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Anaximander of Miletus

By: José Proveti Junior¹
jose.proveti@ifpr.edu.br

Abstract

The article presents the results of the studies carried out by the author on the appropriation that the philosopher Karl R. Popper, during his life, realized of the theses and behavior of some pre-Socratics. The thinker under study in the article is Anaximander of Miletus, son-in-law and countryman of Thales, the first critical and revisionist rationalist thinker, creator of reason as a rational discursive mode. In this sense, the article aims to present how Anaximander gave continuity to the pedagogical procedures of Thales and extraordinarily deepened the consequences of the critical revisionism of the School of Miletus on the works of Homer and especially those of Hesiod, inaugurating a new way of representing the cosmos the *phýsis* and the human adventure on Earth, considered by the ancients to be "our home".

Keywords: Anaximander of Miletus; Reason; Ancient Philosophy; School of Miletus; Karl Popper.

Resumo

La artikolo prezentas la rezultojn de studoj realigitaj de la aŭtoro en la alproprigo kiun la filozofo Karl R. Popper, laŭlonge de lia vivo, farita de la tezo kaj konduto de iu antaŭ-Sokrata. La Pensulo studis en la artikolo estas Anaximandro de Mileto, bofilo kaj ulo civitano de Thaleso, la unua kritika raciisma pensulo kaj reviziisma pro la kreinto, kiel racia parolita maniero. En ĉi tiu senso, la artikolo prezentas kiel Anaximandro daŭrigis la instruadon proceduroj Rakontoj kaj eksterordinare

¹ He's a Master's degree in Modern and Contemporary Philosophy from the State University of Western Paraná - UNIOESTE, is a Master in Philosophy of Mind and Cognitive Processes at the Universidade Estadual of North-Fluminense Professor Darcy Ribeiro - UENF, Specialist in History, Art and Culture at the State University Of Ponta Grossa - UEPG, is a Specialist in Health for Teachers and Students of Elementary and Middle School by the Federal University of Paraná - UFPR, Graduated in Philosophy from the University of the State of Rio de Janeiro - UERJ. He is a federal public servant, professor of Basic, Technical and Technological Education (EBTT) of the discipline of Philosophy, at the campus of the Federal Institute of Education, Science and Technology of Paraná - IFPR, in the city of Assis Chateaubriand/ PR. He works as a Philosophy professor in the Integrated Technical Courses in Informatics and Electromechanics and in the Subsequent Technical Course of Community Orientation. He is a professor and researcher at the Nucleus of Ancient Studies - NEA, at the University of the State of Rio de Janeiro - UERJ/ RJ, and is a researcher in the Group of Studies on Logic, Epistemology and Language Philosophy of the postgraduate program - Master in Philosophy Modern and Contemporary - UNIOESTE/ Toledo, researcher of the Group of Studies in Teacher Education - IFPR/ Goioerê, is General Coordinator, professor and researcher of the Research Group Philosophy, Science and Technology - IFPR/ Assis Chateaubriand. He is a member of the National Association of Postgraduates in Philosophy - ANPOF and member of the Brazilian Society of Classical Studies - SBEC. Participates in the Editorial Team of the Contemporary Journal of Education, UFRJ. He is Editor-in-Chief of the IF-Sophia Revue: electronic journal of Philosophical, Scientific and Technological investigations, reviewer of Magazines Academic Space and *Acta Scietiorum* - UEM and of *Mundi Magazine* - IFPR, author of the books "Soul in Hêlade: the origin of subjectivity In the West "(2011)," The Dualism in Plato "(2014)," The Greek Origins of Popperian Rationalism "(2016) and" Philosophy in Secondary Education: Little Apology of Teaching Work "(2016). He is the author of chapters in the books "Life, Death and Magic in the Ancient World" (2008), "Pregnancy and Adolescence" (2009), "Contemporary Philosophy, Logic and Science" (2013) and "IF-Sophia Umurama: And autonomy "(2012). He is the author of scientific articles in the national and international specialized media.



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enprofundiĝis la konsekvencoj de kritika reviziismo de Mileto Lernejo sur la verkoj de Homero kaj, precipe, Hesíodo, inaŭgurante nova maniero reprezenti la kosmo la phýsis kaj homa aventuro sur la Tero, konsiderita de la antauxuloj kiel "nia domo".

Ŝlosilvortoj: *Anaksimandro de Mileto; Razono; Antikva Filozofio; Lernejo de Mileto; Karl Popper.*

Resumo

O artigo apresenta o resultado dos estudos levados a efeito pelo autor sobre a apropriação que o filósofo Karl R. Popper, ao longo de sua vida, realizou das teses e comportamento de alguns pré-socráticos. O pensador em estudo no artigo é Anaksimandro de Mileto, genro e conterrâneo de Thales, o primeiro pensador racionalista crítico e revisionista, criador da razão, enquanto modo discursivo racional. Nesse sentido, o artigo objetiva apresentar como Anaksimandro deu continuidade aos procedimentos pedagógicos de Thales e aprofundou extraordinariamente as consequências do revisionismo crítico da Escola de Mileto sobre as obras de Homero e, em especial, as de Hesíodo, inaugurando uma nova maneira de representar o cosmos a phýsis e a aventura humana na Terra, considerada pelos antigos como sendo "o nosso lar".

Palavras-chave: *Anaksimandro de Mileto; Razão; Filosofia Antiga; Escola de Mileto; Karl Popper.*

In the innovative context in which the School of Miletus initiated a new perspective of approaching the questions related to what Popper calls "[...] as our home. [...] ". . It was verified that a new behavioral ethics of the members of the School was established, in relation to the popular educational tradition, understood through the myths aired by the rhapsodes, as affirmed Popper (2002a, p. 22-23):

However, this may be the conjecture that Thales actively encouraged criticism in his pupils could explain the fact that the critical attitude toward the master's doctrine became part of the tradition of the Ionian School. [...] Anyway, there is the historical fact that the Ionian School was the first one in which the students criticized their masters, one generation after another. There can be no doubt that the Greek tradition of philosophical criticism had its main source in Ionia.²

Anaximander of Miletus, compatriot and son-in-law of Thales, according to the philosophical tradition, was the first student of Thales and his follower, although they were of approximate ages. It is said that the death of one and the other is within a few years, as seen in Suda *apud* Kirk, Raven & Schofield (1994, p. 99).

What makes us to conjecture that in this auspicious beginning of the School and the philosophical tradition Ionia, founder, teachers and students had some years of communion, in the case, these would be the thinkers Anaximenes, Xenophanes and Heraclitus; Which is rarely put in

² However this may be, the conjecture that Thales actively encouraged criticism in his pupils would explain the fact that the critical attitude towards the master's doctrine became part of the Ionian School tradition. [...] At any rate, there is the historical fact that the Ionian School was the first in which pupils criticized their masters, in one generation after the other. There can be little doubt that the Greek tradition of philosophical criticism had its main source in Ionian.



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the books of History of Philosophy as participants in some effective coexistence throughout its existence.

It is important to point out that Anaximander was simultaneously a product and continuator of the didactic-methodological-pedagogical innovations of Thales, since in the course of the teacher's demise, for a few more years, Anaximander continued to apply the Thales method to his students.

Based on the above-mentioned Popperian conjecture, the author of this dissertation supposes that the same thinkers had as example the experience and procedural coexistence of the creator of the School, that is, Thales and the teacher, Anaximander, being molded methodologically in the fire of discussions in the capital Ionia.

Therefore, the role of Anaximander in the sedimentation of the critical and revisionist rationalist process posed by Thales was fundamental and yielded and yields, in Philosophy and Physics, many fruits, as Popper (2002a, p. 36) points out, is one of the boldest and most naive theories in the history of science. [...]³, immediately provoked the criticism of Anaximenes against the principle chosen by the master, that is, the *apeiron*⁴.

Already Xenophanes of Colophon, according to Popper (2002a, 37), would have interfered in the discussion in favor of Anaximander. This attitude would have caused Heraclitus of Ephesus to criticize everyone, but the most surprising thing is that Anaximander's theory was essential for the reflections of thinkers, philosophers, physicists, and astronomers such as Aristarchus (310-230 BC), Hypatia of Alexandria (355-415 AD)⁵, Copernicus (1,473-1,543), Kepler (1571-1630), Galileo (1564-1642) and anticipated Newton's theory (1643-1727) on universal attraction, valid up to the present.

From the fragments of Anaximander's plots nothing survived, and therefore, like Thales, what is known is through doxography. According to Popper (2002a, p. 9), his theory, apart from being the consecration of the method of application of rational language and of the critical and revisionist

3 “[...] is one of the boldest and most ingenious theories in the history of science. [...]”

4 In this dissertation we will adopt the meanings of "infinite" and "unlimited" due to the theoretical discussion about the conceptual application adopted by Anaximander, which will be presented and discussed throughout this text, below.

5 An addition made to the list of philosophers, physicists and astronomers related by Popper, influenced by the theses of Anaximander, considering that due to its feminine condition, at the time, and since then, this philosopher has been relegated to the forgetfulness, even of the books of History of Philosophy, and therefore, it pays homage of honor and glory to the contributions made to the history of thought and science. This note is addressed to the research colleagues of the Lighthouse Study Group of Alexandria, especially through the teacher Dr. Fernanda Lemos de Lima, leader of this Group of Studies that has been working for the version of original texts of Hellenistic Alexandrian works for Portuguese and For having discovered the philosophical production of Alexandria from Egypt for the author of this dissertation.



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stance proposed by Thales, points out that "... it is one of the most audacious, revolutionary ideas And portentous of the whole history of human thought. [...]".⁶

It is noteworthy that Anaximander's teachings dealt with cosmogony and cosmology, predominantly and in a secondary way, around meteorology, the origin of animals and men, the theme developed by Proveti Jr. (2008, p. 29- 33), indicated by this author as the anticipator of Darwin's theory of evolution.

The Anaximander's propositions were of speculative character, that is to say, without applying or recommending to its students the observation or the experimentation, as criteria of truth. At the time of the founding of rational thought, in Ionian Hellas, even Medicine had not appropriated rational discourse, as seen in Frias, Cairus & Ribeiro Jr., *apud* Proveti Jr. (2011c, p. 33):

According to Frias (2001, p. 14), Hippocrates, in systematizing part of what is now considered the corpus hipocraticum, had been deeply influenced by pre-Socratic philosophical thought, of physical characteristic, for trying to understand rationally the origins of nature, understood in the case, As the totality of the animal, mineral, and vegetable kingdoms of the worlds of men (Hellenic politicians and barbarians, enslaved for not living as the Hellenic), the dead and the Olympian gods. This influence is notorious in several parts of Hippocrates' medical thinking, for example, in Hippocrates in his "The Nature of Man" (CAIRUS & RIBEIRO JR, 2005, p. 43): [...] On the other hand, if Heat and cold and dry and wet do not interrelate with moderation and equality, but one predominates over the other, the stronger over the weaker, the genesis will not occur. [...] Since this is the nature of all beings and of man, then man must not be one; But each of the moods that contribute to the genesis preserves in the body its property, and precisely that which contributes.

This quotation from Hippocrates of Kos (2005, p. 43) is clearly consistent with the theory of opposites developed by Anaximander in his cosmology, and it is at this point that it becomes necessary to understand that pre-Socratic rational thought, in especially that of Anaximander, revolved around the discussion about the constituent principles (*archai*) of *kosmos*.

Like Thales, this research instituted a certain debate that for Popper (2002a, p.36) focused on the question of the Thales theory on the sustainability of the Earth, with his disciple Anaximenes.

For Thales, the primary element of the *kosmos* was water, a traditional symbol in all the river cultures of the Near East of creation, renewal, purification and transformation, as seen in Cornford (1989, p. 257-409), Brandão (1998, p. 275-279), and Jaeger (1952, p. 26-27):

[...] The Homeric passage is relatively late in what Ocean calls the origin of all things the word is already used in this sense. It means that Ocean is the genesis of all things is virtually the same as calling it *physis* of all things. Now, Thales holds that water is the origin of all things. This does not seem very different, but it is indisputably in the presence of a difference: this lies in the fact that the philosopher dispenses with all allegorical or mythical expression to enunciate his intuition that all things have come from the water. [...]

6 "[...] is one of the boldest, most revolutionary, and most portentous ideas in the whole history of human thought. [...]"



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Under the Thales's stimulus, Anaximander not only takes great pains to criticize the Homeric and Hesiodic mythic tradition, but also directs his analysis to the master and in this way questions his theory of the sustainability of the Earth.

He puts it in check on the pertinence of the *arche* (principle) proposed by Thales, for in antiquity, matter was understood in four representative modes of manifestation: earth, water, air, and fire.

These elements each symbolized characteristics that are not specifically related to the substances represented directly by the names applied for their identification but, mainly, to the characteristics inherent to them.

Anaximander analyzed the question posed by Thales as to the principle of *kosmos* being water and reasoned that it, as archetype of one of the manners of manifestation of matter, would necessarily be linked to the cyclic equilibration that determines *sophrosyne*.

As a moral standard implemented in Hellas from the time of the creation of the polis, and as a social element necessary for the reorganization of the Hellenic spiritual cosmos, the ideal of *sophrosyne* (fair-measure or just-mean) preached "nothing in excess".

In this perspective, the *sophrosyne* was projected by the cosmogonists and Hellenistic cosmologists as a parameter for the structuring of *physis* functioning, as seen in Vernant (1998, p. 41-54).

On this projection, when the human order was established, the understanding of the kosmos was created as a cyclical equilibration between the elements, as seen in Mondolfo (1968, p. 57-69) and Simplicio *apud* Kirk, Raven & Schofield (1994, p. 117):

110. [...] another *apeiron* nature, from which comes all the heavens and worlds contained therein. And the source of the generation of things that exist is that in which destruction also occurs "according to necessity; For they pay punishment and retribution to one another for their unrighteousness, according to the decree of Time, "and so he expresses himself in very poetic terms.

Now, according to this fragment attributed to Anaximander by Simplicius, the pre-Socratic thinker established the necessary relations of equilibration according to *Dike* (Justice), "[...] according to necessity; [...] according to the decree of Time, [...] "

Considering that for the ancient Hellenes all these concepts are both natural elements and cosmic forces, it is worth mentioning that Anaximander in this fragment concludes that the water of Thales or the air of his disciple Anaximenes or any other proponent of cosmology that attributed to the principle One of the existential frameworks of matter, would fall into misunderstanding.

If the *kosmos* works according to such determinations of "Justice", "necessity" and "Time", how would the predominance of one of them over other?



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According to Popper (2002a, p. 36), Anaximenes would have attempted to rescue the conception of thalesian's principle, but modified the element, based on Anaximander's theory of the changes that occur in the world through the action of the wind, going to a substantial elementary conception closer to the traditional mythical and philosophical conception, as seen:

He wanted to replace the *apeiron* with something more familiar, namely, the Air - including the fog and heavy clouds. The appearance of air clouds seems to demonstrate the possible appearance of even more solid matter floating in the air, such as the sun, moon, and stars - and even carried by air, animals such as insects and birds. Anaximenes explained the Earth's stability by assuming that it rested in the air in a way that the solid lid of a pot is supported by the vapor.⁷

Following the thalesian's methodology of teaching, Anaximander did not use the argument of authority and stimulated the revisionist rationalist critique of Anaximenes. However, it is enough to analyze the arguments of the pupil of Anaximander to classify them as superficials, before the proposal of the master's *arche*.

Just as made by Anaximander to Thales and to all those who defend cosmologies, whose principles are one of the elements of *phýsis*, the question remains: what sustains it so that it can stabilize the Earth?

For Popper, the cosmologies that adopt one of the four elements as principle are taken by an argument that leads to regression to infinity, since a more elementary cause will always be sought to ensure the stability of the Earth's sustaining element.

Anaximander's main concerns in proposing his theses were, according to Popper (2002a, p. 13): a) the architecture of the *kosmos*; b) the structure of the *kosmos*' architecture and c) the plans and construction materials of the *kosmos*.

In this sense, the discussion about the problem of *kosmos* architecture and its structure imply, necessarily, the definition of an explanation that accounts for how the processes occur in the *phýsis*. For that, of which material it is composed, so that based on the knowledge developed about this material, one understands how it behaves, implying in the understanding of what everything comes from.

According to the cadence of the above arguments, Anaximander corroded the revisionist rationalist critique of the philosophical and mythical tradition in an innovative question and, according to Popper, the most important in the history of human thought, namely: once considered

⁷ [...] (Anaximenes) he wanted to replace the “*apeiron*” by something more familiar, namely “Air” - including mist and heavy clouds. The emergence of clouds from air seems to demonstrate the possible emergence of even more solid matter floating in air, such as the Sun, the Moon, and the stars – and, indeed, airborne such as insects and birds. Anaximenes explained the stability of Earth by assumption that it is supported by air, as the solid lid of the kettle is supported by steam.



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the elements (earth, water, fire And air) unfit to play the role of *arche* of *phýsis*, what would be the principle?

The answer to this question is known to any student of contemporary Philosophy and is explicit in any book of introduction or history of Philosophy, namely: το απειρον (*tò ápeiron*), according to sees in Kirk, Raven & Schofield (1994, p. 105).

These German Hellenists, in their famous work "The Pre-Socratic Philosophers" (1994) indicate the meaning of the Hellenic word as being "the indefinite," that is, that which has no fixed, fixed form.

They bring to the discussion that the term does not have the consensus of field researchers. In this case, Popper (2002a, p. 13) agrees with Kirk, Raven & Schofield as to the interpretation of the term *apeiron* in a sense approximated to them, as follows: "[...] the 'without end' or 'unlimited' or 'unlimited' or 'report'; The *apeiron*."⁸

The conception of the concept of *apeiron* implies something that Anaximander claimed to be above the four elements, being independent of them and simultaneously being the original and dispersing source of all that is in the *kosmos*.

It is interesting to note that Kirk, Raven & Schofield (1994, p. 105-119) conclude that there is no agreement among doxographers and even commentators on the precise meaning of the term, suggesting the question: where What does Anaximander remove and what exactly are the implications of its use in the student theory of Thales?

The fact is that Anaximander would have been the first Hellenic to forge a technical concept of philosophy, as seen in Kirk, Raven & Schofield (1994: 107), namely the concept of *arche* (αρχη, principle). This is corroborated by one of Anaximander's commentators that Popper (2002a, 38, 41, 58, note 13, 114, 120, 127, notes 23 and 24, 129, notes 47-48, 130, note 49; 50, 133, notes 61 and 63, 146, 148, 154-155, 158, 205, note 7, 210, notes 10 and 11, 209, note 42, 217, 222, note 1-4, 31 and 268) more praises and is grounded to weave his approach, which is CH Kahn.

However, according to Kirk, Raven & Schofield (1994, p. 107) the term *apeiron*, since the Alexandrian period is obscure, its origin and use by Anaximander is even more so to the present.

According to the surviving doxographic records, the following reports on the subject are given in Simplicio *apud* Kirk, Raven & Schofield (1994, pp. 105-107):

101. Among those who admit a single moving and infinite principle, Anaximander of Miletus, son of Praxias, successor of Thales, [...] said that the principle and element of things that exist is the apex, [indefinite or infinite], having been He is the first to introduce this name of the material principle. [...] He says that this principle

8 "[...] the 'endless' or 'boundless' or 'unbounded' or 'unformed' – the *apeiron*."



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is neither water nor any other so-called elements, but another ape-like nature, from which all the heavens and the worlds contained therein come. [...] And the source of the generation of things that exist is that in which destruction also occurs "according to necessity; ... For they pay punishment and reward to one another for their unrighteousness, according to the decree of Time, "and so he expresses himself in very poetic terms.

Now it is clear from the above that nothing is said about what it is, about the origin and the specific relation of the *apeiron* to *kosmos* and *physeis*, except the traditional one, and to formulate a thesis that the principle only is to the extent that it is the source and the end of everything that exists.

On the other hand, the words of Simplício indicate the sources of the characteristics of the apex of Anaximander, insofar as they relate it in their way of being and acting, that is, the traditional epithet described in the previous paragraph and, as a source of opposing elements that Act in balance, "according to necessity" and "according to the decree of Time".

Now that it implies the understanding of Popper's position in relation to Anaximander's theory, to know the original meaning and application of the term *apeiron* for the epistemologist?

To the extent that Popper considers Anaximander to be the creator of the most naive yet audacious and innovative theory ever seen by mankind in the history of science, it is believed that it is important to understand what is implied in the Anaximander's thesis, in order to identify whether such an issue is present in Popper's theses.

The beginning of the analysis will consist of an attempt to understand the meanings of the Greek language. According to Izidro-Pereira (1990, p. 62) the term for "unlimited, indefinite and indeterminate" is ἀορίστος, ον (*aoristos, on*).

The word that means "infinite" is ἀπειρέσιος, α, ον (*apeirésios, a, on*), (1990, p. 66), having as synonymous plus the sense of "Immense" the word ἀπειριτος, ον (*sayings, on*).

In other words, in the Greek language, the term is "indefatigable, incessant, without end" (IZIDRO-PEREIRA, 1990, p.86) and the word ἀσπετος, ον (*aspects, on*), with the meaning of "unspeakable, immense, infinitely innumerable" (IZIDRO-PEREIRA, 1990, p. 86).

Now, something infinite is what lacks limits by its amplitude, size, in order to be considered interminable. Already something indefinite is uncertain, vague, indeterminate, indistinguishable.

Although the concept of infinity can to some extent be classified as "indeterminate", the idea of indefinite does not necessarily imply the concept of infinity, for something may be unknown or little known and therefore "indefinite" and not infinite, while the infinite, necessarily, is infinitely innumerable.

The Greek terms *atytos* and *aspects* are found in the Hellenic texts of Homer's treatise, while the terms *apeirésios, a, on* and *apelirito, on* are commonly used by doxógrafos, when they



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make mention of the ideas of Anaximander, as it is seen in Simplicio *apud* Kirk , Raven & Schofield (1994, p. 105-107).

In this sense, the questions remain: what is the *apeiron* itself and what is the effective relation to Anaximander's theory? From where the thinker draws this concept and its importance, to the point of Popper (2002a, p. 218) assert with Kahn, that "These ideas of Anaximander, Kahn notes, form the background of Western cosmological thinking."⁹

It is stated in this dissertation, together with Mondolfo (1968, p. 43-54), that the conception of *apeiron*, in the sense of "infinite", adopted by Anaximander as his *arche*, from which opposing or opposing elements arise and from which emerges the movement of the opposites, which generate the four elements that totalize balanced in the *kosmos* and the characters of the *phýsis*, comes from the conception of infinity, constant in the Homeric poems.

This conception identifies the "infinite" with the "eternal" (MONDOLFO, 1968, p. 57-62), remodeled by theogonies and in orphism (MONDOLFO, 1968, p. 63-68), being revised and proposed as a rational reprint and critique of myth, by Anaximander, is the prototype of the time-space pair, in the mythical figure of *Chronos* (Time). In its necessary, eternal and cyclical movement, everything produces and consumes.

This puts itself in the condition of conjecture of resolution to the problem of the very first origin of everything, coming from the debate of the theogonies in force at the time. According to Mondolfo (1968, p. 77-78):

[...] For Anaximander there is a cycle of formation and disintegration of the worlds, which takes place in the order of time ("according to the order of time" - *katà tèn chronu táxin*), but this order of time is infinitely renewed in the infinity of vicissitudes Cyclical, while the eternal permanence of the *apeiron*: "infinite," the divine principle "innate and incorruptible" (*agéneton kai áphtharton*), which Anaximander himself calls "immortal and indestructible" (*athánaton kai anólethon*). Thus the incessant cyclical return of the order of time has, in a certain way, in the permanent eternity of the *apeiron*, its continent; Or *ápeiron* is *tó períekhōn*: "the continent", both in the temporal as in the spatial aspect. There seems to be a conception of the eternal (*apeiron aion*: "eternal infinite," according to the expression of the "Stromata" pseudoplatarquianos relative to Anaximander), which includes time transcending it, but in fact the transcendence of the eternal with respect to the Time, because the eternal permanence of the "infinite" is nothing but an infinite change and movement ("from infinite eternity in the vicissitude of all things" *ex apeíru aiōnos anakykluménon pánton*).

The cosmological system of Anaximander starts from the *apeiron*, as the generating and consuming source of everything that occurs in *kosmos* and *phýsis*. Mondolfo affirms that the *apeiron* is an active principle that acts according to the order of the time.

9 "These ideas of Anaximander, Kahn observes, form the background of Western cosmological thought".



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This "order" is infinitely cyclical, according to the temporal cosmogonic model that the Hellenists adopted. In this sense, the *apeiron* is eternally under the determination of Time, and in that sense, if it exists, it is necessarily as eternal as time and therefore infinite.

The infinitude of the *apeiron*, as well as that of time, comes from the essential character of any deity, namely: ingenuity, that is, it has never been created and therefore dispenses with paternity, beginning or end, and therefore, Necessarily incorruptible. Therefore, immortal, indestructible, as it is called by Anaximander.

In considering the geometric conception of time, as a circle in which there is no beginning or end, no matter if it progresses or regresses to the future or past. Time, as much as the *apeiron*, is consolidated in what Mondolfo calls the "continent," that is, a locus in which, simultaneously, it is external to the *kosmos*, involving it as well as transpassing it, integrating it and / or Dissipating it and, therefore, instantaneously and totally change and remain simultaneously.

They change insofar as transcending the *apeiron* time determines it and only does so insofar as it identifies with it, and it can be said, therefore, with Mondolfo that the *apeiron* and time in Anaximander are one and only thing or, As the pre-Socratic cosmologists put it, "are one."

They remain the same and identical to themselves insofar as, by cyclically changing their beginning-end, they are integrated in a way that does not exist as a solution of effective continuity.

These deductions follow from what Mondolfo (1968, p. 78) asserts when he criticizes Burnet, who opposes the doxographers, and does not attribute such words to Anaximander, that regardless of whether such expressions are not of the millennium, in itself, the concept of *apeiron* has Implicit in its nature the immortal and therefore, indestructible principle. Generating and reabsorbing in itself and by itself, in the setbacks of its cyclic eternity, the *phýsis* of the *kosmos*.

But the question still remains: where does Anaximander draw inspiration from such an unusual and innovative cosmological conception?

According to Mondolfo (1968, p. 69), the Milieu School had in the tradition of Homeric-Hesiodic education the elements necessary for understanding the concept of infinity.

Insofar as they began the application of critical rationalism in a review of the cosmogonic and theogonic explanations that preceded them, as seen in Popper (2002a, 109), they encountered what Mackenzie says to Mondolfo (1968, p. 69) Affirms as a widely diffused popular consciousness of conceptions of 'eternity', namely: 1. as that which extends infinitely in time; 2. as that which is absolutely outside of it and 3. as that which includes it, transcending it.

In the case of Anaximander, the milieu undertook the third conception of "eternal", to conceive its *apeiron*, and this idea followed, as Mondolfo (1968, p. 63) argues, the discussion about what would be the protiston, "The very first" of the generative gods of the *kosmos*. In this case, they



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are related as follows: a) Hesiod, which attributed the principle to the god Chaos; b) the Museum, which indicated the principle through the gods Tartarus and the Night; c) Acusilau, who defended the thesis that they were the gods *Chaos*, *Erebus* and *Night* and d) the Orphic tradition, which indicated the source of the *kosmos* as coming from the action of the gods *Chaos*, *Night*, *Erebus* and *Tartarus*.

While deities, who according to the hesiodic genealogy (1996) had their cosmic activity defined to certain constituent aspects of the *kosmos*, Mondolfo (1968, p. 65-66) reports that:

... The epic, by introducing into the development of myth the element of calculation (which is undoubtedly a limitation) constituted by divine genealogies, restrict the idea of birth to that character of eternity, or rather, of unlimited extension of existence. This, prior to all genealogical ordination, seems to be implicit in the conception of all the Gods, "who always existed" (*aieiguenéta*).

Therefore, as can be seen from Popper's (2002a, p. 109) words, along with that asserted by Mondolfo, supra:

Philosophical speculation is assumed to have been initiated with the Ionians: with Thales of Miletus and his disciple and relative Anaximander. And indeed, some very new things have been added by these two. They added the critical approach or the critical tradition: the tradition of looking at an explanatory myth, such as the explanatory model of the universe due to Homer and Hesiod, with critical eyes. What initial Greek philosophy or early Greek science adds to the creation of myths is, I suggest, a new attitude: the critical attitude, the attitude of changing an explanatory myth in the light of criticism. It is this critical examination of explanatory stories, or explanatory theories, undertaken in the hope of getting closer to the truth that I observe as characteristic of what may be somewhat vaguely described as rationality. And it is this critical examination that explains the changes in these myths and the surprisingly rapid development of the myth in doing what looks very much like science. Theories remain speculative; But under the influence of rigorous criticism, they show an increasing degree of verisimilitude. The only way in which this development can be explained is by the conjecture that the critical attitude has made a tradition in the Ionic philosophical school.¹⁰

Thus Anaximander's inspiring source for the creation of the concept of *apeiron* and its attributes, which allowed him to evade the theoretical trap of proposing a principle connected with the four elements of manifestation of matter, was a revisionist critical appropriation of the theogonic

¹⁰ Philosophical speculation is assumed to have started with the Ionians: with Thales of Miletus, and his disciple and kinsman Anaximander. And indeed, something very new was added by these two. They added the critical approach or the critical tradition: the tradition of looking at an explanatory myth, such as the model of the universe due to Homer and Hesiod, with **critical eyes**. What early Greek philosophy or early Greek science adds to myth making is, I suggest, a new attitude: the **critical attitude**, the attitude of changing an explanatory myth in the light of criticism. It is this critical examination of explanatory stories, or explanatory theories, undertaken in the hope of getting near to the truth that I regard as characteristic of what may be somewhat loosely describes as **rationality**. And it is this critical examination that explains the changes in these myths, and the surprisingly rapid development from myth making into what looks very much like science. The theories remains speculative; yet, under the influence of severe criticism, they show a greater and greater degree of truthlikeness. The only way in which this development can be explained is by the conjecture that the critical attitude became a tradition in the Ionian philosophical school.



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tradition, Identifying the *apeiron* with Time and, therefore, leaving it in a locus simultaneously apart and intrinsically inherent to the *kosmos* and the *phýsis*, thus making possible an unbeatable solution to the question.

The interesting thing about Anaximander's thesis is that he explicitly declares his conception of *kosmos*, to be made possible from the *apeiron*, and describes his conjecture quite well, despite the absence of his own texts on the subject.

For Popper (2002a, p. 15): "The three millenniums considered in common that the world was our home. In this house there was movement, there was change, there was hot and cold, fire and damp. [...] "However, unlike the traditional myth-poetic version, the world," our house, "is not the only one existing in the *kosmos*."

As a product of the eternal movement coming from the apex, the elementary opposites are placed according to necessity and temporal determination and, in frank balancing, form the Earth and in it the *phýsis* and their particularities.

In such a cosmology an explanation of movement is not necessary, for it is essential to the nature of the principle itself, and as such transmitted by contact and existential inertia.

The opposites make all *kosmos* work. However, in the context of the imminently quotidian changes, Anaximander, according to Popper (2002a, p. 155), is concerned about the shift to revolve around the phenomena of qualitative change present in the conflicts of opposites:

All this can be found in Anaximander; and under its influence the idea of opposites develops a primitive theory of change: change is conceived as a qualitative change, as the temporary victory of one of the pairs of opposing powers over the other.¹¹

For millesium, this kind of change that occurred in the *phýsis* of the *kosmos* was independent of the *apeiron*, as the vector of transformation and therefore did not present itself as a problem of cosmic order, but, on the other hand, within the *phýsis*, for the Anaximander's theory, all the changes were governed by the action of the instigated thermal changes by the wind.

In other words, and in the pre-Socratic terminology proper to it, the qualitative change, of physical order, was due to the conflict between hot (fire) and cold (water), incited by the wind (air) including his explanation of the origin of living beings and men.

The origin, properties, and action of Anaximander's *arche* are explained here in order to make a presentation of his theory of *kosmos*, in order to understand the innovative character of the conjecture of the millennium, and why Popper indicates it as the "background" of Philosophy and Western Science.

¹¹ All this is to be found in Anaximander; and under his influence, the idea of opposites developed into a primitive **theory of change**. Change is conceived as qualitative change, as the temporary victory of one of pair of opposing powers over the other.



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According to Pseudoplatarco *apud* Kirk, Raven & Schofield (1994, p 131):

121. He says that what produces, from the eternal, the heat and the cold, separated, when the generation of this world, and that from it a kind of sphere of flame formed around the air that surrounds the Earth, Like the bark around a tree. When this sphere popped and closed in certain circles, it was then that the Sun and the Moon and the stars formed.

In this fragment the narrative of Pseudoplatarco is observed as for the thesis of Anaximander, regarding the formative process of the Earth, the stars and stars that surround it from the *apeiron*.

Note that it marks Anaximander as the first thinker to propose the sphericity of the Earth, from what he called "the sphere of flames" around the Earth, although it does not say exactly about the sphericity of the Earth. How would a sphere of flames form around it if it were not spherical?

So far, in the description of the doxographer we have seen only the description of what has already been commented, nevertheless, in continuity through fragment 122-124 of Pseudoplatarco, Hipólito and Aristotle quoted by Kirk, Raven & Schofield (1994, p 133 -134) indicate:

22. (A) He says that the Earth has a cylindrical shape, and that its depth is one-third the width.

(B) Its shape is curved, round, similar to the stem of a column; Of the two flat surfaces, we walk on one, and the other is on the opposite side.

123. There are some, like Anaximander among the ancients, who claim that it [the Earth] stands still because of its equilibrium. For strength is that that which is placed in the center, and is equal to the extremes, in no way moves more up or down or to the sides; And it is impossible for him to move simultaneously in opposite directions, so that he remains fixed by necessity.

124. The earth is suspended in the air, without anything holding it, but it is held firm by the fact that it is at equal distance from all things.

As Popper (2002a, p. 110) attests, Anaximander's theory that an unsustained and freely suspended Earth, stabilized by the equilibrium action of cosmic forces from the sphere of fixed stars acting on it at a certain distance is, In his words: "[...] breathtaking in his boldness. [...]".¹²

Such a position of Popper is justified, since it is a theory as non-observational as that of the *apeiron* and surely anticipates Newton's theory. This points to the link between the pre-Socratic epistemological procedure and the tradition Cornford (1989, p. 1-304) points out.

This author presents and introduces the description of the theory and methods of knowledge used by the early rationalist thinkers, which is complemented by the works of Mondolfo (1970, p. 97-290), in which the Italian philosopher points out the predominance of the criteria of truth Used by the

12 "[...] is breathtaking in its boldness. [...]".



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Hellenists, which varied from conceptibility to knowability, but did not appeal to empiricism and experiment until Aristotle, as Popper (2002a, p. 1-32).

Anaximander needed to present a model that explained the sustainability of the Earth, in a way different from the one made by Thales and which had continuity in the Anaximenes thesis, since it did not have the conditions to base what would support the element), Which the teacher and the student proposed to him as thesis.

For Anaximander, the *arche* of the *kosmos* could not be one of the four elements, inasmuch as it became necessary to describe to the infinite of what would support this element so that it was given as proposed.

If the *apeiron* is identified with *Chronos*, the god Time, being eternal, source and fanal of dissolution of everything that is generated and corrupted in the *kosmos*, through the action of the opposites (earth, water, air and fire), arising from the eternal movement and Cycle of time, as Anaximander explains the stability that attaches to the Earth? Since it has no support whatsoever, as can be seen in the mythic-poetic, theogonic and rational tradition, and the theogenic, rational, and Anaximeneian, such as explaining the sustainability of the Earth

In order to understand the question of innovation and revolutionary proposal of Anaximander, a review of the state of the field will be carried out on its cosmological theory which, according to Popper (2002a, p. 110-111):

a) The *apeiron* is the source and destruction of all that is in *kosmos* and *phýsis*, acting upon them through its eternal movement, which balances the four elements that symbolize matter at the time, namely earth, Water, air and fire;

b) Between *apeiron* and Heaven (the god Uranus or the firmament) there is a sphere of fire, which the ancients claimed to be the divine matter or the fifth element, namely ether;

c) In the ethereal spheres that surround the world (the Earth or the goddess Gaia) comes, respectively, in decreasing order as to the distance of the Earth: the Sun, the Moon and the fixed stars.

It should be noted that in the sphere of these it was established what the ancients called Heaven, which in the case of Anaximander's theory, all these spheres would be similar to car wheels, with tubular rays filled with fire (ether), where Would see the stars, the Moon and the Sun and explain the mechanism of eclipses through the obstruction of these tubular structures;

d) The Earth, as opposed to accompanying the sphericity of the Sun, the Moon and the Sky, would have the shape of a small column, similar to a drum with a disk surface, and the men would live on the upper face of the disk;



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e) The Earth would stand still, at the center of this system, by keeping itself at the same distance from all other things in the *kosmos*.

In short, these are the characteristics of Anaximander's cosmological thesis. Popper (2002a, p. 11) states that:

There is an obvious objection to Anaximander's theory of symmetry, according to which the Earth is equidistant from all other things. The asymmetry of the universe can easily be seen by the existence of the Sun and the Moon, and especially of the fact that the Sun and the Moon are sometimes not far apart from each other, so that they are on the same side of the Earth, while there is nothing on the other side to balance them.¹³

In addition to the critique developed by Popper, it can still be said that the aforementioned symmetry that would guarantee the Earth's sustainability would be even more impaired if one takes into account the credibility of the comments of the Simplicio and Augustine doxographers, which attest to the existence of Anaximander would call it "infinite worlds," as seen in Kirk, Raven & Schofield (1994, 124):

113. For those who supposed that the worlds were in infinite numbers, as the followers of Anaximander and Leucippus and Democritus, and later those of Epicurus, supposed us to be born and to perish for an infinite time, with some of them always to Born and others to perish; and they said that the movement was eternal.

14. It is that he [Anaximander] thought that things were born not of a single substance, as Thales thought they were born of water, but each of his particular principles. These principles of individual things, he believed, were infinite, and spawn innumerable worlds and whatever is born in them; And he thought that these worlds are now dissolved, now again generated, according to the age to which each one is able to survive.

Now, in considering these quotations as valid, in Anaximander's *kosmos* there would be infinite worlds similar to Earth, and in that sense, as would his balance thesis criticized by Popper as refutation in this particular, although he considered it an astonishing anticipation to Newton?

Firstly, it is important to note that Anaximander's source of inspiration for proposing his theory of Earth sustainability in the parameters of his theory of the *apeiron* as a principle lies within the framework of Hellenic geometric mathematical thinking, according to Vernant (1998, p. 67-68 and 73), concerning the organization of the human cosmos, which:

In contrast to the *hybris* of the rich, the *sophrosyne* ideal is delineated. It is made of temperance, of proportion, of just measure, of just mean. "Nothing in excess," such is the formula of the new wisdom. This valuation of the weighted, the mediator,

¹³ There is an obvious objection to Anaximander's theory on symmetry, according to which the Earth is equally distant from all other things. The symmetry of the universe can be easily seen from the existence of Sun and Moon, and especially from the fact that Sun and Moon are sometimes not far distant from each other, so that they are on the same side of the Earth, while there is nothing on the other side to balance them. [...].



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gives the Greek arete a more or less "bourgeois" aspect: it is the middle class that can play in the city the moderating role, establishing a balance between the ends of the two borders ... Those who are called *hoi meson* are not only members of a particular social category, equal distance from indigence and opulence: they represent a type of man, they embody the new civic values, like the rich, the madness of hubris. In a middle position in the group, the *mesoi* have the role of establishing a proportion, a trace of union between the two parties that tear the city apart, because each one claims the whole of the *arche*. [...] the *sophrosyne*, virtue of the just means, corresponds to the image of a political order that imposes a balance on opposing forces, establishing an agreement between rival elements. But as in the case, in its new form, arbitration presupposes a judge who, in order to enforce his decision, or to impose it if necessary, refers to a law superior to the parties, a dike that must be for all equal and the same. [...] Justice appears as an entirely natural order that regulates itself.

The development of moral thought and political reflection will continue along this line: relations of force will seek to substitute "rational" relations, establishing in all domains a regulation based on measure and aiming at providing, Various types of exchange that form the fabric of social life.

Vernant's citation portrays the Hellenic effort of the archaic period, post-creation of the polis, after more than three hundred years in which the defacing of Mycenaean societies occurred until around the 8th century BC.

Such an event, which plunged the pre-Hellenic world into isolation from Near-Eastern societies and without established political organization, immersed itself in the chaos of violence and the obscurity of writing, with the institution of shamans, poets and fortune-tellers as the sole banner of oral culture, which passed through their prognostics, songs and dances inspired by the gods, what communities should do to survive.

The creation of the polis as a social organization that emerged from the reunion of some villages around the totemic family and tribal structure established a mode of existence in which public space started from the principle of citizenship which, as Vernant (1998, p. 33-64) In the group of *homóioi*, that is, "those that are equal" indistinctly to the origin or social class.

There was a dispute between the nobility and the plebs for the possession of power, migrating between acerbic civil conflicts of a tutelage almost exclusive to the nobility, or one or more royalties to democracy, which was to be modeled in Athens in the period classic.

The crisis of the cities was mediated by the first sages, who according to Vernant (1998, p. 55-56) embodied the ideal of *sophrosyne* in such a way that they were able to temporize sometimes the situation of social imbalance:

On this traditional datum of the Seven Sages, it would be well to support a historical conclusion: the list of the Seven Sages is fluctuating and variable; He sees neither chronology nor verisimilitude. However, the political and social role attributed to the Sages, the maxims that are considered of its authors, allow to approach, from each other, personages that, in the rest, in everything opposes: a Thales, uniting to so many other competences the one



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of the man Of state - a Solon, elegiac poet, arbiter of the Athenian political struggles, refusing tyranny, - a Periander, Corinthian tyrant, - an Epimênides, the very type of the inspired magician, of the anois, who fed himself with mauve and asphodel , And whose soul is freed from the body at will. Through a mixture of purely legendary data, historical allusions, political sentences, and moral buzzwords, the more or less mythical tradition of the Seven Wise Men makes us reach and understand a moment of social history. A time of crisis, which begins at the end of the seventh century and develops in the VI, a period of confusion and internal conflicts that distinguish some economic conditions; A period which the Greeks lived on a religious and moral level as a discussion of their entire system of values, a blow against the order of the world itself, a state of error and impurity.

It is precisely during the period of creation of critical rationalist thought that the revisionist character attributed to it by Thales, Anaximander, and the students of the School of Miletus, namely: Anaximenes, Xenophanes, and Heraclitus, is consistent with what Vernant points out as a period of "organization Of the human cosmos, "that is, the creation of the polis, of law, of the political relations that will characterize the West.

For Jaeger *apud* Mondolfo (1970, p. 46), the concrete legality established in the polis, in conformity with the religious ideal and, therefore, divine of *sophrosyne* opposes the unmeasured. In open opposition to *hybris*, it provoked the need for the creation of a public space in which the power of the state was balanced by the elements of the polis through the *Dike* (Justice).

Therefore, after its behavioral absorption and internalization by the Hellenic man in the social space, critical rationalist thought, propelled by the aforementioned dispositions of revising the explanations of everything that did not conform to the ordering of the human *kosmos* had to fit, for an impulse of understanding of the human *kosmos* established the investigative inquiry around *phýsis* and *kosmos*. As the old adage goes: "what is above is below".

The author of this dissertation conjecture that the unusual theoretical innovation of the balance theory of the Earth without supports of any nature was inspired to Anaximander by the religious impulse of *sophrosyne* and any element that was put like *arche* of the *phýsis* would be contrary to the geometric and rationalized order that is Experience in Hellenic social life.

The theses of Thales and Anaximander would not be in keeping with the spirit of the age, while that of Anaximander, deductively, without any appeal to empirical analogy, establishes a *kosmos* whose power is apart and interpenetrates the elements contained in its *phýsis*.

In this sense, the elements moved by their eternal, immortal and cyclical action, according to the order of Time (*Chronos*) and by *Diké* (Justice), one pay tribute of equal proportion to the other, in eternal conflict, composing and decomposing the things that in him they get.



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We disagree here with Popper (2002a, 11), for if the doxographic quotations and historical data presented above are consistent with the theses of the time and school in which Anaximander constructed his theories, *kosmos* implies no more one An exclusively geocentric concept, in which the Earth is regarded as the only world existing in it.

Gaia would be only a *phýsis* among the infinite or innumerable worlds existing in the kosmos, and therefore the aforementioned asymmetry to which Popper refers is not credible, given existence in the cosmic plane geometrized in the molds of the polis, according to the determinations of an original locus and Disperser, which surrounds and interpenetrates all these worlds, causing them to arise and consume themselves according to the necessity and determination of Time (*Chronos*).

In this way the Anaximander system is presented much more widely and worthy of a true anticipation not only of Newton but of the current astronomical data.

On the other hand, it is still possible to argue that on the basis of the characteristics of Time, attributed by Anaximander's identification to his *apeiron*, it is linked to the Indo-European conception of circularity of time, to the detriment of the Judeo-Christian-Muslim-scientificist view of linearity of time.

In this sense, it is conjectured that the *apeiron* of Anaximander makes possible the anticipation of Einstein's reflections on the theory of relativity of time and its identification with space, since the *apeiron* is constituted as "the continent" in the time-space dimension.

Therefore, moving from the one-dimensional linearity of contemporary time to the incredible anticipation of three-dimensionality of time and hence of relativity theory and its implications, as seen in Mondolfo (1968, p. 77-78).

However, even if this conjecture of the author of this dissertation is not consistent with what has been exposed up to now, it still opposes the Popperian critique of Anaximander, when he realizes that Popper (2002a, p.11) forgets the so-called "sphere of the firmament" , That is, from Heaven (Uranos), where according to the mythical and theogonic tradition were the so-called "fixed stars".

Even if Anaximander's system were unbalanced and would tend to cause any displacement of the Earth, there would be, necessarily and fixedly, all the innumerable stars which, according to the millennium, are in the sphere closest to the Earth than the Sun. More distant) and the Moon (in intermediate position).

In order to conclude the presentation on the Popperian Anaximander and the discussions raised by his conjectures, it is important to point out that Popper (2002a, p.13) seeks to identify the origins of what he calls "the problem of change".



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In the case, Popper attests that in the world of Anaximander all kinds of changes occur, but they can be synthesized in two types, especially those arising, within the *phýsis*, from the action of the winds. That they are present in all other theses that explain the natural phenomena, from the meteorological events to the biological ones, as the appearance of the living beings and, mainly, the origin of the man.

And in the cosmic sphere, the eclipses of the Sun and the Moon, arising from the action of the movement of the opposites, provoked from the *apeiron* and regulated by necessity and Justice.

But the most important of these constant changes of the Anaximander's *kósmos* is that all changes, according to Popper (2002a, p. 155) "... change is conceived as qualitative alteration, as the temporary victory of one of the pairs of opposing powers On the other. "¹⁴

What, in itself can also be indicated as a further anticipation of the milieu as to the theory of conservation of matter, however, is not intended to develop this in this part of the dissertation.

If he realizes that, as Popper puts it, the pre-Socratic thesis, however puerile and misleading they are today, scientifically speaking has at its core an immense content to be decoded, demystifying its inaccessibility and revealing, in fact, its inspiring potential Of bold new theories for the present, in Philosophy and Science.

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¹⁴ “[...] change is conceived as qualitative change, as the temporary victory of one of pair of opposing powers over the other”.



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