

THE COSMOLOGICAL THEORIES OF THE PRE-SOCRATIC GREEK PHILOSOPHERS AND THEIR PHILOSOPHICAL VIEWS FOR THE ENVIRONMENT*

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Abstract. *In this paper the views related to nature, Mother-Earth and the natural environment in the ancient Greek world are discussed, from the Orphic Hymns and the Homeric world, through the works of Hesiod and Sophocles, and the theories and works of the pre-Socratic philosophers, the Ionian School, Thales, Anaximander, Anaximenes, Heraclitus, Pythagoras and the Pythagoreans, Empedocles, Socrates, Plato, Aristotle, the Stoics and Neo-Platonists, with a particular emphasis on Plotinus. The common elements in the teaching of the pre-Socratic Ionian philosophers and of the latter ancient Greek natural philosophers were the observation of living environment and nature, the corresponding relations, changes and cyclic periodic variations. We note the attempts of Anaximander to formulate the need for the conservation of a dynamical equilibrium in nature and in ecosystems; also, his views on evolution of the living creatures and the humans.*

Key words: *history of science, natural philosophy, pre-Socratic philosophers, environment.*

1. INTRODUCTION

The views of the ancient Greek pre-Socratic philosophers from Ionia opened new paths for the study of nature using human logic. Starting from the worship of the Earth as a goddess, they proceeded to examine its position in the Cosmos, proposing a spherical

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shape for our planet. They pioneered the unifying approach for the physical world, assuming one element as the basis for everything in the Universe – this element was water for Thales, infinity for Anaximander, air for Anaximenes, fire for Heraclitus. The genesis and the decay of worlds succeed one another eternally. Anaximenes believed, like Anaximander, that our world was not the only one that existed. Heraclitus believed that, of the vast richness of the natural creation with its unpredictable changes, nothing remains stable and motionless. There is no constancy, only an eternal flow, a perpetual motion. This is similar to what we accept today in quantum physics; the apparent stability and immobility is an illusion of our limited senses. According to Heraclitus, as Diogenes Laertius writes, matter is constantly transformed (Diogenes Laertius 1935: IX, 7-8, Theodossiou 2007: 72).

The views and the theories of the ancient philosophers indicate the relation of the antique Greek world with the mother Earth and the natural environment, an international issue of first priority nowadays, regarding the need for its immediate protection.

In this work we examine the development of the notions of living environment from the *Orphic Hymns* and the Homeric world, through the pre-Socratic philosophers, Socrates, Plato, Aristotle, Stoics and Neo-Platonists, with a particular accent on Plotinus, in order to follow the development of ideas like the need for the protection of the dynamical balance of an ecosystem, and the apprehension of the living environment, nature and mother Earth, which, as a kind of travel back to the primal sources, has much to reveal to us concerning our modern worries.

2. FROM MYTH TO REASON

The pre-Socratic philosophers of Ionia were carefully observing in the 6th century BC the natural phenomena and their contribution to the challenging of myths was crucial. They attempted to extract all possible conclusions from the observation of nature by using mainly their logic (Theodossiou 2007: 44)

Ancient Greek natural philosophers were preoccupied by the ‘cosmic riddle’, i.e. the questions of the origins, the structure and the construction of our Universe. At the same time, a sudden and rather unexpected shift took place, from mysticism and religious worldview towards reasoning thought, which was the greatness of the ancient philosophy; a switch with very deep consequences for humanity.

Of course, most pre-Socratics were natural ‘monist’ philosophers, in the sense that they were interested in defining the ultimate substance or principle, the primal element from which all things of our world originated. So they created philosophical systems through which they would be able to explain in a rational way the relation between humans and nature. This is the reason that their philosophical thought is relevant today and that the natural component of pre-Socratic philosophy is of such a great importance.

For the first time in the history of the world, with the pre-Socratic views it was expressed the total decoupling of myth from the rational intellect. Here it will be shown how from myth physical environmental thought appeared and was shaped during the first scientific revolution in Ionia, in the 6th century BC. Then philosophers tried to answer two basic questions they were preoccupied with: the first was on the origins of the world and the second was on its structure or form. This was the reason they became the founders of philosophical thought and of science itself.

3. THE PLACE OF THE EARTH IN WORSHIP AND INSIDE THE COSMOS THE WORSHIP OF THE EARTH

A starting point could be the worship of the mother-Earth. In parallel to the primal worship of the Sun, a prominent place in religion was held by mother-Earth, the universal mother. The philosophy of the Greek pre-Socratic philosophers reflected views that respected Nature as the feeding mother of men and their attitude towards 'her' was the one expected towards a living and respectable deity.

In a sense Earth was the supreme goddess, and for this reason Greeks called her –the word for 'earth' in Greek language is of the feminine gender– *Hypertatan* (Supreme) Earth. It should be noted, however, that Gaia (the Earth) was never worshipped as a celestial body or as anthropomorphic deity, but rather as *gaia-chthon*, as the nature with its ground, soil and interior, where humans live and get their food from. Man is 'accused' by the tragic poet Sophocles (5th Century BC) as the creature daring to annoy the supreme goddess, not hesitating to inflict pain on her:

"by ploughing her with his plough, trenching it ceaselessly year after year"
(Sophocles *Antigone* 1994: verse 330).

The conversion of earth-nature to an omnipotent goddess-mother most probably took place when the agricultural societies developed, along with their agricultural festivals-mysteries, pertaining to the eternal cycle of life (sprouting, bearing fruits, ripening, decline and death, seed, sowing, rebirth). Beginning from the depths of antiquity, it can be said that the primitive human from his first cognitive observations of life on Earth understood that, like him, the rest of animal and plant life forms were also tied to the triptych life-development-death. Man's survival was connected with the terrestrial vegetation, since, like the rest of the animals, was eating what was available in nature (Eliade 1978).

Our primitive ancestors, observing carefully the life cycle of the plants, with the seed, its planting inside Mother-Earth and its transformation into new life, discovered over the centuries the corresponding primal cycle of animal sexual reproduction. The sperm (in Greek the word 'sperm' means 'seed') was im-planted by the male into the womb of female, in an exact analogy with the seed of a plant; and from the maternal organism a new life was created. From the 'lifeless' seed, Earth was producing life, exactly as the animal females. Therefore, Earth should also be a living creature and, in order to give birth, she should come into contact with a male element. For this reason, our primitive ancestors personified Earth as a female form, while the fertilizing male was the Sky with his rain, or some large river, such as the divine Nile in Egypt.

Earth (*Gaia*) and Sky (*Ouranos*) constitute the first divine couple, united by cosmogonic orphic Eros (Kern, *Orphic. Fragm* 1922: 1); in this symbolism of erotic cosmogony the Sky (*Ouranos*) embraces and fertilizes Earth with 'his' rain. Their union is therefore presented as an extremely powerful force of reproduction, which united and multiplied the deities, an aspect revered and sung by mythical Orpheus as product of the original Chaos or Erebus and the illuminated part of the day. This union is also symbolized by the love affair of Semele, which represents the Earth, and Zeus (Jupiter), a celestial god who fertilizes his beloved woman with his thunders, harbingers of the precious rain. Similar is the way Zeus fertilizes the earthly Danae, after he is transformed into golden rain in order to penetrate into her subterranean cell. Symbolically, the sky god softens with his beneficial waters the dried from the drought body of the Earth in order to grow life in it.

4. THE PLACE OF EARTH IN THE COSMOS

Earth in the Homeric Universe was considered as a circular flat disc surrounded by a vast circular 'river', the Ocean. This model appears for the first time in the *Homeric Hymn: "Incense to Pan - various"* (*Panos thymiama, poikila*): "*And the Ocean encircles the Earth in its waters*" (*Homeric Hymns* 1914).

The Sky rises upon Earth. In the Orphic Hymns (1981) the Sky is mentioned as the master of the World (Cosmos), encompassing the Earth as a sphere (our Celestial Sphere). The Sky is the abode of the blissful gods and it moves in rotations, spinning (*Orphic Hymn 4: Incense to Ouranos*).

According to the ancient Greek traditions the Sky was a metallic canopy made of copper or iron, supported by very tall columns; in other traditions the Sky was a giant. Homer combines these two views by having the giant Atlas supporting the columns himself (*Odyssey* 1919: 1:53-54). Hesiod writes that his fate of supporting the sky was assigned to him by Zeus (*Theogony* 2006: 517). So, in ancient Greece the Sky was thought to be made of a solid, metallic, material. For this reason, in the Homeric poems is referred as *chalcous* that means of copper (*Iliad* 1924: 17:424) and *polychalcus* that is made of much copper (*Iliad* 1924: 5:504, *Odyssey* 1919: 2:458, 3:2, 16:364, 19:351), or as *siderous* – of iron (*Odyssey* 1919: 15:329, 17:565).

The space between the Sky and the Earth, according to the beliefs registered by Homer, was filled with the (comparatively dense) air in its part towards the Earth (*Iliad* 1924: 14:288). Towards the Sky this intermediate space was filled with the clean and transparent *aether* (the ether), a kind of 'light air'. Beyond the ether there was the starry Sky.

Of course, one must not believe that the Sky was a bare metallic dome. It was, as Homer mentions, full of life, a life offered by the stars that decorate it. Because of this it was called *asteroeis*, i.e. full of stars (*Iliad* 1924: 6:108, 15:371, *Odyssey* 1919: 9:527). On this celestial dome travels the Sun (*Odyssey* 1919: 1:7-9), hence called *ouranodromos* (running on the sky).

Homer in his poems, dated *circa* 900 to 800 BC, describes the Earth as flat and circular with the Ocean around it, a model first appearing in the *Orphic Hymn "X. TO PAN, The Fumigation from Various Odors"*, verse 15: "*Old Ocean too reveres thy high command, whose liquid arms begirt the solid land*", while Hesiod in his *Theogony* describes the Universe as spherical, divided in two parts by the plane of the flat Earth.

The great philosopher Pythagoras (6th Century BC) is generally credited as the first supporter of the idea of the spherical Earth. He expressed the opinion that, since the Sun and the Moon are spherical in form, the same should be the case with the Earth, which was sitting motionless in the center of the Universe! Pythagoras was teaching that Earth was spherical, isolated and inhabited; it should be noted that Anaximander also supported that the Earth was isolated, while Empedocles stated that the Earth floats freely in space. Thus, Pythagoras and the Pythagorean philosophers were supporting the spherical shape of the Earth mainly for symmetry reasons, since they regarded sphere as the most perfect form a solid body can take. The same views were upheld by Parmenides in the 5th century BC, who declared with certainty that the Earth was spherical.

Influenced and probably persuaded by the thoughts of Pythagoras and his School, many other major Greek philosophers and astronomers adopted similar views, such as Aristotle, Hipparchus, Crates of Miletus and others. Aristotle dedicates a significant por-

tion of his book *On the Heavens* to the support and propagation of this view, stating that "*the Earth has a spheroid shape, as is necessary to her*" (*On the Heavens* 1956: B, 297b, 18-19).

However, as with many other pioneering views, ideas and theories of the ancient Greek philosophers –e.g. the heliocentric system of Aristarchus– the hypothesis of the spherical shape of Earth was forgotten with the decline of ancient Greece and the rise of the practical Roman spirit during the times of the Roman Empire. It was therefore natural for the simpler view to conquer the Byzantine East and the mediaeval West, and this was the flat Earth theory. The teachings of scholars who tried to restore the old view for the shape of the Earth were intensely fought by simpler people, who basically were arguing that it would be impossible for the Earth to be spherical, because in such a case the people living at the antipodes, i.e. the diametrically opposite point of the Earth would stand upside down and would inevitably fall into the abyss.

Of course it must be stressed that accepting a spherical shape for Earth would mean not only abandoning the 'obvious' flat shape of our world, but the deeply entrenched notion in the mind of mediaeval people that in space there is one absolutely defined direction: the 'up' and 'down' one. This was an age without physics and the seemingly easy for us to comprehend idea that all material bodies are attracted towards the center of the Earth was even for educated people of that period utterly incomprehensible!

From the 15th century on, when the scholars of the age had a better look at the Aristotelian text, the debate on the shape of the Earth started again. It must not be forgotten that, probably based on this view of Aristotle (and of the other Greek philosophers) and guided by the writings of Ptolemy on Geography (*Geografike Hyphegesis* 1883, Berggren and Jones 2000) Christopher Columbus dared his voyage to the West in order to discover another way to India.

5. THE PRE-SOCRATIC ENVIRONMENTAL APPROACHES

In the 6th Century BC, with the philosophers from Miletus and the rest of Ionia, a real revolution took place in philosophy and science. The scientific philosophy was born, its theory, notions and objective physical-mathematical science, the great accomplishment of the Greek spirit even to this day (Theodossiou 2007: 40).

At first, Thales of Miletus, the founder of Monism, proposed that the basis of everything was water. Then, Anaximander proposed infinity, Anaximenes the air, while Heraclitus of Ephesus proposed the fire as the primal element. The variety of their answers to the question of the basic element characterizes their philosophy.

A common element in the thought of all natural pre-Socratic Greek philosophers was the observation of the environment, of the rates and the mutations of the natural elements, and of the cyclical, periodically repeated natural processes.

Thales, the founder of the Ionian School and the first theoretician of geometry and astronomy, was the first to express the opinion that the polymorphic world of natural phenomena has single base, originating from one only creative common natural entity, the water according to him.

Water was for Thales the essential component of all things, beyond any divine interventions; all entities in nature were mutations of that original material. For Thales water was representing the primal essence from which all forms of matter were emerging and to

which they were returning time and time again. According to Thales beings have a common natural origin and reason, water, and all physical entities are created as transformations of that original element through 'condensation' or diluting. Water (*hydor*) is the element that expanding through its evaporation creates the air, while with its contraction and condensation produces the earth; this can be verified, Thales believed, with the appearance of alluvial deposits from the rivers.

Not only our planet, but the whole Universe according to Thales was based on water and it had the form of a hemisphere. Its interior was full of air, while its surface was the sky, the celestial dome. On the plane of its base there was the stationary Earth, which he thought it was floating on water: "*floating as a piece of wood or something similar*" (Aristotle, *On the Heavens* 1956: B, 297b, 28).

Anaximander believed that in the Universe there is a kind of natural law, a cosmic 'justice' that keeps the balance among the four principal elements, which always are in a state of antagonism due to their different essence and texture. Their natural relation, according to Anaximander, should be conserved in eternity, so that no one of the four basic elements could subordinate the rest. Anaximander was rejecting the idea of his teacher Thales that the basic element was the water, because if this were the case the natural balance of 'justice' among the four elements would be disturbed. If one of the elements had an advantage over the others, then it would have absorbed the rest, and the Universe would be not only entirely different, but it would be headed for its final destruction.

The following phrase is attributed to Anaximander by the neo-Platonic philosopher Simplicius (6th century):

"Anaximander had said that the origin of all beings is infinity, from which all heavens were created and all the worlds that exist within them; and that their birth came from infinity and to infinity they end through their wearing. In this way they compensate one another for the injustices that took place as time passed" (Simplicius in *Physicorum* 1895: 24, 13).

This passage indicates the belief that the opposites, through the successive prevalence of one upon the other, are the agents of evolution and change. The 'passing of time' denotes most probably a universal law that checks the deadlines for the justification to come along, which will correct for the 'injustices'.

This principle can be proved to apply in the equilibria among ecosystems. In the ecosystems there are no one-sided and monopolic processes; all exist in a state of dynamical equilibrium. Destruction, decomposition, creation and regeneration are continuous and periodically alternating processes. New organisms are born only when the old forms die, because the material for the composition of the new creatures comes from the material of their dissolution. This state of dynamical equilibrium (whose great importance was realized by environmental scientists only in the second half of the 20th century) is subject, according to Anaximander, to a 'procession of time'. In other words, they are subject to periods of time. This observation applies to the currently observed biorhythms and biological cycles of the ecosystems, since inside each open biological system there are periods in the increase and decrease of the populations it contains. By extending this principle we could argue that probably the ignorance of its power led the Western civilization to invest on energy and time to one-sided selections, such as the choice of fossil fuels as its main energy source, overlooking the fact that the cycle of the terrestrial fossil fuels is of the order of many million

years. Consequently, the need for a dynamical equilibrium in nature is urgent, a fact that can be extracted as a conclusion by the above proposition of Anaximander.

Anaximander was the first cartographer who dared to draw the known world. He also proposed a most intriguing origin for the human species; according to it the first humans were created from fish-like beings. Other pre-Socratic Ionian philosophers, like Empedocles, had made such conjectures concerning the origin from dead matter or the various transformations of the first life forms; for Empedocles they had disappeared because of lack of adapting ability. These first attempts to formulate a theory of natural history and a reasonable explanation of the phenomenon of life were agreeing in a 'spontaneous creation', and not in the creation of life by some Creator God, as Plato supported later in his *Timaeus* (Plato 1929).

As it can be deduced from the above, the idea that no life form is eternally unchanged, but it evolves in its attempt to adapt to an equally changing environment did not originate with Charles Darwin (*The origin of species* 1998) but with Anaximander.

Anaximenes also accepted (as the rest of the Ionian philosophers) the basic principle of monism common to the Ionian School that everything stems from one origin and finally goes back to it. According to his views, the origin of everything was the air, which for Anaximenes was infinite, that is indeterminate and eternal. The air was the vast material mass to which everything was or could be reduced.

The air of Anaximenes was constantly moving, exactly as Anaximander's infinity. Out of this perpetual motion of the air all the variety of things and phenomena was finally created. Fire originated from the air through thinning, while the condensation of the air created the waters and the Earth.

The genesis and the decay of worlds succeed one another eternally. Anaximenes believed, like Anaximander, that our world was not the only one that existed; he also supported the idea that the vast mass of the air incorporated innumerable worlds that were being created and died all the time, emerging from and returning back to the initial infinity.

Heraclitus considered fire as the originating essence of our world. He believed that, of the vast richness of the natural and celestial/Universal creation with its unpredictable changes, nothing remains stable, motionless and granted. There is not constancy, but only an eternal flow, a perpetual motion.

This is exactly what we accept today for the world of quantum physics; the apparent stability and immobility is an illusion and is due to our limited senses. According to Heraclitus, matter is constantly transformed, while in our finite Universe the elements 'fire', 'air' and 'earth' are just different states of one and only material.

All the ancient natural philosophers of Ionia distanced God the Creator from nature and history, keeping always a deep respect for the beliefs of their fellow people; most probably they, too, kept a form of God in some area of their minds and souls, in his spiritual and moral dimension.

After the natural philosophers of Ionia, in Socrates we see the rejection of the distinction man-animal kingdom, while in Plato we find a philosophical treatment of the Earth and the celestial bodies. Plato also mentions some environmental problems in ancient Attica. In Plato's *Dialogues*, especially in *Gorgias*, we find the following philosophical position: "*Society keeps together sky and earth and gods and men...*" (1925: 508A), while in the cosmological *Timaeus* (1929: 77a) Socrates tackles, as we mentioned, our relation with the animal and plant kingdoms:

"Blending it with other shapes and senses they engendered a substance akin to that of man, so as to form another living creature: such are the cultivated trees and plants and seeds which have been trained by husbandry and are now domesticated amongst us; but formerly the wild kinds only existed" (Timaeus 1929: 77a).

Socrates concludes that there is no essential difference among the three broad categories of living creatures (humans-animals-plants): "... Thus, both then and now, living creatures keep passing into one another in all these ways, as they undergo transformation by the loss or by the gain of reason and unreason." (Timaeus, 1929, 92b-c), and: "there were two kinds of living beings, the human race and a second one, a single class, comprising all the beasts" (Statesman 1925: 263c).

In addition, from the study of Aristotle's works it is evident that in his teaching sciences, philosophy and the world that surrounds us are all correlated and interdependent. Setting out from the description of this conception of him, the great philosopher creates the term 'energy' (Aristotle 1933: *Metaphysics*, I, 982b, 7, 1072a - 8, 1073a).

6. STOICISM AND NEO-PLATONISM

In the following centuries we witness the continuation of the Platonic tradition in the Stoics. Professor P. Damaskos, starting from the views of several scholars (e.g. Sambursky 1959, Long 1986, Brennan 2005), writes:

"Stoicism elevates to the status of a basic principle the decision to live in accordance with Nature and the co-existing Logos. These notions are not explained; they are taken as known. Besides, Stoicism is not famous for dwelling on theoretical forms and mental analyses on cosmological and metaphysical matters. However, even in its moral teachings we can discern its respect for the Whole, the brotherly coexistence of all beings and the respect for the nature of each species." (The problem of ecology in the Stoics, 27 March 2009).

In the chain of philosophical schools Neo-Platonism comes next; neo-Platonists returned to the theoretical, rather dogmatic Platonic tradition and in this form is represented by the significant philosopher Plotinus. The classic Greek philosophy owes much to the renovating thought and penetrating mind of Plotinus, to its knowledge, but also to his dialectic attempt to develop Platonic dogmatic views and at the same time to combine them with the theories of Stoics and of the Peripatetic School, as well as with Aristotelian views.

Klaus Oehler notes that:

"Neo-Platonism, without a doubt a feat of systematic meditation, is the last product of the methodical and systematical character that was inherent to the philosophical schools already from the beginning of the Hellenistic age and up to its period." (2000, p. 6).

According to theologian Dr. Ioannis Lilis (2006: 583), Plotinus also uses the term 'energy' (*energia*) to describe his own cosmic view. More specifically, Plotinus suggests that the entire reality consists of the En (The One – God), the Nous (Mind), the Psyche (Soul of the World), nature and matter. The universe "comes out" from God not by free and

willing creation but by constant "emanation". Through these emanations the "God-substance" becomes common to all other degrees of reality (Pantheism). God transcends the world, yet the world-stuff is God-stuff. The emanations are the *Nous*, the world Soul, and nature and matter. The first emanation is the *Nous*, i.e. the intelligence, and the second emanation is the world Soul, the *Psyche*. It proceeds from the *Nous* as the *Nous* proceeds from the *En* and it is therefore inferior to the *Nous*. The third emanation, proceeding from *Nous* and *Psyche* forms the nature and the matter; matter, as the final step, has no form, while nature perceptible through our senses does have form. Plotinus, stressing that *Nous* is emanating from *En*, and that *Psyche* is one within the unified reality, since has two kinds of activities, contemplative (beyond matter and time) and plastic (in forming the particular things of the Universe according the ideas contemplating in the *Nous*), calls *Nous* and *Psyche* "from energy, not potentially". He stresses that everything was created by the Essence or Quantity and together with it: "If it is maintained that the continuous is a Quantity by the fact of its continuity, then the discrete will not be a Quantity. If, on the contrary, the continuous possesses Quantity as an accident, what is there common to both continuous and discrete to make them quantities?" (Plotinus 1991: *The Enneads* 6, 4, 4).

In addition, *The Enneads* contain a beautiful passage about the personified Nature: "If one asked: For what reason does her create? And if Nature heard the question and wanted to answer, she would certainly say: You should not ask me but instead you should understand by yourself, in silence like me, for I do not speak often. So, what should you understand? That my creation is an object of viewing made by me, the silent one, an object that resulted by nature and has received by me (I was also resulted by such a viewing) the property to be viewed. And my viewing creates the viewed object, just like mathematicians can draw only when they can view. And, while I do not draw but I just watch, the borderlines of the bodies result somewhat like the rainfall. Nothing different happens with me than what happens with my parents; they, too, resulted from such a viewing" (*The Enneads*: 3, 8,4).

In other words, nature, personified in this passage by Plotinus presents herself, her origins and her work.

7. CONCLUSIONS

In this work the views related to nature, mother Earth and the natural environment in the ancient Greek world were examined, from the *Orphic Hymns* and the Homeric world, through works of Hesiod and Sophocles, and theories and works of the pre-Socratic philosophers, the Ionian School, Thales, Anaximander, Anaximenes, Heraclitus, Pythagoras and the Pythagoreans, Empedocles, Socrates, Plato, Aristotle, Stoics and Neo-Platonists, with a particular emphasis on Plotinus. The way such views evolved to physical studies, reflection and theories during the first scientific revolution in Ionia in the 6th century BC, has been discussed from a mythological point of view the development of such theories and some of their possible implications in later centuries, like the idea of spherical Earth of Pythagoreans and the idea of Columbus to search for a new way to India.

We can conclude that the common elements in the teaching of pre-Socratic Ionian philosophers and latter ancient Greek natural philosophers were the observation of living environment and nature, the corresponding relations, changes and cyclic periodic variations.

We also emphasize the attempts of Anaximander to formulate the need for the conservation of a dynamical equilibrium in nature and in ecosystems and his views on evolution of the living creatures and the humans, which all witness that in works of Greek antiquity one could find several interesting views and reflections on our modern worries.

REFERENCES

1. Aristotle (1933) *Metaphysics*. Books I-IX, transl. by Hugh Tredennick. The Loeb Classical Library (reprinted 1936, 1947, 1956, 1961, 1968, 1975, 1980, 1989, 1996). London: Heinemann.
2. Aristotle (1956) *On the Heavens (De Caelo)*. transl. by W.K.C. Guthrie. The Loeb Classical Library (reprinted 1936, 1947, 1953, 1956). London: Heinemann.
3. Brennan, T. (2005) *The Stoic Life*. Oxford: Oxford University Press.
4. Damaskos, P. (2009, March 27) *The problem of Ecology in the Stoics*. Symposium Hellenic Physicist Society, Rethymno, Crete [in Greek].
5. Berggren, J. L. and Jones, A. (2000) *Ptolemy's Geography: An Annotated translation of the theoretical Chapters*. Princeton: Princeton University Press.
6. Darwin, C. R. (1998) *The Origin of Species*. Oxford World's Classics. Oxford, New York: Oxford University Press.
7. Diogenes Laertius (1935) *Lives of Eminent Philosophers*. transl. by R.D. Hicks. Two volumes. Loeb Classical Library, London: W. Heinemann.
8. Eliade, M. (1978) *A History of Religious Ideas*, vol. I, *From the Stone Age to the Eleusinian Mysteries*. transl. by W. Trask, Chicago: University of Chicago Press.
9. Hesiod (2006) volume I, *Theogony. Works and Days. Testimonia*. Ed. & transl. by Glenn W. Most. The Loeb Classical Library, No. 57N, London: W. Heinemann.
10. Homer (1924) *The Iliad*. transl. by A.T. Murray (reprinted 1954), The Loeb Classical Library, London: W. Heinemann.
11. Homer (1919) *The Odyssey*. transl. by A.T. Murray, revised by G.E. Dimock (reprinted 1954 and 1995). The Loeb Classical Library, London: Heinemann.
12. *Homeric Hymns*. (1914) transl. by Hugh G. Evelyn-White, Cambridge, M.A., Harvard University Press. London: Heinemann.
13. Kern, O. (1922) *Orphicorum Fragmenta*. Berlin: Weidmann.
14. Long, A. A. (1986) *Hellenistic Philosophy: Stoics, Epicureans, Sceptics*. 2nd edition, London: Duckworth.
15. Lilis I. (2006) "The presence of ancient Hellenic philosophy during the first Byzantine centuries", *Orthodoxy*, period 2, year 13, July-September, pp. 577-596. Ecumenical Patriarchate, Constantinople [in Greek].
16. *Orphic Hymns (The Hymns of Orpheus)*. (1981) transl. from the original Greek text by Thomas Taylor, Introduction preface by Manly Hall, The Philosophical Research Society INC., Los Angeles, California.
17. Oehler K. (2000) "The continuation of Hellenic Philosophy from the end of Ancient Times to the fall of Byzantine Empire". Linos Benakis (edit.), *Medieval Philosophy. Modern research and Anticipations, Parousia*, Athens, p. 6. [in Greek].
18. Plato (1929) *Timaeus, Critias, Cleitophon, Menexenus, Epistles*. transl. by R.G. Bury (reprinted 1942, 1952, 1961, 1966, 1975, 1981, 1989, 1999). The Loeb Classical Library No. 234 (v. 9). Harvard University Press. London: Heinemann.
19. Plato (1925) *Lysis. Symposium. Gorgias*. transl. by W.R.M. Lamb (reprinted 1932, 1939, 1946, 1953, 1961, 1967, 1975, 1983, 1991, 1996). The Loeb Classical Library No. 166. Harvard University Press. London: Heinemann.
20. Plato (1925) *Statesman, Philebus, Ion*. transl. by H.N. Fowler & W.R.M. Lamb. The Loeb Classical Library No. 164. Harvard University Press. London: Heinemann.
21. Plotinus (1991) *The Enneads*. transl. by Stephen MacKenna and John Dillon. Penguin, London & *The Six Enneads*, transl. by S. Mackenna and B.S. Page. The Internet Classics Archive at MIT. classics.mit.edu/Plotinus/enneads.html
22. Ptolemy (1883) *Klaudiu Ptolemaiou Geographike Hyphegesis*. trans. in Latin by Karl Müller, Editore Alfredo Didot, Paris.
23. Sambursky, S. (1959) *The Physics of the Stoics*. London: Routledge.
24. *Simplicius in Physicorum*. (1895) Libros VVIII, in *Commentaria in Aristotelem Graeco*, Editit Hermannus Diels, Typis et Impensis G. Reimeri. Vol. X. Berolini.

25. Sophocles (1994) Vol. II. *Antigone. The women of Trachis. Philoctetes. Oedipus at Colonus*. Edit. & trans. by W.H.S. Jones, The Loeb Classical Library No. 21. Harvard University Press. London: Heinemann.
26. Theodossiou, E. (2007) *The dethronement of the Earth – The dispute between geocentric and heliocentric systems*. Athens: Diavlos Publ. [in Greek].

KOSMOLOŠKE TEORIJE GRČKIH PRESOKRATOVSKIH FILOZOFA I NJIHOVI FILOZOFSKI POGLEDI NA ČOVEKOVU ŽIVOTNU SREDINU

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U ovom radu razmatraju se pogledi u antičkom grčkom svetu na prirodu, Majku Zemlju i čovekovu životnu sredinu, od Orfičkih himni i homerovskog sveta, preko radova Hezioda i Sofokla, i teorija i radova presokratovskih filozofa, Jonske škole, Talesa, Anaksimandra, Anaksimena, Heraklita, Pitagore i Pitagorejaca, Empedokla, Sokrata, Platona, Aristotela, Stoika i Neoplatonista sa posebnim naglaskom na Plotina. Zajednički elementi u učenju presokratovskih jonskih filozofa i kasnijih starogrčkih filozofa prirodnjaka bili su posmatranje čovekove životne sredine i prirode, odgovarajućih veza, promena i cikličkih i periodičkih varijacija. Naglašavamo pokušaje Anaksimandra da formuliše potrebu za očuvanjem dinamičke ravnoteže u prirodi i ekosistemima, kao i njegove poglede na evoluciju živih bića i ljudi.

Ključne reči: *istorija nauke, prirodna filozofija, presokratovski filozofi, životna sredina.*