

Ecpyrosis and Cosmos in Heraclitus

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1. Introduction

There are two ways of interpreting Heraclitus' cosmology: the first adopts the view that the Ephesian supported a theory of one, unique and eternal universe in which all kinds of change take place without the occurrence of any kind of *ecpyrosis*, which is considered as Stoic idea. According to Kirk this view has been supported by many scholars such as Schleiermacher, Lassalle, Burnet, Reinhardt; we must cite also Kirk himself as an ardent follower of this view. The second sustains the view that *ecpyrosis* is one of the main features of Heraclitus' cosmology, according to ancient testimonies such as those of Aristotle and Theophrastus; in this view there occur alternating geneses and decays of universes; thus, there is a phase of cosmogony followed by the evolution of the emerged universe and ending by *a kind* of *ecpyrosis*. This view is supported by Diels, Gomperz, Gilbert, Brieger and Gigon; we can add the names of Charles Kahn, Philip Wheelwright, and Rodolfo Mondolfo. Our interpretation supports the latter view of successive universes, with an important difference: there is no need to suppose that a total conflagration is taking place; on the contrary, we assert that the expression *ἀπτόμενον μέτρα* ('kindling in measures') in fr. 30 precludes the occurrence of *ecpyrosis* in the sense of total conflagration. Thus, we introduce the notion of *quasi-ecpyrosis*, where "a maximal amount of the universal stuff has returned to a fiery condition"¹ leading to a state, where fire is the preponderant element in a mixture of the three elements, *fire, sea, and earth*, the latter two being a transformation of the first. This interpretation has as a crucial element the new interpretation we give to fr. 124 saved by Theophrastus. Thus, in our view, this fragment plays a

¹ Wheelwright, see below.

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crucial role in supporting a new interpretation of Heraclitus' cosmology, which includes a phase of cosmogony too.

2. The Most Essential Fragments for the Establishment of a New Interpretation of Heraclitus' Cosmology

The most important fragments leading to the establishment of a new interpretation of Heraclitus' cosmology are listed below:

Fr. 30: *This world-order, the same of all², did none of gods or men make, but it always was and is and will be an everliving fire, kindling in measures and going out in measures.*

Next fr. 31a comes with an introductory comment of Clement, who saved both fr. 30 and 31:

“And that he pronounced the opinion that it [the world] is both created and destructible, the following words tell us: (fr. 31a follows)³.

Fr. 31a: *fire's changes: first sea, and of sea one half is earth and the other half is lightning flash (πρηστήρ).*

For he says that fire virtually, by the logos and god which steer all things, is turned by way of air into fluid, which acts as the seed of the world-ordering process, and which he calls sea; then, out of this (the sea), earth comes into being and heaven and everything comprised in it” (this is the closing sentence which refers to fr. 31a).

Then fr. 31b comes with Clement's comments again:

² Cf. Gregory Vlastos, *On Heraclitus*, *American Journal of Philology*, 76 (1955) 345 and n. 21.

³ Kirk's translation, with slight differences in some points.

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“That these things are taken up again and turned into fire he shows clearly with these words:

Fr. 31b: *<earth> is dispersed as sea [‘sea is dispersed’, Clement understood] and is measured so as to form the same proportion as existed before it became earth.*

Similarly too about the other elements the same things happen. Opinions kindred to those of Heraclitus are pronounced also by the most renowned of the Stoics, with their beliefs about the things turning into fire and the arrangement of the world...”

Fr. 50: *Listening not to me but to the logos it is wise to agree that all things are one.*

Fr. 51: *They do not apprehend how being at variance it agrees with itself; there is a connection working in both directions, as in the bow and the lyre⁴.*

Fr. 64: *The thunderbolt steers all things.*

Fr. 66: *Fire coming on will discern (κρινεῖ, literally: separate) and catch up with all things.*

Fr. 41: *Wisdom is one thing, to be skilled in true judgment, how all things are steered through all.*

Fr. 54: *The unapparent harmony (connexion) is better than the apparent.*

We cite also two fragments which contain the expression εἰ δὲ μή:

⁴ Kirk’s translation; note the expression ‘a connection working in both directions’.

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Fr. 94: *The Sun will not overstep his measures; if he does (εἰ δὲ μῆ), the Erinyes, the minions of Dike, will find him.*

Fr. 121: *The Ephesians deserve to be hanged to the last man, every one of them, and leave the city to the boys, since they drove out their best man, Hermodorus, saying 'Let no one be the best among us; if he is (εἰ δὲ μῆ), let him be so elsewhere and among others'.*

We now cite the crucial, to our opinion, fr. 124 quoted by Theophrastus, with his introductory comment:

“It would be unreasonable to think that, although the whole of heaven and each of its parts are all ruled by order, logos, forms, powers and periods, in the principles nothing of the sort occurs, but, as Heraclitus says,

Fr. 124: *the fairest order in the world is a heap of random sweepings.”*

We give now the doxographer's citations which favor Heraclitus' theory of cosmogony:

(a) Aristotle, *Physics* 205a and *Metaph.* 1067a:

... as Heraclitus says the whole of things become from time to time fire.

(b) Aristotle, *De caelo* 279b:

All (the natural philosophers) say that (the cosmos) comes into being; but some hold that it comes into being (as) eternal, and others that it is perishable as everything else of its components, and others (consider it) as coming to being and perishing

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alternately and this being so [that is, perennially], as Empedocles of Acragas and Heraclitus of Ephesus declare.

(c) Aristotle, *De caelo* 280 a 10:

For they say that orderly things are becoming from disorderly ones, but to be orderly and disorderly at the same time is impossible, and it is necessary that they are parted with genesis and time... then, it is clear that it is impossible that the cosmos can be eternal and generated.

(d) Theophrastus, *Metaph.* 7a (we give the comment that comes before the one which cites fr. 124):

*Perhaps one would wonder how and which principles we should assume, that is which of the two, the amorphous ones and like dynamical, as they say those who speak about fire and earth⁵, or the formed ones, as mainly ought to be defined as (Plato) says in the *Timaeus* because for the most decent things the most proper are order and determination...*

(e) Theophrastus' comments after the quotation of fr. 124:

And these phenomena ask for a scrutiny, for it is demanded to be defined up to which degree the order (is present there) and for what reason it is impossible to have more order than to go over to the worst".

(f) The Derveni Papyrus:

⁵ With this expression we think that Theophrastus alludes to Heraclitus.

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(i) *the Sun... according to nature has the width of a human foot, not overstepping his measures; if he does, the Erinyes, the minions of Justice, will find him.*

(ii) *it will be an overstepping... of justice⁶.*

(iii) *[Thus] knowing that the fire when is mixed with other entities agitated (i.e. stirred or churned) them and prevent the entities from assembling because of the heat, (Zeus, i.e. air/Mind) removes a sufficient quantity of fire in such a distance so that it (fire) could no longer prevent the entities to clump.*

3. Our Interpretation

We now proceed to develop our interpretation of Heraclitus' theory of the cosmos. We support the view that his theory comprises two phases⁷ taking place during a time interval, probably the one known as the *Great Year*. The first phase is the cosmogonical one: the universe starts from a state of disorder (fr. 124), which develops to a state of dynamical equilibrium, which is unstable (in modern terminology) and is described by fr. 31a and 51. The second phase refers to the universe as we know it, with the immense diversity of changes taking place in it. The end of this phase comes when fire *is kindled in measures* (fr. 30) and *comes, discerns and catches up with all things* (fr. 66). The former phase corresponds to the Way Down and the latter to the Way Up. All the

⁶ See in Gabor Betegh, *The Derveni Papyrus, Cosmology, Theology and Interpretation*, Cambridge University Press, 2004.

⁷ This is not quite original, as in Anaximander's cosmology too there are two phases, one that starts with ἄπειρον giving birth to the opposites (according to Plutarchus, 'φησὶ δὲ ἐκ τοῦ αἰδίου γόνιμον θερμοῦ τε καὶ ψυχροῦ κατὰ τὴν γένεσιν τοῦδε τοῦ κόσμου ἀποκριθῆναι...') and the second, during which from the opposites (the elements) all the beings of the cosmos emerge. We adopt Vlastos idea that Heraclitus was influenced by Anaximander and Anaximenes (cf. G. Vlastos, *On Heraclitus*, AJP, Vol. LXXVI, 4, p. 354).

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processes taking place in either phase are governed (or steered) by fire: fire is the common stuff of everything and also the agent which governs everything and develops, at every step of the development of the universe, its plan-cosmos. From the saved fragments it comes up that fire is indeed the fundamental element and all the other entities, both the elements sea and earth or every other being in the universe consist fundamentally of fire; that is, everything is but a transformation of fire⁸.

Now, what is the state from which cosmogony starts? The state described by fr. 124 and 66 (the state of disorder) comes first; and then fr. 31a marks the beginning of cosmogony. We make the hypothesis that the two consecutive states of fr. 124 and fr. 31a concern this initial state (that is, before cosmogony starts), which we can designate *pre-universe*, during which fire is changing first to sea. According to Clement, (Heraclitus says that) “fire virtually is turned by way of air into fluid, which he calls sea, and which acts as the seed of the world-ordering process”. It seems curious that researchers did not give the due attention to this Clement’s comment, which begins with this characteristic expression “δυνάμει γὰρ λέγει [Ἡράκλειτος]...” We may take as granted that the verb λέγει means that Heraclitus alluded to some process like that described by Clement. If this is so, then we may proceed to assume that this initial state, the pre-universe, consists of the mixture of *fire* + *sea*, and assume that the element *sea* is *fire* in a different state⁹.

⁸ We should mention here the view Heisenberg, one of the greatest physicists of 20th century, had phrased in his book *Physics and Philosophy* (Harper and Brothers, N.Y., 1958, p. 63): “[But] the change in itself is not a material cause and therefore is represented in the philosophy of Heraclitus by the *fire* as the basic element, which is both *matter* and a *moving force*. We may remark at this point that modern physics is in some way extremely near to the doctrines of Heraclitus. *If we replace the word ‘fire’ by the word ‘energy’ we can almost repeat his statements word for word from our modern point of view*” (italics are ours). As Heisenberg identifies *fire* with the modern concept/entity of *energy*, it is worth noticing what he says about the latter: “Energy is in fact the substance from which all elementary particles, all atoms and therefore all things are made, and energy is that which moves”.

⁹ It has been pointed by the doxographers that Heraclitus had followed the scheme of Anaximenes, according to which his element, air, is transformed to liquid by condensation; further

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Now, according to fr. 51, this state of the mixture is a dynamical state of equilibrium like that of the bow and the lyre. We know that fr. 51 describes such an equilibrium by saying that [fire] *being at variance* (meaning, according to our interpretation, after having changed to sea) *it agrees with itself* (meaning that it continues to be fire in another form or state); and these changes are likened to the state of the (at least transient) equilibrium of the string of the bow and the lyre; for in the latter case, when the string is released, the equilibrium breaks down, and as a result, the arrow of the bow is winged or the string of the lyre produces a sound. For that reason we said earlier that this equilibrium is unstable or, at least, a transient state. And a state of equilibrium of the mixture *fire + sea* means that every time the quantity of fire that transforms to sea is equal to the quantity of sea that transforms to fire, like the following scheme

$$\text{fire} \rightleftharpoons \text{sea};$$

this is entailed by the simile of the bow (or the lyre)¹⁰, where two forces are applied in the case of the bow, the one that the hand of a man exercises on the string; the other, as reaction to this, is the force of tension of the string acting in the opposite direction. We think that this is a complete and integral treatment of fr. 51.

Before going to the next step, that is the beginning of cosmogony, we have to go over the famous issue of *ecpyrosis*. We disregard the arguments pro and against the proper notion of *ecpyrosis*, which assumes that, at some epoch, all

the liquid (water or sea) being congealed turns to earth. Thus, we may say that, for Heraclitus, these derivative elements (sea and earth) remain all the time *fire* in another form (or state); the same is true for all entities: this is the meaning of fr. 50 that *'all things are one'*.

¹⁰ Vlastos, op. c., p. 351. After his argument in favor of the word *παλίντροπος* (instead of *παλίντονος* proposed by Kirk and others) he makes the following comment in relation to *παλίντροπος* *ἀρμονίη*: "If this is to the *framework* of the bow and the lyre, then *παλίντροπος* must refer to their shape... but that would make for a static image... To get a comparably dynamic image out of the bow and the lyre we must assume that *ἀρμονίη* refers to their *modus operandi*. This is indeed *παλίντροπος*, for bow and lyre do their work, send forth arrow or sound, at just that moment when the process of stretching the string is reversed."

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the entities and elements will turn into pure fire. We pretend that *ἀπτόμενον μέτρα* of fr. 30 precludes such a total conflagration. In our view, the conflagration is understood as partial, leading to an excess of fire vis-à-vis the other Heraclitean elements, sea and earth. And, according to fr. 31a, the initial mixture after the *ἀπτόμενον μέτρα*, will consist of fire, sea, and earth where fire is the extremely preponderant one.

It was a pleasing surprise to read in Wheelwright¹¹ a very similar view. Meeting Kirk's arguments against ecpyrosis, he makes the following comments: "If the dominance of fire in an *ἐκπύρωσις* were to entail the destruction of all strife, then admittedly a situation would arise—an interval of absolute peace and rest—such as is expressly denied by several of Heraclitus' statements. But would a cosmic conflagration ever be absolute? Could it, in Heraclitus' terms of thinking, represent an interval of unalloyed oneness and unchallenged stasis? The very notion is repugnant to Heraclitus' style of thought. But could there not be a periodic cosmic conflagration without any implication of purity? There is nothing pure about the *contrary* cosmic situation—when a maximal amount of the fiery substance has transformed itself into water and earth. Why could there not be a counteractive situation, occurring at vastly long intervals, in which the universe somehow bursts into flame (as the doxographers have described the occurrence) with nothing more implied than a maximal amount of the universal stuff, (which is also process), has returned to a fiery condition? Surely the cosmic fiery state would have to be somehow impure in order to allow the seeds of a future universe to emerge from it."

This is exactly our notion of partial ecpyrosis or *quasi-ecpyrosis*; and it corresponds to the period, which is described by fr. 124 and is referred by fr. 103 as the *common beginning and end in a circle's circumference*. We must now examine first the evidence from ancient writers' and doxographers' texts that favors this kind of partial ecpyrosis, and then the meaning of fr. 124 according to our interpretation.

¹¹ Philip Wheelwright, *Heraclitus*, Oxford University Press, Oxford, 1959, pp. 52-3.

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(1) Aristotle in two passages (*Physics* 205a and *Metaph.* 1067a) says that, according to Heraclitus ‘*the whole of things become from time to time fire*’¹². It seems to be certain that Aristotle with this expression means that the whole universe becomes at times fire. This expression alludes to a total ecpyrosis, but we must remember that Heraclitus himself had precluded this case by saying that *fire is kindling in measures*, thus not totally: the meaning is that everything in the universe disintegrates giving a mixture of fire and sea (initially), in which fire is the preponderant element; this is the meaning of fr. 66, where it is said that ‘*fire coming on will discern (κρῖνει, literally: separate) and catch up with all things*’: all the entities in the universe will dissolve into the fundamental elements with fire in an excessive proportion.

(2) In our interpretation it is not the notion of ecpyrosis that is crucial, but the fact that, as Aristotle says it openly, there is a succession of universes in Heraclitus’ theory. As it is seen from *De caelo* 279b, Empedocles and Heraclitus consider the world *as coming to being and perishing alternately and this occurs so* [that is, perennially]. If Aristotle had seen in Heraclitus the idea of one, ungenerated and unperishing world-universe, then he would not have considered him as an opponent to his view (that there is only one and eternal world).

(3) There is additionally this passage (some lines after, in *De caelo* 280 a 10), where he makes allusion to the idea (held very probably by Heraclitus) that some orderly cosmos could be generated from some disorderly state. Aristotle’s conclusion is again that the cosmos is impossible to be eternal and generated (as Heraclitus had held). The disorderly state is described conspicuously by Theophrastus in fr. 124, as we will see in a moment.

(4) Theophrastus ranks Heraclitus in those philosophers, who pretend that the *principles are amorphous and like dynamical, as they say those who speak*

¹² ἅπαντα γίγνεσθαι ποτε πῦρ: the meaning is that, as is said one sentence earlier, even if one of the elements is not infinite, ‘ἀδύνατον τὸ πᾶν, κἂν ἢ πεπερασμένον, ἢ εἶναι ἢ γίγνεσθαι ἐν τι αὐτῶν (it is impossible, even if (the one element) is finite, that everything either be or become one of them as Heraclitus says that everything becomes from time to time fire’.

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about fire and earth—undoubtedly the last sentence refers to Heraclitus. And a little further, he makes a peculiar point by saying that ‘*it is demanded to be defined up to which degree the order (is present there) and for what reason it is impossible to have more order than to go over to the worst*’. This is, we think, a second allusion to Heraclitus, as just a little earlier Theophrastus had cited fr. 124, where the Ephesian is referred by his name, and where the cosmos is characterized as a random throwing of pieces of matter (σάρμα εἰκῆ κεχυμένον ὁ κάλλιστος κόσμος), that is as a disorderly state of materials due to the excess of fire, that is, in modern terminology, due to the high temperature of the mixture.

(5) There is also the relation of Heraclitus’ theory to the Orphic cosmogony, as it is described by a philosopher of the 5th to 4th century in the Derveni Papyrus. Heraclitus could have been inspired by some of the Orphic ideas, but it is more probable that “later writers of Orphic texts looked to Heraclitus for ideas which would lend themselves to verse compositions to be added to the Orphic canon”¹³. The writer of the Papyrus cites some phrases from Heraclitus’ work; in particular, he cites the following: “the Sun... according to nature has the width of a human foot, not over-stepping his measures; if he does, the Erinyes, the minions of Justice, will find him...” It is a pity that the papyrus was significantly destroyed; thus it is difficult to read it and be sure about the meaning of the saved words¹⁴. Of those lines that were saved, it reads: “sacrifice... of justice”; or, in another rendering: “it will be an overstepping... of justice”¹⁵. In either case we could raise the following question: what would happen, if the Sun overstepped its measures? This brings out the issue of the

¹³ See for more arguments in David Sider, *Heraclitus in the Derveni Papyrus*, in *Studies on the Derveni Papyrus*, edited by André Laks and Glenn W. Most, Oxford University Press, Oxford, 1997, p. 148.

¹⁴ See, *The Derveni Papyrus*, Edited with Introduction and Commentary by Th. Kouremenos, G. Parassoglou, and K. Tsantsanoglou, Firenze, Leo S. Olschki Editore, 2006.

¹⁵ See in Gabor Betegh, *The Derveni Papyrus*, Cosmology, Theology and Interpretation, Cambridge University Press, 2004.

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meaning of the expression $\epsilon\acute{\iota} \delta\grave{\epsilon} \mu\eta\grave{\iota}$. Vlastos¹⁶ in his critic of Kirk's views makes the point that "no part of nature can 'overstep its measures', which is surely the point of B 94 and not as Kirk understands it, that 'long term excess is punished (and reduced¹⁷)", which is precisely what Anaximander had taught, not Heraclitus". In footnote Vlastos quotes Reinhardt, according to which the expression ' $\epsilon\acute{\iota} \delta\grave{\epsilon} \mu\eta\grave{\iota}$ ' in fr. 94 "expresses something impossible, a fall, which will never happen, as in fr. 121, where the same expression occurs"¹⁸. But here Reinhardt and Vlastos are not taking into consideration that ' $\epsilon\acute{\iota} \delta\grave{\epsilon} \mu\eta\grave{\iota}$ ' expresses just the opposite of what they assert: Hermodorus was indeed the best among the Ephesians, that is, he had overstepped the measures they had put on this issue and, because of this overstepping, [he] was punished (he was exiled). Thus, it seems that Heraclitus would agree with this interpretation, that whenever a person or a process or a physical body does overstep some measures imposed by nature or the society, then this entity will be punished. This means that we could assert that Heraclitus would also agree with the idea that is expressed in the same part of Theophrastus' comment, after the quotation of fr. 124, i.e. the idea that there is a reason 'for which it is impossible to have more order than to go over to the worst' (that is, to disorder); this reason would be, in this case, the overstepping of some measures in the universe.

The idea in the Orphic cosmogony, akin to Heraclitus' theory, is best described by Th. Kouremenos as follows¹⁹:

"Air/Mind never came to be: it existed before the cosmos came to be and will always exist. It dominates all derivative entities ...; in

¹⁶ G. Vlastos, *On Heraclitus*, AJP, vol. 76, 4, p. 358.

¹⁷ Kirk, Heraclitus, *The Cosmic Fragments*, Cambridge University Press, 1954; in p. 402 says actually that 'long term excess is punished (and reduced) by the servants of Dike'. We agree with this idea, but we disagree with the spirit of the argument Kirk developed there.

¹⁸ Fr. 121: "The Ephesians, every grown man of them, deserve to be hanged and leave the city to beardless youths; for they have exiled Hermodorus, the best man among them, saying: 'no one should be best among us; if there be any such, let him be so elsewhere and among others'".

¹⁹ See, *The Derveni Papyrus*, as in ref. of n. 14.

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other words, the wise air determines the behavior of the other basic entities from which the derivative entities come to be and into which they eventually dissolve... If air/Mind did not want it to, the universe would not be as it is now, for it is air/Mind that caused the other basic quantities to be configured into the cosmos²⁰. As is explained in col. IX.5-10, they were originally dominated by fire which caused them to mix together and prevented the formation of coherent structures (fire era). Air/Mind opened a new chapter in the history of the universe (Mind era) when it came to dominate all other basic entities and caused them to condense out of their primordial mixture. The first to separate out was fire. When the fire content of the mixture dropped to a sufficiently low level²¹, the other basic entities would not be prevented any more from accreting to form the large-scale structures we see in the universe. Since the existence and size of the Sun are thought of as necessary conditions for the generation and existence of all other derivative entities, the quantity of fire air/Mind caused to separate out first can be plausibly assumed to have become the Sun²².

It is worth noticing the sentence by which the writer of the Derveni Papyrus describes why the fire prevented the other elements to form coherent structures:

*Γινώσκων οὖν τὸ πῦρ ἀναμεμειγμένον τοῖς
ἄλλοις ὅτι ταρασσοὶ καὶ κωλύει τὰ ὄντα συνίστασθαι*

²⁰ Heraclitus had the same idea with the difference that in his theory it is fire that *steers* everything; also fire is inherently the medium that bears the cosmic plan and is responsible for its realization.

²¹ In Heraclitus' theory this is due to fire's nature to change to sea (πυρὸς τροπαὶ πρῶτον θάλασσα..., fr. 31a) so that its high proportion in the initial mixture drops significantly and the mixture reaches a state of dynamical equilibrium, described by fr. 31a and 51.

²² *The Derveni Papyrus*, *ibid.*, p. 30.

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διὰ τὴν θάλασσαν ἐξαλλάσσει ὅσον τε ἰκανόν ἐστιν
ἐξαλλαχθὲν μὴ κωλύειν τὰ ὄντα συμπαγῆναι

which, in Th. Kouremenos translation, reads as follows:

[Thus] knowing that the fire when is mixed with other entities agitated (i.e. stirred or churned) them and prevent the entities from assembling because of the heat, (Zeus, i.e. air/Mind) removes a sufficient quantity of fire in such a distance so that it (fire) could no longer prevent the entities to clump.

The idea that things which are heated behave in a disorderly way was very common: think of a copper filled with water and heated up to the boiling point; this was a common experience of a disorderly state. Thus, it is very probable that Heraclitus too had imagined a similar state for the case of the world, when fire was the dominating element in the mixture. During this state the elements could not interact and give birth to the entities of the universe. But, when the transformation of fire into sea had progressed enough, then started the formation of the beings, as very elliptically the comments of Clement describe after fr. 31a: “then, out of this (the sea), earth comes into being and heaven and everything comprised in it”.

4. The Meaning of Fr. 124

The last sentence signifies the end of cosmogony and the beginning of the second phase of Heraclitus’ cosmology, the emergence and development of the universe as we know it. This phase of development, the passage to which has been referred in fr. 30 as fire’s *going out in measures*, is ruled by fr. 80: *One must realize that war is common and Justice is conflict and that all things come to existence (and are ordained?) in accordance with conflict and necessity* (καὶ γινόμενα πάντα κατ’ ἔριν καὶ χρεῶν). It should be stressed that ἔρις and χρεῶν have not the same meaning—thus it is not a redundancy; χρεῶν must

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have the meaning of a deterministic law, whereas ἔρις must be a force acting in opposition to χρεῶν, that is like a force acting between the contrarities as the warm and the cold, etc. In accordance to the simultaneous action of these two agents, fr. 84a says: μεταβάλλον ἀναπαύεται (changing it rests), as well as fr. 84b: κάματός ἐστι τοῖς αὐτοῖς μοχθεῖν καὶ ἄρχεσθαι (it is weariness to toil for and ruled by the same). The former gives the idea of how after the change a state of equilibrium is produced; and the latter gives the emphasis to the fact, which is in accordance with Heraclitus' spirit, that it is not expected that any being could resist to the universal trend of change: it is probable that any entity stays for some period of time unchanged, but sooner or later it will change; in fact, everything changes all the time, but the faintest changes escape our ability to notice them.

The question now is this: how this organized universe will at some time return to its initial state described by fr. 124? Or, in other words, *why is fire kindling in measures again?* How could this be justified by Heraclitus' thought? We could again recur to the meaning of fr. 80, where ἔρις (*conflict*) plays the role of allowing the elements to form orderly things as well as of imposing the dissolution of compound things to their constituents. This is in accordance to another fragment of Heraclitus, namely fr. 41, which states that *'the wise is one, knowing the plan how all things are steered through all'*. The meaning of this fragment is of unexampled (for the ancient mode of thinking) importance: it acknowledges that in the cosmos everything interacts with all the other things in it! This idea, which has been vindicated only by the development of modern physics, has as consequence that all sort of changes can be entailed during the development of the universe, even its perishing. This development is described by fr. 66, which states that *'fire coming on will discern (κρινεῖ, literally: separate) and catch up with all things'*. But, the trouble is that Heraclitus did not want to express his ideas more explicitly. He spoke in an oracular style, which means ambiguously, letting all the possible interpretations open²³.

²³ It is probable that he did so deliberately. One can remind here what Plotinus says, when quoting fr. 84a,b; it seems that he does not understand clearly what Heraclitus had meant by

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As far as the interpretation of fr. 124 is concerned²⁴, we point out the fact that this fragment is either misunderstood or underestimated by many scholars. Kirk, for example, has not comprised it in his classical work ‘*Heraclitus, The Cosmic Fragments*’²⁵. We can anyway find important comments in some other writers’ texts to which we will come in a moment. In our view, fr. 124 plays a crucial role in our effort to interpret Heraclitus’ cosmology. It concerns the situation, which results after the occurrence of fire’s era: the period during which *fire is kindling in measures*, as fr. 30 says. From what has been said earlier, this expression precludes the idea of total conflagration. In our view, as well as in Wheelwright’ view, the situation that comes up during this period is that of a mixture of elements, in which fire is in a tremendous excess vis-à-vis to the presence of the other two Heraclitean elements, sea and earth. This means that the mixture is in a disorderly state, because of this fire’s excess—in modern terminology, because of the extremely high temperature of the mixture. This is the state which is described so properly (to our view) and so unintelligibly (for many writers) by fr. 124. Because of the conditions stated just earlier, the material of fire and the other two elements are behaving like *a heap of random sweepings*. The characterization of this state as *the fairest cosmos* is an idea vindicated by Heraclitus’ pattern of apprehending the very notion of cosmos; we will come to this in a moment.

Thus far it is understandable why under these conditions the elements are in a disorderly state. Let us see what comes next. As fr. 31a states: ‘fire’s changes: first sea, and of sea one half is earth and the other half is lightning flash’. As fire

these fragments, so he comments: “*though neglecting to make the argument clear for us, as though we should perhaps seek in ourselves, as he also sought and found*”.

²⁴ The fragment cited by Theophrastus, says: *And it would seem to them absurd, if the heaven in its totality and every part of it were all of them in order and according to logos and to forms and to powers and periods, but in the principles nothing such occurs, but “the fairest order in the world is a heap of random sweepings”, as Heraclitus says.*

²⁵ In p. 82 of this work he says: “Diel’s emendation, retained in DK, of $\sigma\acute{\alpha}\rho\xi$ to $\sigma\acute{\alpha}\rho\mu\alpha$ in Heraclitus fr. 124 is surely wrong; for a correct explanation of this fragment, retaining ms. $\sigma\acute{\alpha}\rho\xi$, see J. McDiarmid, AJP 62 (1941) 492 ff., and P. Friedländer, AJP 63 (1942) 336.

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begins to change to sea first, its proportion in the mixture is lowered, that means that the temperature drops continually until a new state is reached, in which a state of dynamical equilibrium is achieved, the changes going forward in producing more sea and vice versa. In this state now it is possible that the emergence of the objects of the universe can start. Thus, according to Clements' comments, which follow fr. 31a, (a) "*fire virtually, by the logos and god which steer all things, is turned by way of air into fluid, which acts as the seed of the world-ordering process, and which he calls sea*" (this is the state of dynamical equilibrium); and (b) "*then, out of this (the sea), earth comes into being and heaven and everything comprised in it*": this is exactly the completion of cosmogony. After that, we have the new born universe, which is the second phase of Heraclitus' cosmology.

It remains to comment the expression the fairest cosmos in fr. 124. Why in that state Heraclitus thought that the cosmos is in its fairest form? It is evident that this state is not the one which we see around now. It is another state from which the cosmos runs at some epoch of its development (when 'fire is kindling in measures', fr. 30), and this is done according to fr. 66, as 'fire coming on will discern (*κρινεῖ*, literally: separate) and catch up with all things'. In this state there is disorder, which is the opposite to the notion of order. But, in Heraclitus' theory the opposites are identical, as it is defined in fr. 67 and 8826. From this point of view, in either phase, the one described by fr. 124 and the next which concerns the universe as we know it, there is cosmos. In the former phase cosmos is in a disorderly state; in the latter, it is in the actual state, in which "the whole of heaven and each of its parts are all ruled by order, logos, forms,

²⁶ Fr. 67: *god is day night, winter summer, war piece, satiety hunger and undergoes alteration in the way that fire, when it is mixed with spices, is named according to the scent of each of them.* We must stress the point that 'god undergoes alteration', that is he becomes the opposite, without losing his identity. As the simile declares, it seems that *god is but this one fundamental essence of all things.* Fr. 88: *It is the same the living and the dead and the waking and the sleeping and young and old: for these things having changed round are those and those things having changed round are these ones.* In this fragment the identity of the opposites is realized through changes going to one direction and also to the opposite one.

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powers and periods”. Thus, during the cosmological development the cosmic plan is also developed and changed; and repeats itself remaining always the same, because the responsible agent for the plan is fire, the *everliving fire*.

The distinction of the development of the cosmos in two phases had only a methodological intention: to make easier the apprehension of Heraclitus’ theory. It is obvious that the Ephesian had no particular interest in technical matters. He had defined his principles and applied them in every field of his investigation. He ranked order and disorder as the two faces of the one and unbroken unity of the reality of the cosmos²⁷; and further, according to fr. 54 that says that ‘*the unapparent harmony is better than the apparent one*’, he qualified the unapparent cosmos of fr. 124 as the *fairest cosmos*.

Epilogue

We give below as a synopsis the scheme of Heraclitus’ cosmology citing parts of the relevant fragments and some of the comments made by ancient writers; we begin by citing the views of Aristotle and Theophrastus about the general conception of Heraclitus’ theory of cosmos-world:

[Arist. De Caelo: ‘*and others (consider it) as coming to being and perishing alternately and this being so [that is, perennially], as Empedocles of Acragas and Heraclitus of Ephesus declare*’;

²⁷ We cite here the writers who have made substantial comments on the meaning of fr. 124 with the relevant references: H. Fränkel, *A Thought Pattern in Heraclitus*, AJP 59(1938) 309-337, T.M. Robinson, *Heraclitus*, University of Toronto Press, 1987, p. 96, A. Finkelberg, *On Cosmology and Ecpyrosis in Heraclitus*, AJP 119 (1998) 195-222, Charles Kahn, *The Art and Thought of Heraclitus*, Cambridge University Press, Cambridge, 1979, Philip Wheelwright, *Heraclitus*, Oxford University Press, 1959, pp. 50ff., Miroslav Marcovich, *Heraclitus, Greek text with a short commentary*, Academia Verlag, Sankt Augustin, Jean Bollack, Heinz Wismann, *Héraclite ou la Separation, Les Editions de Minuit*, Paris, 1972, pp. 338-9, Marcel Conche, *Héraclite, Fragments*, Presses Universitaires de France, pp. 276-8.

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Theophr. Metaph. 7a: *‘for what reason it is impossible to have more order than to go over to the worst’*].

(1) *fire is kindling in measures (fr. 30)*

(2) *fire coming on will discern (κρινεῖ, literally: separate) and catch up with all things (fr. 66)*

(3) *the fairest order in the world is a heap of random sweepings (fr. 124)*

(4) *fire’s changes: first sea, and of sea one half is earth and the other half is lightning flash (πρηστήρ) (fr. 31a).*

[We add here Clement’s comment for the state produced when fire begins to change significantly to sea: “For he says that fire virtually, by the logos and god which steer all things, is turned by way of air into fluid, which acts as the seed of the world-ordering process, and which he calls sea”].

(5) They do not apprehend how being at variance it agrees with itself; there is a connection working in both directions, as in the bow and the lyre (fr. 51).

(6) *fire is going out in measures (fr. 30)*

[“Then, out of this (the sea), earth comes into being and heaven and everything comprised in it”: the succession of Clement’s previous comment; and Ar. *De Caelo*: (they say—probably, an allusion to Heraclitus) from disorderly things orderly things are becoming].

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(7) One must know that the war is common and Dike (justice) is strife, and that all things are happening by strife and necessity (fr. 80)

(8) *<earth> is dispersed as sea and is measured so as to form the same proportion as existed before it became earth (fr. 31b)*

[with Clement's comment again: Similarly too about the other elements the same things happen—the Way Up].

(9) *fire is kindling in measures [the world comes to the initial state].*

So, with the last point a new cycle begins in Heraclitus' cosmology.

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