

Parmenides' Structure of the Earth*

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GUIDO CALENDIA / *Università di Roma Tre* /

Introduction

Parmenides' cosmological doctrine seems almost incomprehensible, due to the overlapping of two incompatible descriptions: on the one hand, a certain number of celestial bodies and, on the other, a sky made of alternating igneous and solid spherical crowns. The celestial bodies are mentioned in Parmenides' fragments 10, 11, 14 and 15, and in some short doxographic passages; the crowns in Aëtius 2.7.1 and, apparently, also in Parmenides' fragment 12.

These cosmological elements are part of Parmenides' scientific doctrines, described by Plutarch as follows:

ὅς γε καὶ διάκοσμον πεποιήται, καὶ στοιχεῖα μιν γνῶς τὸ λαμπρὸν καὶ σκοτεινὸν ἐκ τούτων τὰ φαινόμενα πάντα καὶ διὰ τούτων ἀποτελεῖ. καὶ γὰρ περὶ γῆς εἴρεκε πολλὰ καὶ περὶ οὐρανοῦ καὶ ἡλίου καὶ σελήνης καὶ ἄστρον, καὶ γένεσιν ἀνθρώπων ἀφήγηται, καὶ οὐδὲν ἄρρητον,

* This paper is an updated English translation of the central chapter of my book *Un universo aperto* (Calenda 2017).

ὥς ἀνήρ ἀρχαῖος ἐν φυσιολογίᾳ καὶ συνθεῖς γραφῆν ἰδίαν, οὐκ ἄλλοτριάν διαφορῶν, τῶν κυρίων παρήκεν. (*Adv.Col.*, 13, 1114b)

Unfortunately, of this broad work only a few fragments remain, a total of only 44 verses on the composition of the earth, on cosmology, on man and genetics.

The description of Parmenides' scientific doctrines is introduced by an ontological section, which has an essentially epistemological scope,¹ and is connected to questions also raised by Xenophanes and, above all, by Heraclitus.² The interest of modern scholars is almost exclusively focused on this ontological premise, so that several scholars have even argued that in the second part of his poem Parmenides did not plan to expose his own opinions, but only wanted to exemplify the false opinions of others.³

The scarcity of the remaining fragments, and the confused nature of the main evidence, conceivably contributed to the relative lack of interest in Parmenides' scientific doctrines. However, a certain return of interest in these aspects of Parmenidean thought has been recently observed, as shown by several contributions to the International Symposium *Parmenides Venerable and Awesome* held in Buenos Aires in 2007 (Cordero 2011),⁴ and by some sweeping studies on the argument published by Rossetti.⁵

That the earth is spherical, that also the moon is spherical and shines with reflected light, and that Hesperus and Phosphorus are the same celestial body are solid astronomical doctrines, which Parmenides certainly shared and was perhaps the first to formulate. This gives an idea of his exceptional abilities as an empirical observer, that make us regret the almost total loss of his cosmological doctrines; hence the need to make the most of the limited information available, to overcome the difficulties of traditional interpretations.

¹ See Calenda (2020).

² See Calenda (2011: 299); Calenda (2020).

³ Zeller (18925: 582): "Parmenides selbst erklärt zu bestimmt, dass er nur das Eine unveränderliche Wesen als ein Wirkliches anerkenne, der Vorstellung dagegen, welche uns Vielheit und Veränderung zeigt, nicht die mindeste Wahrheit einräume, dass er daher in dem zweiten Theil seines Gedichts nicht seine eigene Ueberzeugung, sondern fremde Meinungen vortragen wolle." Long (1963: 98): "The cosmogony is thus seen to be, *exempli gratia*, an excursus within the false premises which vitiate all such accounts [...] it demonstrates that the appearances thought by ordinary men to fill reality are totally false"; Mourelatos (1970: 260): "Why did Parmenides bother [...] to append an exposition of »mortal opinions« that was actually longer than the first part? He did it as a case-study in self-deception, indecisiveness, and confusion"; Barnes (1979: 157): "the Way of Opinion does not express Parmenides' own convictions"; Gallop (1984: 23): the goddess "attributes to mortals a theory about the physical world, from which she not only stands aloof, but which she expressly declare to be mendacious"; Cordero (2004: 158): "in the part of his Poem called »Dóxa,« Parmenides works out a fictitious philosophical system, a true summing up both of »what is said« and of the previous philosophical schools." But more recently Cordero (2011b: 107) admitted that "in fragments 10–11 and 13–18, we face theories that Parmenides considers not only »true,« but also worthy »to be known« [...]. The Goddess speaks in her own name" (see also Cordero 2011c).

⁴ On this topics see Casertano (2011), Cerri (2011) and Mourelatos (2011).

⁵ Rossetti (2016), (2017). See also Rossetti (2023).

1. Spherical crowns

In fragment 10 the goddess undertakes to teach her disciple the nature and origin of some celestial entities, namely the ether and everything we see in it: the sun, the moon, the stars. In fragment 11, which implies the same premise, “you will know”, of fragment 10,⁶ the goddess says that she will explain how some of the previously mentioned entities were forced to be born, namely the sun, the moon and the ether, she adds the milky way, the extreme Olympus and, above all, begins with the earth (γαῖα).

These fragments introduce a broad set of subjects, including together with a cosmology, also a cosmogony. Parmenides treated this matter in some detail, without neglecting anything important, as Plutarch suggests (καὶ οὐδὲν ἄρρητον ... τῶν κυρίων παρήκεν), but very little has reached us.

Apart from fragments 14 and 15 on the moon, the only other text of Parmenides which seems to refer to what fragments 10 and 11 pledged to teach is fragment 12:

αἱ γὰρ στενιότεραι πλῆνται⁷ πυρὸς⁸ ἀκρήτιοι,
αἱ δ' ἐπὶ ταῖς νυκτός,⁹ μετὰ δὲ φλογὸς ἴεται αἴσα·
ἐν δὲ μέσῳ τούτων δαίμων ἢ πάντα κυβερνᾷ·
πάντων¹⁰ γὰρ στυγεροῖο τόκου καὶ μίξιος ἄρχει
πέμπουσ' ἄρσενι θῆλυ μιγῆν τό τ' ἐναντίον αὐτίς
ἄρσεν θηλυτέρῳι. (Simp. *in Phys.* 34.14)

This text lists some tighter objects full of pure (not mixed) fire and, over them, several other objects full of night, adding that among the last ones goes a portion of fire. What those objects are the fragment does not say; but we can gather information from two other sources (both included in DK 28 A 37). One is Cicero's *De natura deorum* (N.D. 1.11.28):

Nam Parmenides quidem commenticium quiddam: coronae simile efficit (στεφάνην appellat), continentem ardorem (et) lucis orbem qui cingit coelum, quem appellat deum; in quo neque figuram divinam neque sensum quisquam suspicari potest. Multaque eiusdem monstra, quippe qui bellum qui discordiam qui cupiditatem ceteraque generis eiusdem ad deum revocet,

⁶ Conche (1996: 211): “ce fragment est, comme le précédent, sous le signe de la promesse.”

⁷ Diels and Kranz (1951: 183, n. 2): πλῆντο; Fränkel (1955: 183): “We must write πλῆνται because of the faulty metre...” (english transl. by D. Harvey, M. Frede). So also Tarán (1965), and Mansfeld, Primavesi (2011).

⁸ Verse 8.56-57: φλογὸς αἰθέριον πῦρ, / ἦπιον ὄν, μέγ' ἔλαφρόν.

⁹ Verse 8.59: νύκτ' ἀδαῆ, πυκινὸν δέμας ἐμβριθές τε.

¹⁰ πάντα DEF, πάντων W; Diels, Kranz (1951): πάντα γὰρ <ῆ>; Coxon (1986: 242): “Mullach's correction (πάντη) of the manuscript reading πάντα is more attractive than Karsten's insertion of ἦ, which was adopted by Diels, but the text remains uncertain”; Conche (1996: 224): “πάντων, que donne le manuscrit W (Musée historique d'État de Moscou, n 3649, xiiiie s.) – manuscrit que Diels ne connessait pas –, doit être retenu (ainsi font Mansfeld, Kirk-Rav.-Sch., Gallop)”; πάντων: Mansfeld and Primavesi (2011), and Laks and Most (2016).

quae vel morbo vel somno vel oblivione vel vetustate delentur; eademque de sideribus, quae reprehensa in alio iam in hoc omittantur.

After suggesting that Parmenides is contriving something fictitious, similar to a fiery crown (στεφάνην), which surrounds the heavens, and which he calls god, Cicero harshly criticizes such a ludicrous image of divinity.

Greater influence has the other source,¹¹ Aëtius 2.7.1, which, as we shall see, shows several affinities with fragment 12:¹²

Παρμενίδης στεφάνας εἶναι περιπεπλεγμένας, ἐπαλλήλους, τὴν μὲν ἐκ τοῦ ἀραιοῦ, τὴν δὲ ἐκ τοῦ πυκνοῦ· μικτὰς δὲ ἄλλας ἐκ φωτὸς καὶ σκοτὸς μεταξὺ τούτων. καὶ τὸ περιέχον δὲ πάσας τείχους δίκην στερεὸν ὑπάρχειν, ὑφ' ᾧ πυρώδης στεφάνη, καὶ τὸ μεσαιτάτον πασῶν¹³ περὶ ὃ πάλιν πυρώδης [sc. στεφάνη]. τῶν δὲ συμμιγῶν τὴν μεσαιτάτην ἀπάσαις¹⁴ (ἀρχήν) τε καὶ (αἰτίαν) κινήσεως καὶ γενέσεως ὑπάρχειν, ἦντινα καὶ δαίμονα κυβερνήτην καὶ κληιδούχον¹⁵ ἐπονομάζει Δίκην τε καὶ Ἀνάγκην. καὶ τῆς μὲν γῆς ἀπόκρισιν εἶναι τὸν ἀέρα διὰ τὴν βιαιοτέραν αὐτῆς ἐξατμισθέντα πύλησιν, τοῦ δὲ πυρὸς ἀναπνοὴν τὸν ἥλιον καὶ τὸν γαλαξίαν κύκλον. συμμιγῆ δ' ἐξ ἄμφοιν εἶναι τὴν σελήνην, τοῦ τ' ἀέρος καὶ τοῦ πυρὸς. περιστάντος δ' ἀνωτάτω πάντων τοῦ αἰθέρος ὑπ' αὐτῶι τὸ πυρῶδες ὑποταγῆναι τοῦθ' ὅπερ κεκλήκαμεν οὐρανόν, ὑφ' ᾧ ἤδη τὰ περιγεια.¹⁶

It is commonly acknowledged that this entry by Aëtius is very confusing.¹⁷ Therefore modern criticism, which made many attempts to understand the cosmology described by Aëtius, failed to reach a shared interpretation. The interpretative attempts start from

¹¹ But Gigon (1945: 279): “ungemein wichtige Ciceronstelle 28 A 37.” Also Coxon (1986: 236): “Cicero’s version of the tradition may be more reliable than the fuller version of Aëtius.”

¹² Pseudo-Galen. *hist. phil.* 50 = *Dox.* 622, draws almost verbatim from the *Epitome* of Pseudo-Plutarch: “Παρμενίδης στεφάνους εἶναι πεπλεγμένους πρὸς ἀλλήλους τὸν μὲν / ἐκ τοῦ ἀραιοῦ, τὸν δὲ ἐκ τοῦ πυκνοῦ, καὶ τὸ περιέχον δὲ τὸ πᾶν στοιχείον / δίκην στεφάνου στερεοῦ εἶναι” and he adds: “πρῶτον πῦρ, εἶτα αἰθέρα, μεθ' ὃν ἀέρα μεθ' ὃν / ὕδωρ”. Torraca (1961: 10) on Pseudo-Galen: “[*Epitome pseudo-plutarchea*] dal capitolo 25 alla fine è fonte unica, fedelmente, ma non sempre intelligentemente seguita.”

¹³ Diels (1879: 335) notes: “πασῶν scil. στερεὸν ὑπάρχειν”; Diels and Kranz insert στερεόν in 28 A 37.

¹⁴ <ἀρχήν> τε καὶ <αἰτίαν> Diels and Kranz; τε καὶ A; τοκέα πάσης Diels 1879; αἰτίαν πάσης Hense and Wachsmuth 1884 (TLG Stobaeus I.22.8).

¹⁵ κληιδούχον Fülleborn; κληρούχον A. (Diels and Kranz I 224).

¹⁶ The text belongs to Stobaeus *Ecl.* 1.22; in Pseudo-Plutarch *Epit.* 2.7 only the initial part, down to ὑπάρχειν.

¹⁷ See Gigon (1945: 283): “Es ist ganz unmöglich, daß es eine Deutung der Überlieferung geben könnte, die allen Berichten gerecht würde”; Morrison (1955: 60): “Aëtius [...] is probably reproducing Theophrastus, and, it will appear, condensing him often to the point of obscurity”; Guthrie (1965: 61): “The only information about cosmology comes from a condensed and disordered paraphrase of Aëtius”; Reale (Zeller and Mondolfo 1967: 264, n. 45): “La testimonianza A 37, che dovrebbe essere un chiarimento del fr. 12 è, in verità, assai oscura, e più ancora l’hanno oscurata i vari tentativi fatti dai moderni per spiegarla”; Kirk *et al.* (1983: 259): “it is impossible with any confidence to reconstruct a coherent account of this extraordinary theory of ‘garlands’ or ‘rings’”; Cerri (2011: 88): “Aëtius’ testimony, very valuable for reconstructing the type of overall architecture, is however too confused and inconsistent when it comes to details of the system.” *Contra*: Reinhardt (1916: 10): “Was Aëtius darüber berichtet, macht den Eindruck großer Zuverlässigkeit, weil es auf jede Ausdeutung verzichtet.”

the hypothesis that the 'crowns' mentioned by Aëtius – i.e. the entities also mentioned in fragment 12 – represent celestial elements (annular or spherical) that surround the earth.

Aëtius' text can be divided into two parts. Only the first part, down to Δίκην τε καὶ Ἀνάγκην, is clearly a paraphrase of fragment 12 and will be examined here. Parmenides' fragment 12 is compared with Aëtius' testimony in the table below, following Aëtius' order.

Comparison between Aëtius 2.7.1 and Parmenides' fragment 12

AËTIUS 2.7.1	PARMENIDES fragment 12
<p>(i) στεφάνας εἶναι περιπεπλεγμένας ἐπαλλήλους,</p> <p>(ii) τὴν μὲν ἐκ τοῦ ἀραιοῦ,</p> <p>(iii) τὴν δὲ ἐκ τοῦ πυκνοῦ·</p> <p>(iv) μικτὰς δὲ ἄλλας ἐκ φωτὸς καὶ σκότους μεταξὺ τούτων.</p> <p>(v) καὶ τὸ περιέχον δὲ πάσας τείχους δίκην στερεὸν ὑπάρχειν,</p> <p>(vi) ὑφ' ὧν πυρώδης στεφάνη,</p> <p>(vii) καὶ τὸ μεσαίτατον πασῶν, περὶ ὃ πάλιν πυρώδης [sc. στεφάνη].</p> <p>(viii) τῶν δὲ συμμιγῶν τὴν μεσαιτάτην ἀπάσαις (ἀρχήν) τε καὶ (αἰτίαν) κινήσεως καὶ γενέσεως ὑπάρχειν, ἦντινα καὶ δαίμονα κυβερνήτην καὶ κληιδουχὸν ἐπονομάζει δίκην τε καὶ ἀνάγκην.</p> <p>(ix) καὶ τῆς μὲν γῆς ἀπόκρισιν εἶναι τὸν ἀέρα διὰ τὴν βιασιέραν αὐτῆς ἐξατμισθέντα πίλησιν, τοῦ δὲ πυρὸς ἀναπνοὴν τὸν ἥλιον καὶ τὸν γαλαξίαν κύκλον. συμμιγῆ δ' ἐξ ἀμφοῖν εἶναι τὴν σελήνην, τοῦ τ' ἀέρος καὶ τοῦ πυρός. περιστάντος δ' ἀνωτάτω πάντων τοῦ αἰθέρος ὑπ' αὐτῶν τὸ πυρῶδες ὑποταγῆναι τοῦθ' ὅπερ κεκλήκαμεν οὐρανόν, ὑφ' ὧν ἤδη τὰ περιγεια.</p>	<p>[before frg. 12]</p> <p>αἱ γὰρ στεριότεραι πληνται πυρὸς ἀκρήτιοι,</p> <p>αἱ δ' ἐπὶ ταῖς νυκτός,</p> <p>μετὰ δὲ φλογὸς ἴεται αἴσα·</p> <p>[specifies (iii) by placing the solid above everything]</p> <p>[specifies (ii) by placing the fire below the solid]</p> <p>[missing]</p> <p>ἐν δὲ μέσῳ τούτων δαίμων ἢ πάντα κυβερνᾷ· πάντων γὰρ στυγεροῖο τόκου καὶ μίξιος ἄρχει πέμπουσ' ἄρσενι θῆλυ μιγῆν τό τ' ἐναντίον αὐτὶς ἄρσεν θηλυτέρωι.</p> <p>[after frg. 12]</p>

Aëtius' text begins with passage (i), which is missing in fragment 12, transmitted by Simplicius, but something of the kind must have preceded the fragment, because Parmenides surely named the entities to which αἱ στεινότεραι refers. I have no difficulty in admitting that these entities are precisely what Aëtius and Cicero call 'crowns' (στεφάναι); but we have no way of knowing whether the very term 'στεφάνη' was used by Parmenides, or whether it is merely a doxographic interpretation, just as "ἄρματείωι τροχῶι παραπλήσιον" (Aët. 2.20.1) was for the circle of the sun in Anaximander;¹⁸ or as "οἱ μὲν μυλοειδῶς, οἱ δὲ τροχοῦ δίκην περιδινεῖσθαι" (Aët. 2.2.4) for Anaximenes' celestial bodies. Obviously in those cases Aëtius does not report the exact words of the authors, but he, or his source, with the images of the wheel or of the grindstone, is trying to make sense of indirect and unclear information. Since I believe that Aëtius was talking about the same type of objects as Parmenides, in the following I will use the same word 'crowns' also for the objects of fragment 12. I believe that Parmenides conceived the earth as spherical;¹⁹ therefore I think that the system described by Parmenides in fragment 12 is spherical too, and that the entities that Aëtius calls 'crowns' should be understood as *spherical crowns*, in the sense in which we say 'solar crown'.

After the initial passage, Aëtius mentions two 'crowns' formed (ii) "one from the thin" and (iii) "one from the dense", without specifying their mutual position. These objects are clearly the same ones that Parmenides indicates as "the narrowest filled with unmixed fire" and "those above with night." Aëtius then adds (iv) that there are "others, among these, which are mixtures of light and darkness," a passage which must be Aëtius own interpretation of Parmenides' phrase "afterwards a portion of flame spreads." We therefore have, also in Aëtius, some concentric crowns, one of which is thin and fiery, the other dense, plus others mixed in between.

In quoting fragment 12, Simplicius omitted something which should have come before, where Parmenides specified what he was talking about – he does not mention the objects that Aëtius calls 'crowns' – however his quotation of the fragment is continuous: first he describes the succession of pure crowns of fire and, above these, other crowns of night, in which a portion of fire spreads. After that, the fragment points out where the *dáimon* is located. In passage (viii) Aëtius also introduces the *dáimon*. But Aëtius' passages (v), (vi) and (vii) have no corresponding passages in fragment 12. Where do they come from? For passages (v) and (vi) the answer is easy: in (ii) and (iii) Aëtius does not

¹⁸ Similarly for the moon (Aët. 2.25.1) and the stars (Aët. 2.13.7).

¹⁹ See Calenda (2017: 37 f.).

say where the crowns he is speaking of are located, thus in (v) and (vi) he just specifies the mutual positions of the first two crowns previously mentioned:

– the crown in (iii), the one of ‘dense’, which in passage (v) surrounds everything, and is made of solid and inert matter (στερεὸν) as a wall, corresponds to Parmenides’ crowns of night (verse 12.1);

– the crown in (ii), that of ‘rare’, which in passage (vi) is placed underneath, corresponds to Parmenides’ crowns of pure fire.

Let us now consider passage (vii). Nothing corresponding to this passage appears in fragment 12. It begins with “καὶ τὸ μεσαίτατον πασῶν,” a crown which is most in the middle of everything, but what it is made of is not told; then Aëtius adds “περὶ ὃ πάλιν πυρώδης”, that is, all around the first one is another fiery crown. Therefore Aëtius could not be speaking again of steps (ii) and (iii), i.e. to verses 12.1–2, where the fiery crown is below and the night crown above. So, where do these new crowns come from? I can imagine three alternative hypotheses:

1) Aëtius mentions new crowns which are named by Parmenides before or after fragment 12;

2) Aëtius adds something he, or his source, thinks should be there;

3) Aëtius, or his source, try to explain passage (iv).

Hypothesis 1): if in Parmenides’ poem, the first crown named by Aëtius in passage (vii) came before²⁰ fragment 12, τὸ μεσαίτατον πασῶν στερεὸν²¹ may suggest that before verse 12.1 Parmenides mentioned a solid central sphere,²² surrounded by spherical crowns; then, περὶ ὃ πάλιν πυρώδης could be the same unmixed fire (πῦρ ἄκρητος), mentioned in 12.1. But what could this central sphere be, if not the solid earth? In this case the crown of night of verse 12.2 – that is Aëtius περιέχον δὲ πάσας τείχους δίκην στερεὸν – would be in the sky.

I see two difficulties here. First, a solid wall located in the sky around everything (περιέχον δὲ πάσας) contradicts passage (ix), where Aëtius says that what surrounds everything is αἰθήρ, which surely cannot be identified with a wall. Furthermore, Aëtius’ αἰθήρ does not surround a ‘wall’, but a fiery body “called sky”, and further below there is “what surrounds the earth.” Where is the wall, then? Note that Cicero’s passage (*N.D.* 1.11.28) also places a fiery body around the sky (*qui cingit coelum*), and does not mention a solid vault, nor a wall. This contradiction was highlighted by Tarán.²³ Second, why

²⁰ ‘Before’ is more likely than ‘after’.

²¹ As suggested by Diels (see note 14).

²² Coxon (1986: 235): “it is true that the doxographic account of P.’ rings is based in part on lines of the poem now lost.”

²³ Tarán (1965: 238).

Aëtius, who follows the main order of Parmenides' fragment, should place (*vii*) in the middle of his paraphrase and not at the beginning?

Hypothesis 2): it is also possible that during the transmission of the text, someone tried to explain, according to his own interpretation, a synthetic commentary by Theophrastus,²⁴ inserting in (*vii*) what he expected to find: namely, that at the centre of the cosmos there is not a sphere of fire but our solid earth.²⁵ Thus, τὸ μεσαίτατον πασῶν στερεὸν περὶ ὃ πάλιν πυρώδης could be a suggestion from Aëtius, or his source, which places the earth in the centre, surrounded by the sky. This hypothesis too would project the crowns of night (i. e. Aëtius' τείχους δίκην στερεὸν) into the sky, just as hypothesis 1 does.

Hypothesis 3): Aëtius locates the mixed crowns between the crowns of light and of darkness; however, since the mixed crowns are plural (μικτὰς δὲ ἄλλας), their distribution still needs an explanation. Perhaps Aëtius is trying to figure out the disposition of the mixed crowns below the solid wall, but he, or his source, could only guess.

I believe that the objections to the first hypothesis are conclusive: to suppose that the incomprehensible passage (*vii*) was taken from some other part of the poem and then placed in the middle of a fragment is, in my opinion, arbitrary. The two other hypotheses seem more likely. Passage (*vii*) is then an arbitrary attempt by Aëtius or his source to place the earth in the centre of everything (hypothesis 2), or to explain a text that they were unable to understand (hypothesis 3). Thus, passage (*vii*) does not add anything to fragment 12.

Aëtius' paraphrase of fragment 12 ends with passage (*viii*), which specifies that one of the mixed crowns – the one most in the middle – is a *dáimon*, which not only is the cause of movement and genesis, but also guardian, justice and necessity.

In fragment 12 Parmenides locates the *dáimon* who governs everything among the crowns of night (i.e. solid), into which a portion of fire spreads (φλογὸς ἴεται αἴσα), but he does not identify her with one of these crowns. As described in 12.4–6, this *dáimon* is the goddess of life, and there is no reason to believe that she is the same goddess as the guardian of the keys, mentioned in the preamble, nor that she is the same as Δίκη, or Θέμις, or Ἀνάγκη, or Μοῖρα, which are personalisation of justice, of the bonds of law, of necessity and of the unavoidable fate – which in the poem indicate the rigid constraints of logic.²⁶

Like Aëtius, Cicero identifies Parmenides' god (*deum*) with a crown, but he does not place it in the middle of mixed crowns, but rather in the *ardor* (i.e. the ether) which

²⁴ Tarán (1965: 247) goes farther: “it seems to me that one should stop asserting that this report of Aëtius is derived from Theophrastus.”

²⁵ This would justify Diels' στερεόν. Zeller (1892: 573): “der mittlere feste Kreis dagegen kann nur die Erde sein, von der auch sonst bezeugt wird, Parmenides habe sie sich als eine Kugel gedacht, die in der Mitte der Welt ruhe”; Coxon (1986: 236): “The centre is similarly expressed in the neuter (τὸ μεσαίτατον πασῶν) and is clearly identical with the earth.”

²⁶ See Calenda (2017: 51 f.).

surrounds the sky outside of everything. He probably draws from the same source as Aëtius,²⁷ but interprets it differently.

Verses 12.3–6 are the original text, which Simplicius quotes verbatim, while the interpretations of Aëtius and Cicero are based on a paraphrase transmitted in a confused form, through interpretations and transcriptions. Cicero's derogatory text is a clear example of the widespread inability of the ancient tradition to make sense of Parmenides' thought.²⁸

2. Celestial crowns?

It is not easy to overcome the contradictions detected by Tarán in Aëtius and those between Aëtius and Cicero, contradictions that lead him to suspect a Stoic contamination in both these authors.²⁹ Tarán, like most of modern critics,³⁰ interprets Parmenides' cosmos as consisting of a central, solid earth, encircled by a series of concentric crowns, in which the celestial bodies are surrounded by a solid crown, like a wall.

Although Tarán, recognizing the unreliability of Aëtius' 2.7.1,³¹ dropped the surrounding αἰθήρ, along with some other elements, such as the ring of fire around the earth and the mixed crowns,³² he is still forced to admit:

It is not possible, however, to get a complete and satisfactory idea of the astronomical conception behind the few remains of Parmenides' poem and the confused notices preserved by Aëtius.³³

Not even the attempts of Coxon (1986) and Conce (1996) to explain the arrangement of the crowns by referring 'στεινότεραι', not to their diameter, but to the width of the

²⁷ Cicero had attended the school of Posidonius in Rhodes, and, to use the words of Torraca (1961: 12): "la maggior parte della materia dossografica, contenuta nel libro I del *De deorum natura* e nel *De pietate* deriverebbe dai *Placita*. Per il Diels tale ipotesi è molto vicina al vero, qualora s'intendano non i *Placita* di Aëtio o del Pseudo-Plutarco, ma i *Placita vetusta*."

²⁸ Provided that the speech Cicero puts into the mouth of the epicurean Valleio actually represents Cicero's own judgment, or at least a current opinion on Parmenides.

²⁹ Tarán quotes another passage from Cicero *N.D.* 1.14.37: "Cleanthes [...] tum ipsum mundum deum dicit esse, [...] tum ultimum et altissimum atque undique circumfusum et extremum omnia cingentem atque complexum ardorem, qui aether nominetur, certissimum deum indicat."

³⁰ See e.g.: Zeller (1892: 572 f.); Reinhardt (1916: 10 f.); Untersteiner (1958: 174 f.); Pasquinelli (1958: 390): "Tutte queste soluzioni risolvono parte delle difficoltà, ma nessuna soddisfa completamente"; Guthrie (1965: 61 f.); Couloubaritsis (1986: 314, 321) names at least 10 celestial crowns, and some more. Following a suggestion by Reinhardt, Hölscher (1969: 108), Conche (1996: 217), Bollack (2006: 242), Bredlow (2010: 294) and Brisson *et al.* (2022: 136 f.) interpret Aëtius 2.7.1 as the description of a pre-cosmogonic phase.

³¹ Tarán (1965: 237): "the untrustworthiness of Aëtius' report is evident."

³² Tarán (1965: 239): "we may safely infer that the ring of fire which Aëtius places around the earth may be eliminated, since it is only the result of his misunderstanding of frg. XII.1-2. I think that we may dismiss, too, Aëtius' notion of the 'mixed rings'."

³³ Tarán (1965: 241). Guthrie (1965: 62): "It is impossible to reconstruct a detailed cosmic order from this garbled and confused summary."

ring band,³⁴ allow us to conceive a reasonable structure for Parmenides' cosmos, which agrees with fragment 12 and Aëtius 2.7.1.³⁵

The internal contradictions of Aëtius' text, its disagreement with Cicero's, and the difficulty of making both agree with fragment 12, make it hard to imagine how Parmenides could have conceived such an absurd astronomical theory, uncorroborated by what is observed in the sky. What relationship can ever be established between the crowns of fire and night, and the celestial bodies mentioned by fragments 10 and 11 – two groups of entities that seem to belong to incompatible cosmoses?

Some authors recall the cosmos of Anaximander, in which the celestial bodies are fiery annular bands, hidden by dark hazy layers, whose light is visible through tubular openings in the haze (vents similar to aulus pipes).³⁶ This analogy, however, does not hold, because Parmenides' celestial bodies are bodies, not holes in the haze, as shown by the fact that the moon, at least, is spherical, being lighted by the sun.³⁷ Equally absurd is the hypothesis of a solid wall-like crown³⁸ surrounding the cosmos. It is true that Homer conceived the sky as a solid vault, similar to bronze³⁹ or steel,⁴⁰ placed above the earth at an enormous distance, but this is a poetic conception based on myths that claim no scientific status.

Parmenides' world is completely different, and before him the Milesians had already conceived an infinite universe. Even the reference to Anaximenes does not work, because his solid vault depends on Aëtius 2.14.3: Ἀναξίμενης ἡλῶν δίκην καταπεπηγένα τὰ ἄστρα τῷ κρυσταλλοειδεῖ. This interpretation, clashes with Aëtius 2.13.10: Ἀναξίμενης πυρίνην μὲν τὴν φύσιν τῶν ἄστρον, περιέχειν δέ τινα καὶ γεώδη σώματα συμπεριφερόμενα τούτοις ἀόρατα: therefore the adjective 'crystalline' refers to these invisible orbiting bodies; so the fixed vault is just a misinterpretation.⁴¹ Aëtius 2.7.1 is the only text which mentions Parmenides' solid wall, but it does not claim that such a 'wall' is in the heavens.

³⁴ When we call a ring narrow, it is the diameter we are referring to, not the width of the strip: in Liddel and Scott στῆνός is "a narrow, close or confined space."

³⁵ Why should the Coxon's equatorial band of the sky (οὐρανός) be fiery, and the bands around the northern star dense and heavy is not easy to visualize. It would be more understandable if the bands were on the earth's surface.

³⁶ See Hipp. *Haer.* 1.6.4; Aët. 2.13.7; 2.20.1 and 2.25.1; Ach. Tat. *Isag.* 1.19 (p. 46, 20). I have shown (Calenda 2015: 97 f.) how Anaximander's conception is a rational hypothesis, which can explain, the rotation of the celestial bodies around the earth, the stability of their orbits and the origin of celestial fires.

³⁷ Zeller (1892: 576): "sich Parmenides die Gestirne mit Anaximander als hohle, mit Feuer gefüllte Ringe gedacht habe, aus deren Oeffnungen dieses hervortrete, ist nicht bloß unerweislich, sondern auch mit der Thatsache, dass ihm die Beleuchtung des Mondes durch die Sonne bekannt war, unvereinbar."

³⁸ Coxon (1986: 236): "Aëtius assertion that the outer envelope is στερεόν appears to be a misinterpretation of ὄλυμπος ἔσχατος."

³⁹ Hom. *Il.* 5.504; 17.423; *Od.* 3.2.

⁴⁰ Hom. *Od.* 15.329; 17.565.

⁴¹ See Calenda (2015: 175). Obviously, the presence of a solid crown cannot be justified by the mention of the sphere (σφαῖρα) in verse 8.43, which is only a simile used to illustrate the uniform distribution of being.

3. The structure of the Earth

We can easily eliminate all contradictions if we drop the preconceived idea that the spherical crowns, described by Parmenides' in fragment 12, are celestial features, and assume instead that they belong to the earth. In fact, neither Parmenides nor Aëtius explicitly declare that these spherical crowns are located in the heavens. Only Cicero says so, but he speaks of a single crown, and gives this name to the ether that surrounds the sky. Aëtius too mentions the αἰθήρ in (*ix*), but he does not call it a 'crown'. It is likely that Cicero, getting the name στεφάνη from the same source as Aëtius, refers it to the ether. It is therefore worthwhile exploring the possibility that fragment 12 describes not celestial entities, but the earth's composition, as announced in fragment 11. I will show that this interpretation makes all the contradictions disappear. Thus the discrepancy between the system of the 'crowns' and that of the celestial bodies listed in fragments 10 and 11, also vanishes.

The same concentric crowns are reported in 12.1–2 and in passages (*ii*), (*iii*) – multiple in fragment 12, but single in Aëtius – and their mutual position is established by Aëtius in passages (*v*) and (*vi*). The mixed crowns of Aëtius (*iv*), try to interpret what the second part of verse 12.2 describes as the transmission of fire to the night crowns.⁴² Once ascertained that Aëtius' text, up to step (*viii*), does not provide additions to the Parmenides' fragment, we can leave Aëtius aside and proceed directly to the interpretation of fragment 12.

In this spherical system, Parmenides places several crowns: pure fire occupies the central position, and around it are arranged crowns of inert matter (ταῖς νυκτός), which Aëtius compares to a wall. A portion (αἶσα) of flame (φλογός) pushes or breaks (ἔται) into the inert crowns. Among these is the demon who governs life, symbolized by sexual coupling. The most fitting explanation seems to be that, in these verses, Parmenides describes γαῖα, the earth, which is the first of the entities listed in fragment 11. The earth is therefore composed of solid crowns, that form what we call the earth's crust, arranged around a core of fiery crowns, which sheds off the heat that flows in the solid crowns above. Thus, Parmenides introduced, before Philolaus, a central fire, placing it inside the earth rather than outside.

Did Parmenides have a reason to conceive such a structure? I think he had: a thinker of Ionian culture, with a clear propensity for observation – who lived in Elea, on the coast of Southern Italy, surrounded by active volcanism,⁴³ well known to the Greeks of

⁴² Untersteiner (1958: 177): “ἔται evidentemente non esprime μίξις, ma intervento, che determina la compresenza di φῶς e νύξ.”

⁴³ Many volcanic systems in that area are still active today. The latest eruptions are: Vesuvius in 1944 AD; the vulcan of Campi Flegrei in 1538 AD, which created Monte Nuovo; the vulcan of Ischia in 1302 AD; the island of Vulcano in 1890 AD; while the volcanoes Etna and Stromboli are still in continuous activity. The volcanic chain is integrated by several active submarine volcanoes, such as the Empedocles vulcan, south of western Sicily, whose eruption in 1831 AD built the Ferdinandea Island, demolished by the sea after a few months; and

the time⁴⁴ – could reasonably imagine that the earth was not just a mass of rock, and that a huge fire was burning in its depths.⁴⁵ Such a scheme has a solid empirical base, which is missing from Philolaus’ central fire.

Already Diels suggested that Aëtius 2.7.1 could represent also the earth’s crust and the fiery core of the earth:

Denn da der rätselhafte Feuerkranz, den die Erde umgibt, ebenfalls wie der innerhalb des Firmamentes befindliche Aether, als der innere betrachtet werden muss, so stellt Parmenides, da er sich die Erde als Kugel dachte, darunter den feuerflüssigen Kern vor, der sich unter der Erdrinde befindet. Parmenides ist also für uns der erste, der nicht nur die richtige Gestalt, sondern auch die richtige Beschaffenheit der Erde sei es geahnt sei es aus Indizien (Vulkanen, heissen Wassern) richtig erschlossen hat (Diels 1897: 105).

Thus Diels, who interprets most of Aëtius’ multiple crowns as celestial elements, states that Parmenides correctly conceived not only the shape of the earth, but also its composition. But he interprets in this sense, Aëtius’ passage (*vii*) reading περί as if showing the intimate connection between the earth’s crust and the internal fire:

περί ist aber wohl, wie der Zusammenhang lehrt, nicht zu verstehen wie etwa ὁ περί τὴν γῆν ἄῆρ, sondern in allgemeinerem Sinn vom unmittelbaren Anschluss an die innere Wölbung der Erdkruste (Diels 1897: 106).

This interpretation of περί was explicitly rejected by Reinhardt, Tarán and Reale,⁴⁶ and Diels’ proposal was shelved.⁴⁷ However, Diels’ description fits smoothly to Parme-

the volcanoes Marsili, north of the Aeolian Islands, and Palinuro, off the coast of Cilento (southern Italy), where Elea was located.

⁴⁴ It is at the origin of the myth of Typhoeus, a rebellious Titan, buried by Zeus between Cuma and Sicily (Pi. P. 1.15).

⁴⁵ Empedocles DK 31 B 52: πολλὰ δ’ ἔνερθ(ε) οὐδεὸς πυρὰ καίεται. Burkert (1962: 317, n. 94) comments: “This is natural enough for a Sicilian, with Etna before his eyes.” However Reinhardt (1916: 11) argues strongly against: “hätte Parmenides wirklich die feurige Beschaffenheit des Erdinnern geahnt oder erschlossen und aus diesem Grunde die Erde in zwei konzentrische Sphären eingeteilt, so stände er damit allein unter allen griechischen Philosophen.”

⁴⁶ Reinhardt (1916: 11) argues that περί ὁ cannot be read as ὑφ’ ὃ; Tarán (1965: 235): “this interpretation of περί ὁ is impossible”; Reale (Zeller, Mondolfo 1967) 265 n. 45: “Diels, per ottenere codesta immagine, è costretto a forzare il testo, soprattutto là dove Aët. dice περί ὁ.”

⁴⁷ However, Diels’ thesis was also taken up, in passing, by Kirk *et al.* (1983: 259): “Philolaus was perhaps following Parmenides when he placed fire both at the extremity of the universe and at its centre [...] (but Parmenides’ idea may have been of fire *within* the earth).” Both Diels and Kirk *et al.* seem to accept the multiplication of Aëtius’ celestial crowns. Finkelberg (1986) gives the earth a solid core, enveloped by a subterranean fire, but he projects the mixed layers in the sky and encloses everything into a solid shell, which he identifies with the ‘utmost Olympos’ (frg. 11: ὄλυμπος ἔσχατος).

nides' verses 12.1–2, that is, to the crowns which Aëtius names in passages (ii) and (iii), whose mutual positions are stated in steps (v) and (vi).

A question still remains: if the structure of the earth is actually composed of a nucleus of fire, surrounded by the earth's crust – therefore of only two parts – why does Parmenides use the plural? Why does he say “the narrowest *ones*” (αἱ γὰρ στενιότεραι), and then “*others* above *those*” (αἱ δ' ἐπὶ ταῖς)? We can only guess; but reflecting on the nature of Parmenides' ‘forms’ (μορφῆ) – that is, ethereal fire (αἰθέριον πῦρ) and dark night (νύκτ' ἄδαῖ) – may provide some further elements.

With ‘fire’ and ‘night’ Parmenides does not mean ‘elements’ in the sense that we usually give to this word. He means that men⁴⁸ identify in the world two groups of properties, which belong: to *fire*, subtle (αἰθέριον), hot like flame (φλόξ), favourable to life (ῥῆπιον); and to *night*, body (δέμας), in itself devoid of light (νύξ), dense (πυκνὸν) and heavy (ἐμβριθής). These are respectively the general properties of *heat* (and *light*), and of *matter*.⁴⁹ Heat and matter are both present in living beings. It is not impossible, therefore, that Parmenides, speaking of a plurality of crowns, had in mind the infinite heterogeneity of his “forms.” Indeed, ‘fire’ and ‘night’ have numberless aspects. So, when lava erupts from volcanoes and cools, it solidifies and appears just like any other rock, but when fluid it is molten rock, that is, inert matter associated with very strong heat.

According to fragment 12, the *dáimon*, who governs life in its various aspects, acts on the crowns of night that surround the central fire, i.e. on the earth's crust; instead Aëtius embodies it, so to speak, in a mixed crown placed ‘most in the middle’ (μεσαιτάτην ἀπάσαις). Then, Aëtius is saying something different from what we read in the fragment,⁵⁰ but it is to the latter that we owe our own trust. The goddess of life acts on the earth's crust, and life is fed in part by the benign fire that emanates from the subsoil, and above all by the sun. According to this interpretation, fragment 12, which describes the earth, is a rational doctrine, in accordance with what experience suggests.

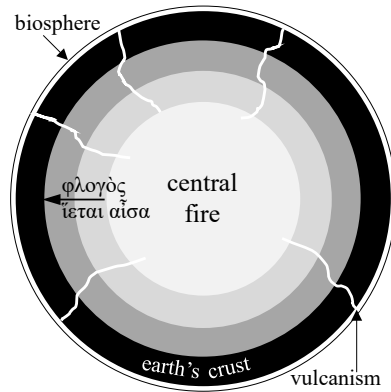
If in verse 12.2 we read μετὰ as ‘after’ or ‘beyond’⁵¹ the series of the fiery crowns and of the earth's crust, then the passage “μετὰ δὲ φλογὸς ἔται αἴσα” involves also a further crown, inhabited by life, animated by a form of fire, where the goddess of reproduction is located; a level which, with a Greek term, we call ‘biosphere’ (see figure). Fragment 12 goes no further.

⁴⁸ That is, Parmenides – in fact the goddess speaks as his mouthpiece.

⁴⁹ Calenda (2017: 23 f.).

⁵⁰ Reale (Zeller, Mondolfo 1967: 275): “L'identificazione della dea col cerchio o con la sfera è avvenuta nell'iter dossografico, e probabilmente è dovuta a Teofrasto stesso [...] e non c'è traccia di essa nei versi di Parmenide che possiamo ancora leggere.”

⁵¹ Conche (1996: 223): “Comme le notait déjà H. Ritter [...] le sens de μετὰ n'est pas clair.”



Structure of the Earth

In conclusion, what fragment 12 describes concerns only the terrestrial globe. In the remaining testimonia on Parmenides' cosmology the celestial crowns are not named.

Passage (*ix*) of Aëtius 2.7.1 has no parallel in fragment 12. It probably refers, more or less correctly, to the elements of the Parmenidean cosmology, named in fragments 10 and 11, such as: the sky, the objects which are in the sky (sun, moon...), and the αἰθήρ that surrounds everything. Conceivably Parmenides wrote about them in further passages of his poem following fragment 12.⁵²

⁵² On Parmenides' cosmology and cosmogony see Calenda (2017: 81 f.).

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GUIDO CALEND A
/ Roma Tre University, Italy /
guido.calenda@gmail.com

Parmenides' Structure of the Earth

It is generally accepted that the enigmatic fragment 12 of Parmenides, supplemented by the first part of Aëtius II 7.1, represents an unlikely cosmos which comprises alternating spherical crowns of fire and night, surrounding the earth. A comparison of the fragment and Aëtius' text shows that the latter adds nothing substantial to the fragment. Thus, fragment 12 can actually represent the structure of the earth, which consists of a core of fire, is surrounded by the layers of the earth's crust, into which heat is transmitted from within, and on which the goddess of life dwells.

KEY WORDS

Greek science, Presocratics, Parmenides, cosmology, earth's crust, central fire, biosphere