements which God has placed in the human body.

The Cartesian project is clear. It assimilates the human body to a divine artifact, constructed and working as clocks and mills do in the human scale of production.

Another important difference with the Platonic and Aristotelian model is the first movement. To the self movement of the soul (Plato) or of physical beings (Aristotle), Descartes prefers inertia defined as the first law of nature: every body remains in the state it is in so long as nothing changes it (*Principia, II. 37*). Self movement does not exist except in the case of God. He is the first mover.

Conclusions

It is clear from this brief survey that the reductionist model of scientific inquiry attributed by Biocosmologists to Plato in reality originates in Cartesian rationalism and the Enlightenment perception of reality. Plato envisaged the world as an organic living and intelligent whole defined by generation and change. It is an inventive copy of the intelligible world. However, a copy has to solve a number of problems in order to imitate the original in the best possible way. Such “technical” problems include how to transpose eternal sameness and this is solved by permanent change in endless time. Visibility poses its own challenges, such as mixing the elements and dividing according to the harmonious numbers. Construction of the whole further depends on applying geometry to solids. Finally the whole is made of two basic materials, perishable body and eternal soul. The model of scientific exploration takes into account the twofold nature of the world and focuses on generation and change. Generation concerns birth and how things come to be produced and change concerns their incessant becoming. Mathematics are of course a means to get certain knowledge but, as the last part of *Timaeus* makes clear, knowledge of the physical world far exceeds mathematical formulas. It is definitely not a rational method of explaining phenomena as if they were mechanical artifacts. Their relations are not ruled by action and reaction inasmuch as the soul is endowed with self movement. Therefore, all generated things possess a certain degree of initiative and self determination. If Plato has not developed the stages of growth and decay from the initial nature of generated things, final cause is confusedly (yet) contained within form. Things and the world as such tend to create harmony. By their very nature they constitute and tend to realize the best, most perfect and entirely good world.

References

- Aristotle. Hicks, R. D. ed. (1907). *De Anima*. Cambridge. Cambridge University Press.
- Descartes, René. Bridoux, A. ed. (1953). *Œuvres et Lettres*. Paris. Bibliothèque de la Pléiade. Gallimard.
- Khroutski, Konstantin S. (2013). Forming an Evolutionary Vector to the Aristotelian Pole of Scientific Organicism (Biocosmology). *Biocosmology – Neo-Aristotelism*. 3[1].
- Makolkin, Anna (2013). Aristotle, Aristotelianism(s), and Neo-Aristotelianism – Wisdom Therapy for the Ailing Post-Modern Civilization. *Biocosmology – Neo-Aristotelism*. 3[4].
- Plato. Barnet, J. ed. (1903). *Platonis Opera*. Oxford. Oxford University Press.