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ARGUMENT AND DIALECTICAL STRUCTURE IN *PHYSICS* VIII 1

Abstract

Physics VIII 1 presents a multi-stage argument concluding that there was not, nor ever will be, a time when there was not nor will not be motion (*Phys.* VIII 1.252b5-6). In this paper I shall argue that chapter's argument is dialectical in a precise way. My claim will be that *Physics* VIII 1 is apodeictically conditioned – its structure must be understood in terms of the theory of science in the *Posterior Analytics* and the methods for establishing principles in the *Topics*. *Physics* VIII 1 is not demonstrative in a straightforward deductive way, but is structured with the nature of a scientific *genos* and requirements for scientific knowledge always in mind. Aristotle begins by asking about the eternality of motion, posing a pair of conceptual opposites that form a mutually exclusive and logically exhaustive dichotomy. But the initial statement of the dichotomy turns out to require substantial unpacking, leading eventually to a single remaining option, that motion in the cosmos is eternal. But the status of this conclusion itself turns out to be problematic. Put in terms of Aristotle's theory of science, all *phusiologoi* made motion a posit or hypothesis, whether they regarded motion as eternal or not. Though Aristotle has rejected one option, at a deeper level, he finds all previous accounts lacking. Because motion is fundamental to all coming-to-be and passing-away, what is at stake is the status and adequacy of a principle governing the whole science of nature (*tên theôrian pasan*; 250b17). In this way, the chapter prepares for the subsequent investigation into the principles of cosmic motion.

Keywords

Aristotle, *Physics*, Dialectic, Demonstration, Principles

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The first chapter of *Physics* Book VIII consists of an extended, multi-stage argument concluding that motion (*kinesis*) in the universe must be eternal – or as the chapter’s final lines put it, “that there was not, nor ever will be, a time when there was not nor will not be motion”.¹ Though the conclusion is clear, many of the chapter’s details are obscure. Clearly enough, Aristotle prepares for book VIII’s subsequent investigations into cosmic motion and the identification of an unmoved first mover. What has gone largely unnoticed is that the chapter’s argument relies throughout on Aristotle’s accounts of scientific principles in the *Posterior Analytics* and of dialectical techniques as a path to principles described in the *Topics*. Once this is recognized, the chapter’s criticisms of predecessors reveals not simply that certain earlier accounts of motion are inadequate, but why they have failed to satisfy theoretical requirements Aristotle sets for scientific explanation within a *genos*. In the language of the *Posterior Analytics*, while all philosophers of nature agree on the *that* of motion, no one has offered a theoretically adequate explanation of the *why*.

In this paper, I will not be concerned with the accuracy of the positions Aristotle attributes to predecessors or the adequacy of his criticisms of them. Rather, my aim is to show how Aristotle’s theories of science and dialectic shape VIII 1’s overall argument and structure. *Physics* VIII 1 is what I shall term “apodeictically conditioned.”² By this I mean that while VIII 1 isn’t demonstrative in a straightforward deductive way, key arguments against predecessors depend on the nature of a scientific *genos* and requirements for scientific principles. At the same time, the chapter’s overall structure derives directly from Aristotle’s theory of dialectic. Dialectic is a method, sometimes

¹ *Phys.* VIII 1.252b5-6 (Ross): ὅτι μὲν οὖν οὐδεὶς ἦν χρόνος οὐδ’ ἔσται ὅτε κίνησις οὐκ ἦν ἢ οὐκ ἔσται, εἰρήσθω τσσαῦτα. Translations from the *Physics* are from Graham (1999) (sometimes lightly modified), with the exception of the final two passages in the paper, which are my own. Translations from the *Topics* are my own, following those of Pickard-Cambridge in Barnes (1984), but with an eye on Fowler (1959) and Smith (1997). Translations from the *Posterior Analytics* come from Barnes (1993).

² I develop the notion of a text’s being apodeictically conditioned in Wians (1992). Apodeictic conditioning is closely related to the pedagogical dimension of many Aristotelian treatises; see Wians (1994), and Wians and Polansky (2017) pp. 1-6. I wish also to acknowledge the groundbreaking work on the order of exposition in the *Physics* and *De Caelo* in Lang (1998).

useful for training, sometimes for encounters, and sometimes – when it is used to weigh the truth and falsity on both sides of an issue – for providing a route toward scientific principles. My aim is to show that VIII 1 provides such a route to the principle of cosmic motion. Consistent with the techniques described in the *Topics*, the chapter lays out a series of dichotomies derived from the opinions of Aristotle’s predecessors that taken together constitute a logically exhaustive set of alternatives. Aristotle proceeds to eliminate all but one of the positions and to immediately endorse the remaining option. But it is not an unqualified endorsement. When judged by the requirements of Aristotle’s theory of science, the chapter concludes, all previous positions fall short on theoretical grounds: each posits motion as an unargued hypothesis, where some sort of argument is required. By means of this structure, the chapter serves a cardinal function of dialectic: it prepares for Aristotle’s own investigation into the principle of eternal cosmic motion that occupies the rest of Book VIII.

Physics VIII 1 is a long chapter, filling two full Bekker pages (250b11-252b6). While chapter divisions are a product of later editorial intervention, verbal parallels between VIII 1’s opening lines and concluding lines clearly mark the beginning and end of a sustained and continuous argument.³ It is upon that continuous argument and its structure that I will concentrate. I shall divide the argument of VIII 1 into four stages.⁴ In the first stage (250b11-251a8), Aristotle identifies two mutually exclusive options regarding the eternity of motion and a crucial assumption they share. The second stage (251a8-17) begins with Aristotle’s own definition of motion from earlier in the *Physics* and draws what might be called an ontological consequence that applies to both options identified in the first stage. The third stage (251a17 to 252a5) provides a sustained criticism of the first of the two options, that motion came into being, and concludes by accepting the other option, that motion is eternal (251b28-252a5). This acceptance is made problematic in the fourth stage (252a5-b5), where Aristotle criticizes those

³ Here and throughout, I rely on an insightful discussion of the Aristotelian paragraph in Netz (2001).

⁴ My outline of the chapter differs significantly in its main points from that of Graham (1999) pp. 183-90.

who posit motion, whether perishable or eternal, as a basic principle of nature. Though the chapter's concluding sentence (quoted at the start of this paper) makes clear that Aristotle has rejected one option in favor of the other, at a deeper level, he finds all previous accounts theoretically lacking. With this in mind, let us turn to *Physics* VIII 1.

Stage 1. Kinesis and the Investigation of Nature (250b11-251a8)

Because it frames everything that follows, I will devote more attention to the first stage of VIII 1 than to any of the other stages. Doing so will reveal several specific ways in which the chapter is apodeictically conditioned.

Aristotle begins the chapter with a pair of questions about the eternity of motion (*kinesis*):

But (*de*) did motion come into being at some time (*gegone pote*), without having existed before (*ouk ousa proteron*), and does it perish again in such a way that nothing is in motion? [Call this option 'a'.] Or is it instead the case that it neither came into being nor perishes, but instead always existed (*all' aei ên*) and always will exist; and being deathless and unceasing, is it present in things as if it were a kind of life (*zoê tis*) belonging to everything composed by nature? [Call this option 'b']⁵

Let us set aside for now the odd-sounding concluding clause, which speaks of a kind of vitalism in nature; I shall account for it in due course.⁶ We must first become clear that options 'a' and 'b' form a mutually exclusive and logically exhaustive dichotomy. Either motion began and may or will end at some time; or it always has and always will exist. There is no third

⁵ *Phys.* VIII 1.250b11-15: Πότερον [δε] γέγονε ποτε κίνησις οὐκ οὔσα πρότερον, καὶ φθίρεται πάλιν οὕτως ὥστε κινεῖσθαι μηδέν, ἢ οὐτ' ἐγένετο οὔτε φθίρεται, ἀλλ' αἰεὶ ἦν καὶ αἰεὶ ἔσται, καὶ τοῦτ' ἀθάνατον καὶ φθίρεται, ἀλλ' αἰεὶ ἦν καὶ αἰεὶ ἔσται, καὶ τοῦτ' ἀθάνατον καὶ ἀπαυστον ὑπάρχει τοῖς οὐσιν, οἷον ζωὴ τις οὔσα τοῖς φύσει συνεστῶσι πᾶσιν; In my modification of Graham's translation, I restore the δε at 250b11, which was reduced to the apparatus in Ross's text; see Ross (1936). For a discussion of an important textual variant brought to my attention by Silvia Fazzo, see the appendix at the end of this paper.

⁶ Ross finds the comparison apt, as life "is just the power of self-movement"; Ross (1936) p. 687. So too Kosman (1994) p. 135. Neither identifies this as the position of Democritus, as I shall do later in the paper.

alternative.⁷ Aristotle will eventually identify specific holders of each option, but what he begins here is something more than a typical survey of predecessors. As we shall see, he is concerned not with what has been said by this or that earlier thinker, but with the mutually exclusive options of what can be said. What will emerge is a conceptual mapping, not an historical one.

By framing what is to follow within a mutually exhaustive dichotomy, VIII 1 already displays one of the most important dimensions of its apodeictic conditioning. As a famous passage early in the *Topics* makes clear, the ability to examine both sides of a subject is one of the cardinal uses of dialectic, and is of particular value in the search for principles:

For the philosophical sciences (*philosophia epistemai*) it is useful, because the ability to raise puzzles (*diaporésai*) on both sides of a subject will make use discern more easily the truth and the false in each case. Further, (*eti*) [it is useful] with regard to that which is primary (*ta prôta*) in each science. For on the one hand (*men*), from the principles (*archôn*) proper to the particular science at hand it is impossible to say anything at all, since the principles are primary in relation to everything else; and on the other hand (*de*), is through reputable opinions (*endoxôn*) about them that these must be discussed. This belongs properly or most appropriately to dialectic; for being a mode of testing, it provides a path to the principles of all investigations.⁸

The philosophical sciences are those *methodoi* pursued for the sake of knowledge or understanding, not action or production. They include primarily the three theoretical sciences of mathematics, physics, and theology or First Philosophy (*Metaph.* E 1.1026a18-19). The *Topics* passage identifies two ways in which dialectic proves useful to them. The first involves the posing of dichotomies, and is useful at any level of scientific investigation. Because dialectic can raise puzzles “on both sides”, it is able to test the truth

⁷ There is a suppressed premise here: both Plato and Aristotle believe that which comes into being must necessarily pass out of being. For Aristotle, see *De Caelo* I 10.279b18-20. With that premise supplied, there is no third alternative.

⁸ *Top.* I 2.101a34-b4 (Ross): πρὸς δὲ τὰς κατὰ φιλοσοφίαν ἐπιστήμας, ὅτι δυνάμενοι πρὸς ἀμφοτέρωθεν διαπορήσασθαι ῥᾶον ἐν ἐκάστοις κατοψόμεθα τᾷληθές τε καὶ τὸ ψεῦδος, ἔτι δὲ πρὸς τὰ πρῶτα τῶν περὶ ἐκάστην ἐπιστήμην [ἀρχῶν] ἐκ μὲν γὰρ τῶν οἰκείων τῶν κατὰ τὴν προτεθεισάν ἐπιστήμην ἀρχῶν ἀδύνατον εἰπεῖν τι περὶ αὐτῶν, ἐπειδὴ πρῶται αἱ ἀρχαὶ ἀπάντων εἰσὶ, διὰ δὲ τῶν περὶ ἕκαστα ἐνδόξων ἀνάγκη περὶ αὐτῶν διελεῖν. τοῦτο δ' ἴδιον ἢ μάλιστα οἰκείον τῆς διαλεκτικῆς ἐστίν· ἐξεταστικὴ γὰρ οὕσα πρὸς τὰς ἀπασῶν τῶν μεθόδων ἀρχαὶς ὁδὸν ἔχει. Smith offers a significantly different rendering of the passage's final phrase; see Smith (1997) p. 3 and 54-5.

and falsity of competing claims implied by a contradictory pair.⁹ A further use comes in the pursuit of principles. Here dialectic is especially suited to the questioning of reputable opinions – presumably opinions that bear on putative principles.¹⁰ We should be clear, however, that the latter is closely connected to the former. The value of posing dichotomies at any level in a science is that if one option is shown to be false, the remaining option must be true. In the search for principles, which cannot by their nature be deduced from higher propositions, dialectical dichotomies based on opposing reputable opinions would be of special value as a path to principles. (Over the course of *Physics* VIII 1, we will see how a series of just such dichotomies forms a path leading to the fact of eternal motion.)

The main dichotomy framing *Physics* VIII 1 derives from reputable opinions of “the wise” (*Top.* I 10); in this case, what *Topics* I 11 identifies as “the wise” who hold contrary opinions to one another (I 11.104b4-6). *Topics* I 11 goes on to describe the sorts of dichotomies useful in dialectic, which Aristotle labels dialectical problems. Such problems, he says, depend on contradictory pairs, and are useful in practical matters of choice and avoidance and in theoretical investigations leading to truth and knowledge (*gnôsis*) (*Top.* I 11.104b1-4). Several of his examples are closely related to the questions framing *Phys.* VIII 1: is the *kosmos* eternal or not (104b8; cf. *De Caelo* I 10.279b4-5)? The same example appears a few lines later to illustrate a question so great it is difficult to give a reason (*to dia ti*) for one’s position (104b14-16; cf. *De Caelo* II 3.286a4-7). The same dichotomy, “Is the *kosmos* eternal or not?”, appears at *Top.* I 14.105b24-25 as the example of a dialectical problem in the natural sciences (*ai phusikai*). A student trained in the philosophical uses of dialectic would find Aristotle’s opening strategy in *Phys.* VIII 1 perfectly familiar.

⁹ With this passage one should compare *APo.* I 2.72a7-14, where Aristotle distinguishes between a dialectical proposition that takes either part of a contradictory pair, and a demonstrative proposition, which takes one part because it is true.

¹⁰ See further Smith (1997) pp. 52-4. Smith does not, however, connect the second philosophical use and the first. In fact, his comments on this passage seem not to fully appreciate the role of posing dichotomies and therefore the importance of dialectical examination of contradictory pairs as a route to truth and principles.

Following VIII 1's posing of the dichotomy (and still before naming specific predecessors), Aristotle cites a different sort of *endoxon*. It is not derived from opposing contrary positions, but is on the contrary an opinion shared by "all those who discuss nature." Everyone who studies nature, Aristotle says, assumes that motion exists:

Indeed (*men*), that there is motion is the view of all who discuss nature (*hoi peri phuseôs ti legontes*), since they describe the origin of the world (*kosmopoein*), and their whole study (*tên theôrian pasan*) concerns coming to be and perishing – which could not exist if there were no motion. (my emphasis)¹¹

Obviously enough, the view Aristotle ascribes to thinkers he elsewhere calls *phusikoi* and *phusiologoi* must be counted as an *endoxon*. But the opinion is more than a rare consensus among predecessors. It is another sign of the chapter's apodeictic conditioning. By speaking of the whole investigation (*tên theôrian pasan*; 250b17),¹² Aristotle identifies a fundamental assumption of the science of nature.¹³ In the language of the *Posterior Analytics*, the existence of motion is a posit:

¹¹ *Phys.* VIII 1.250b15-18: εἶναι μὲν οὖν κίνησιν πάντες φασὶν οἱ περὶ φύσεώς τι λέγοντες διὰ τὸ κοσμοποιεῖν καὶ περὶ γενέσεως καὶ φθορᾶς εἶναι τὴν θεωρίαν πᾶσαν αὐτοῖς, ἣν ἀδύνατον ὑπάρχειν μὴ κινήσεως οὐσης.

¹² Reeve (2018) p. 316 n. 731 follows the manuscript τὴν θεωρίαν πᾶσιν at 250b17, against Ross' conjecture τὴν θεωρίαν πᾶσαν. In leaning toward Ross, I take Aristotle to be making a point about the science of nature itself, about Second Philosophy vs. First Philosophy, and what it must assume. All those who speak about nature and say anything about the origin of the cosmos and coming to be and passing away (250b15-17) must take motion as a given. His point is not about what some physicists happen to have said. To put it differently, Aristotle himself is speaking as a natural scientist here and throughout the chapter. The contrast he will develop between himself and his predecessors concerns principles of motion and how they are established, not the nature of the science being investigated.

¹³ Aristotle's description ("their whole study concerns coming into being and passing away") is of course his own. Elsewhere Aristotle identifies the subject matter of the study of nature as those things that have within themselves a principle of being changed or remaining the same. Both descriptions point to the subject matter of Second Philosophy. On how those who investigated *to pan*, the totality of all things, came to be seen as philosophers of nature specifically, see Laks (2018) Chp. 1, especially pp. 2-9.

Every demonstrative science is concerned with three things: what it posits to exist (these items constitute the kind (*genos*) of which it studies the attributes which hold of it in itself)...¹⁴

Aristotle has been criticized for not establishing the existence of motion before explicating its implications.¹⁵ But he is doing precisely what a philosopher of nature should do. Motion must be taken as a given by all those who investigate nature. The disagreement to be investigated in *Phys.* VIII 1 is whether or not motion is eternal.

Because motion is a defining feature of the science of nature, citing the *endoxon* also serves to delimit the discussion to Second Philosophy. While the assumption that motion exists must be shared by all who investigate nature, it was not a universally held *endoxon*. For certain of Aristotle's predecessors did deny motion. Aristotle does not say in VIII 1 who these thinkers were, but we know from other passages that he included the Eleatics among them.¹⁶ For this reason the *endoxon* serves to point to a higher level dichotomy operating in the background of the chapter: a distinction between those who by taking motion as an essential feature of the world (*to pan*) properly investigate nature, and those like the Eleatics who deny this assumption and are not, properly speaking, *phusiologoi* at all. The latter are effectively ruled out of court and will not be addressed in the ensuing discussion. Put differently, the argument of VIII 1 will confine itself within the limits of Second Philosophy, without the digression devoted to the Eleatics Aristotle felt was needed at the outset of the "lectures on natural things" found in *Physics* I 2-3.

Immediately following the *endoxon* (250b18-22) are five lines introduced with an *alla* to contrast with the *men* at b15. While all philosophers of nature assume that motion exists, precisely the issue dividing them is whether or not motion has always existed and will always exist – the two options 'a' and 'b' stated in the opening dichotomy. Still without naming names, Aristotle speaks of those (*hosoi men*) whose belief in a limitless series

¹⁴ *APo.* I 10.76b11-13 (Ross): Πᾶσα γὰρ ἀποδεικτικὴ ἐπιστήμη περὶ τρία ἐστίν, ὅσα τε εἶναι τίθεται (ταῦτα δ' ἐστὶ τὸ γένος, οὗ τῶν καθ' αὐτὰ παθημάτων ἐστὶ θεωρητικὴ)...

¹⁵ Graham (1999) p. 42.

¹⁶ See *Phys.* I 2.184b25-185b25; *DC* III 1.298b14-18.

of *kosmoi* commit them to saying there is always motion; and those others (*hosoi de*) who say there is a single world that came into being and “make corresponding assumptions (*hupotithentai*; b22) about motion”, which should be taken to mean that they assume (or should assume) that motion is not eternal.¹⁷ Commentators have suggested various representatives of the two contending parties.¹⁸ But naming representatives of the conflicting positions is not the point here. Aristotle emphasizes not who disagrees with whom, but what all parties agree on. All *phusiologoi* agree on the fact of motion – that in the cosmos as it presents itself to us now, motion exists. Unlike the Eleatic rejection of motion, the disagreement as to whether motion is eternal or not *is* a proper subject for their investigation.

A further dichotomy is developed in the next twelve lines of the first stage. Aristotle considers two previous thinkers who are committed (as he reads them) to the non-eternal existence of motion (250b23-251a5) but in two quite different ways – in other words, predecessors who represent two sub-options for branch ‘a’ of the dichotomy. These sub-options constitute a further mutually exhaustive division. If, as Aristotle puts it, “it is possible for there to be a time at which nothing is moving”, then either motion has come into existence only once in cosmic history, or it does so more than once, intermittently, alternating between periods with motion and periods of rest (taken to mean the complete absence of motion). Finally, Aristotle attaches names to positions. The first sub-option is identified with the cosmology of Anaxagoras, the second with that of Empedocles. Clearly the position of Anaxagoras is one way to say that motion is not eternal, for he says that everything was together and at rest for an infinite time before Nous initiated motion as an organizing force. But so too is the position of Empedocles. Though he speaks of a series of *kosmoi*, which one might take to mean that motion is eternal, Empedoclean *kosmoi* do not exist simultaneously, as *kosmoi* do in the still unnamed adherents to the second option. Rather, they come into and pass out of existence successively, one kosmos following upon another after

¹⁷ Read at *Phys.* VIII 1.250b21-23: ὅσοι δ' ἕνα ἢ μὴ αἰεὶ, καὶ περὶ τῆς κινήσεως ὑποτίθενται κατὰ λόγον. Following Graham (1999) pp. 39-40 and Reeve (2018) p. 316 n. 732, I reject Ross's conjectural emendation at 1.250b22: ὅσοι δ' ἕνα <ἢ αἰεὶ> ἢ μὴ αἰεὶ (see Ross 1936, p. 687).

¹⁸ See for example Ross, *ibid.*; Graham (1999) pp. 38-40; Reeve (2018) p. 316 n. 732.

a period of rest during which there is no motion (the operations of Love and Strife are therefore irrelevant to Aristotle's main point).¹⁹ The positions of Anaxagoras and Empedocles thus represent two sub-options of the branch of the dichotomy that says motion is not eternal. But once again, attention should be fixed on what the two positions share. For both predecessors, motion is not eternal but came into existence. In one account, motion once initiated is everlasting, in the other account, motion will cease and pass out of existence before coming into existence again at some later time. Taken together, Anaxagoras and Empedocles represent mutually exhaustive sub-versions of option 'a'.

The first stage of VIII 1 concludes by affirming the value of the investigation for the study of nature as a whole:

So we must examine (*skepton*) what is the case concerning these matters: for to see the truth will be useful not only for the study of natural philosophy (*tên peri phuseôs theôrean*), but also for our enquiry into the first principle as well (*tên peri tês archês tês prôtês*).²⁰

The conclusion reinforces two ways in which the chapter is apodeictically conditioned. First, the *genos* under investigation is that of Second Philosophy, a point seen already. Second, the chapter promises to contribute to the identification of the *archê* of motion, just as passages from the *Topics* had suggested.

This is the first time the term *archê* has appeared in the chapter. Is Aristotle pointing toward the unmoved mover of Book VIII's final chapter? Perhaps;²¹ but we should note a more immediate point of reference, one fully within the boundaries of the science of nature. Over the course of the first stage, Aristotle has identified three distinct options regarding the possible

¹⁹ My interpretation is supported by Reeve (2018) p. 316 n. 734.

²⁰ *Phys.* VIII 1.251a5-8: σκεπτέον δὴ περὶ τούτων πῶς ἔχει· πρὸ ἔργου γὰρ οὐ μόνον πρὸς τὴν περὶ φύσεως θεωρίαν ἰδεῖν τὴν ἀλήθειαν, ἀλλὰ καὶ πρὸς τὴν μέθοδον τὴν περὶ τῆς ἀρχῆς τῆς πρώτης. Graham's paragraphing places 251a5-8 as the final lines of a paragraph beginning at 250b23. This obscures what I take to be the conclusion of the whole.

²¹ Aristotle's language could imply that "our enquiry into the first principle" may exceed the boundaries of the investigation of nature. As a prolegomenon to the rest of Book VIII, the first chapter could imply that the investigation will approach the threshold of First Philosophy. This is not a question that can be answered here. But see Kosman (1994) p. 136; Graham (1999) pp. xiv-xv.

eternality of motion: one that motion is eternal, and two different versions claiming that it is not. Closer inspection reveals that each option has been linked to a putative *arché* of motion as understood by that option's proponents. For Anaxagoras, the cosmos is put into motion by Nous (250b26). For Empedocles, the two sources of motion are Love and Strife. For the unnamed proponents of option 'b', the eternality of motion, the *arché* is a kind of life inherent in things (250b14-15), the odd-sounding vitalism suggested in the final clause of the opening passage of VIII 1. Does Aristotle have a specific thinker in mind? There's a passage in *De Caelo* II 12.292a14ff. where Aristotle recommends the traditional view that the stars partake of life (*zoé*), so he might seem to be relying on an ancient, even mythic *endoxon*. But I think the passage serves as an allusion to Democritus, the only other natural philosopher named and criticized later in the chapter. At *De Anima* I 2.405a5-13 (= 68A101/LM D130), Aristotle reports that Democritus identified mind and soul with spherical fire atoms, and therefore life, which are present throughout nature (see also *Resp.* 472b30-473a18 = 68A106/LM R29a; and 68A37/LM D29, in which Simplicius quotes from Aristotle's lost *On Democritus*). If I am correct in this identification, then each of the three options – 'b' and the two sub-options of 'a' – can be linked to an *arché* or *archai* associated with one of the three natural philosophers named in the chapter.

My analysis of the first stage has been lengthy. To clarify what's been accomplished and to make one final point, I'd like to offer a map of its structure as a series of dichotomous divisions.

Dichotomizing the Cause of Motion

Those who assume motion exists

(the *phusiologoi*)

Those who do not study or deny motion

(including the Eleatics)



If motion exists

(a fundamental assumption of *tên peri phuseôs theôrean*), then:

Either/Or



(a) motion came into existence;
(Anaxagoras, Empedocles).

(b) motion always existed and always will exist
(Democritus; *archê*: Life? Cf. 68A101)



If motion came into existence, then:

Either/Or



(a.1) motion came into existence once;
(Anaxagoras; *arche*: Nous)

(a.2) motion comes into existence intermittently
(Empedocles; *archai*: Love and Strife)

A passage from *Topics* VIII 14 makes the logic behind the structure of *Physics* VIII 1 clear:

With regard to knowledge (*gnôsis*) and to the *phronesis* coming from philosophy, the power to discern and view at the same time what follows from of each of two hypotheses is no mean instrument; for it remains only to choose one of them correctly.²²

We can now see why the first stage presents much more than a standard survey of predecessors and how the entire chapter is informed by the logic of dialectical dichotomies. Given the mutually exclusive nature of the dichotomies, there is no need for Aristotle to consider other thinkers. As we will

²² *Top.* VIII 14.163b9-12: πρὸς τε γνῶσιν καὶ τὴν κατὰ φιλοσοφίαν φρόνησιν τὸ δύνασθαι συνορᾶν καὶ συνεωρακέναι τὰ ἀφ' ἑκατέρας συμβαινόντα τῆς ὑποθέσεως οὐ μικρὸν ὄργανον· λοιπὸν γὰρ τούτων ὀρθῶς ἐλέσθαι θάτερον. My translation of the opening phrase tries to capture dialectic's value for both the theoretical grasp of principles (*gnôsis*) and practical investigations (*phronesis*), implied at *Top.* I 11.104b1-4 cited previously. See also Smith (1997) pp. 154-5.

proceed to show, the bulk of VIII 1's argument will be directed against the two sub-options (a.1) and (a.2) represented by Anaxagoras and Empedocles respectively, that motion came into existence either once or periodically. Refuting the two sub-options of option 'a' will leave 'b' as the only viable option. By this means, the investigation of VIII 1 will simultaneously accomplish the two goals stated in the final lines of the first stage: it will contribute to the study of nature and provide a path to principles by showing that the *arché* of motion in nature must be eternal.

Stage 2. Implications of the Definition of Motion

The dichotomy posed by the chapter's first stage asked what sort of motion, eternal or non-eternal, gave rise to the world order. Stage Two reveals that asked in this way, the question cannot be answered. In a manner familiar from the *Topics*, its central terms must be clarified. The very notion of *kinesis* carries implications that must be identified before the opening question can be resolved. In the process of tracing them out, signs of the chapter's pedagogical dimension will also become apparent.

The second stage signals the start of Aristotle's own analysis.²³ It is brief, barely ten lines long. It begins with a definition of motion that comes from *Physics* III 1 and draws a crucial implication from that definition:

Let us begin first from the definitions we have already laid down in the *Physics*. Now we say that motion is the actuality of the movable in so far as it is movable. It is necessary, therefore, that there should be objects (*ta pragmata*) which are able to move with each kind of motion.²⁴

²³ Graham thinks the introductory section concludes some sixteen lines earlier at 250b23, just before the references to Anaxagoras and Empedocles. As explained above, I take 250b23-251a8 as the delineation of the two sub-options (a.1) and (a.2) of the main dichotomy 'a' and thus belonging to the introductory framing section. I take *arxómetha prôton* at 251a8 to mark the true beginning of Aristotle's own analysis.

²⁴ *Phys.* VIII 1.251a8-11: ἀρξώμεθα δὲ πρῶτον ἐκ τῶν διωρισμένων ἡμῖν ἐν τοῖς φυσικοῖς πρότερον. φαμέν δὴ τὴν κίνησιν εἶναι ἐνέργειαν τοῦ κινήτου ἢ κινήτῳ. ἀναγκαῖον ἄρα ὑπάρχειν τὰ πράγματα τὰ δυνάμενα κινεῖσθαι καθ' ἑκάστην κίνησιν.

The definition referred to is to the general definition of motion developed in *Phys.* III 1.²⁵ The consequence is that for each kind of motion there must be objects capable of that kind of motion. Moveable *things* must, in other words, exist prior to motion of any sort. Aristotle then gives a quick inductive argument in support of the priority of moveable things. Even apart from the definitions stated earlier, he says, “everyone” should grant the need for there to exist a kind of thing capable of each kind of motion, a claim followed by a three quick examples (251a12-16).

The definition of motion and its ontological implications govern everything that follows in VIII 1. This is made clear in the concluding line of Stage 2, where Aristotle applies the consequence of the definition to both top-level options ‘a’ and ‘b’:

Thus, these things too [i.e., moveable things] must either come to be at some time if they were not previously in existence, or they must always exist.²⁶

Regardless of whether it is eternal or not, motion must be an attribute of some existing thing – that is, of a moveable thing which itself has a corresponding eternity or perishability. Whereas the chapter began by asking about motion, here Aristotle speaks of things in motion – things moving and being moved, or things at rest. With this conclusion, the discussion has shifted from cosmic motion in the abstract to moveable things. This will become central to the argument in Stage 4.

²⁵ Based on various cross-references between different parts of our *Physics*, including three references in Book VIII (1.251a9, 3.253b8, and 10.267b21), the language here may suggest a reference not to an earlier stage of the same treatise, but to a separate work; see Ross (1936) pp. 1-11, 688; Reeve (2018) pp. 316-17 n. 736. If this is correct, Aristotle regarded *Peri Kínēseōs* as separate from *Physics* 1-4, which is referred to as *Peri Phuseōs*.

²⁶ *Phys.* VIII 1.251a16-17: οὐκοῦν καὶ ταῦτα ἀναγκαῖον ἢ γενέσθαι ποτὲ οὐκ ὄντα ἢ αἰδία εἶναι.

Stage 3. Arguments against the Coming into Being and Perishing of Motion
(251a17-252a5)

Following the conclusion of Stage 2 that motion must be an attribute of some moveable thing, Aristotle returns to option ‘a’, that motion came into existence. Stage 3 consists of three arguments directed against the coming into being and perishing of motion, which is to say, arguments against the mutually exhaustive sub-options of option ‘a’ in both their Anaxagorean and Empedoclean forms. The third stage is the longest of the chapter’s four sections, but because I am interested primarily in its conclusion, I will deal with the its arguments only summarily.

The first argument (251a21-b10) reasons that if moveable things came into being, their genesis would require a prior motion, “so before the first change there will have been a previous change”, an implication Aristotle finds laughable. The second argument points to a related absurdity, that the coming into being of motion at some time implies a time before time existed. But if time is a number or kind of motion, there could not be a time before motion (251b10-28). The third and final argument uses the logic of the first argument to reject the not the coming into being of motion but it perishing (251b28-252a3).

Though the adequacy of each argument remains contested,²⁷ the crucial point for my examination of VIII 1 is that Aristotle regards the three as decisive refutations of option ‘a’. This is made clear by the third section’s concluding line, which gives a strong endorsement of option ‘b’, the eternity of motion:

If, then, these things are impossible, clearly there is everlasting motion, not motion at one time, rest at another. Indeed, this suggestion amounts to sheer fantasy.²⁸

If the coming into being and passing away of motion leads to absurdities, then eternal motion (and entities capable of such motion) must exist.

²⁷ See Graham’s careful explication of each argument, with references to the earlier secondary literature; Graham (1999) pp. 42-51.

²⁸ *Phys.* VIII 1.252a3-5: εἰ δὲ ταῦτ’ ἀδύνατα, δῆλον ὡς ἔστιν αἰδῖος κίνησις, ἀλλ’ οὐχ ὅτε μὲν ἦν ὅτε δ’ οὐ· καὶ γὰρ ἔοικε τὸ οὕτω λέγειν πλάσματι μᾶλλον.

With the elimination of option ‘a’, the third stage concludes with the fact that motion in nature must be eternal. Given the value of posing dialectical problems and “examining problems on both sides,” the logic behind Aristotle’s acceptance of eternal motion is unmistakable. The conclusion of Stage 3 marks the culmination not just of the third stage but of the entire chapter to this point. VIII 1 began by posing a pair of mutually exhaustive options, ‘a’ and ‘b’. Now, having rejected the mutually exhaustive sub-options of option ‘a’, the author of the *Organon* immediately accepts option ‘b’ without further argument.

Nevertheless, while the conclusion at 252a3-5 lays the foundation for his own theory – the eternity of motion is of course a central tenet of Aristotle’s cosmology – the conclusion is limited in a crucial respect. In terms of the stages of inquiry presented in *Posterior Analytics* II 1-2, only the *fact*, the *hoti*, of eternal motion has been established. What remains to be determined is the cause of such motion, the *dioti*, a cause capable of explaining it.

Stage 4. Positing Imperishable Motion (252a5-b5)

Seeking the cause of eternal motion will be the task that occupies the rest of *Physics* Book VIII. Before that task can commence, Aristotle must preempt a strategy adopted by his predecessors that, in effect, obviates the need to explain motion by making motion somehow causally primary, an irreducible principle of nature with no need for further explanation. The fourth stage of VIII 1 counters that move by insisting on requirements for principles derived from the theory of science.

What I am marking as a fourth stage may seem like a continuation of the third stage in that most of the argument is occupied, as before, with criticisms directed against upholders of option ‘a’. In marking it as a separate section, I mean to draw attention to how this final, crucial portion of the chapter depends on key concepts from Aristotle’s theory of science – or to put it differently, how previous accounts, including those that anticipate Aristotle’s own acceptance of the eternity of motion, fail at a theoretical level with regard to the nature and establishment of principles. This fourth stage

is the final, necessary preliminary to Aristotle's positive account in the rest of Book VIII.

The argument of the fourth stage occupies two unequal portions of the text. The first and much longer portion runs from 252a5 to 252a32 and deals primarily with Empedocles (and to a more limited degree with Anaxagoras). The second briefer portion proceeds from 252a32 to 252b5 (about seven lines), and deals with Democritus. What connects the two is Aristotle's rejection of a strategy seemingly adopted by all three thinkers that makes motion causally primary, a principle with no need for further explanation.

The predecessors' common strategy is identified in the first sentence of the section:

And the same goes for saying that things are naturally thus (*pephuken houtós*), and that one must (*dei*) accept this as a principle (*archén*).²⁹

This, it seems, is what Empedocles is committed to doing by saying that Love and Strife rule in turn from necessity (*ex anagkês*; 252a7-9), and what Anaxagoras would say as well (252a10-11), perhaps because he posits only one cause of motion instead of the two of Empedocles. Both thinkers regard motion (in their chases, non-eternal motion) as a basic fact of nature. In terms of *Posterior Analytics* I 10, they would regard motion as a starting point for explanation. But though Empedocles and Anaxagoras are named, the issue isn't whether motion is eternal or not as it was in the third section. Here the question derives from theory of demonstration: is any further explanation of motion is needed? Empedocles and Anaxagoras speak of motion as if it is a fact about which nothing further needs to be said.

In rejecting this strategy, Aristotle invokes what might be called a meta-principle of the science of nature:

But surely there is nothing disorderly in things which happen by or according to nature (*phusei kai kata phusin*), for nature is a cause of order in everything (*pasin*).³⁰

²⁹ *Phys.* VIII 1.252a5-7: ὁμοίως δὲ καὶ τὸ λέγειν ὅτι πέφυκεν οὕτως καὶ ταύτην δεῖ νομίζειν εἶναι ἀρχήν.

³⁰ *Phys.* VIII 1.252a11-13: ἀλλὰ μὴν οὐδὲν γε ἄτακτον τῶν φύσει καὶ κατὰ φύσιν· ἢ γὰρ φύσις αἰτία πᾶσιν τάξεως, τὸ δ' ἀπειρον πρὸς τὸ ἀπειρον οὐδένα λόγον ἔχει· τάξις δὲ πᾶσα λόγος.

According to Aristotle, a fundamental principle of the investigation of nature is that nature is everywhere a principle of order.³¹ But if either the Empedoclean or Anaxagorean sub-option of ‘a’ is correct, Aristotle goes on to argue, there would be no reason why the change should happen now rather than earlier or later. Both proponents of option ‘a’ – which is to say, both sub-options of the mutually exhaustive division they represent – violate the meta-principle by making the coming into being of motion in the cosmos arbitrary, either once or repeatedly, and what is arbitrary in any sphere cannot by its nature be orderly and hence cannot be explained. Positing non-eternal motion a principle undercuts the rationality of nature. What is needed is a principle explaining intermittent motion. The opening lines of *Phys.* VIII 3 make this clear: “The starting-point of our investigation will also be the very one having to do with the puzzle that has just been mentioned: why some beings are sometimes in movement and in turn sometimes at rest” (253a22-23; Reeve’s translation). At least Empedocles, whose overall position was derided as fantasy in the third section of the chapter, is better in this respect, presumably because he makes the alternations between motion and rest periodic and so not utterly random (252a19-22).³²

The final phase of the longer first step of the argument shows even more clearly the chapter’s apodeictic conditioning. Aristotle in effect accuses his predecessors of a more basic ignorance of the nature of a principle in any investigation. If someone (Empedocles is the target) wishes to make motion primary, he must do more than merely assert the fact:

Yet someone who holds this view must not just assert *that* this happens but must say what the cause (*aitia*) is – he should not merely posit (*tithesthai*) something or assume an unargued axiom (*axiou alogon*), but should produce either an inductive argument or a deductive proof (*ê epagôgên ê apodeixin*).³³

³¹ On what I am calling a meta-principle of Aristotle’s science of nature, see especially Lang (1998).

³² A point noted by Ross (1936) p. 689.

³³ *Phys.* VIII 1.252a23-25: ἀλλὰ καὶ τὴν αἰτίαν αὐτοῦ λέγειν, καὶ μὴ τίθεσθαι μηδὲν μηδ’ ἀξιῶν ἀξιῶμ’ ἀλογον, ἀλλ’ ἢ ἐπαγωγὴν ἢ ἀπόδειξιν φέρειν.

Aristotle's insistence that his opponent produce either an inductive argument or a deductive proof must be understood in terms of the theory of science, specifically with regard to the establishment of principles. If motion is indeed a basic fact of nature and hence a principle, then it must be supported inductively. If on the other hand it is not a principle, it can and must be proved deductively from things that are in fact principles. Empedocles fails to do either. He might seem to make Love and Strife principles, but Aristotle points out that causing motion is not part of their essence. In other words, Empedocles has failed to satisfy the requirements of the theory of science with regard to principles. Instead, Empedocles seems to rely on a weak analogy: in human affairs, Love and Strife unite and divide men; therefore, Empedocles supposes the same effects hold for the whole cosmos. He must, Aristotle says a few lines later, provide some argument (*logou tinos*; 252a31-32), where "some argument" presumably points back to the need for either an induction or deduction with regard to motion as a principle.

At this point, the reader might expect Aristotle to reaffirm his endorsement of option 'b', the eternity of motion. Instead, in the shorter second step of Stage Four, he applies precisely the same theoretical objection to Democritus, the only named proponent of option 'b'. I will quote the passage in two parts, commenting after each portion.

Aristotle begins by returning to the chapter's main disjunction between options 'a' and 'b':

But in general (*holos de*) to think that this is a sufficient principle (*archên hikanên*), that something always is or comes to be in this way (*ei ti aiei ê estin houtôs ê gignetai*), is not to assume correctly (*ouk orthôs echei hupolabein*). In this way, Democritus reduces the causes concerning nature (*tas peri phuseôs aitias*), saying that this is how things happened in the past also. (my translation)³⁴

The phrase *ei ti aiei ê estin houtôs ê gignetai* in the first sentence of the passage signals the return to the two options 'a' and 'b' posed at the beginning of the chapter. Motion *either* has existed and will always exist, *or* it comes into being. But once again, Aristotle points to what the proponents of the two

³⁴ *Ibid.* 252a32-35: ὅλως δὲ τὸ νομίζειν ἀρχὴν εἶναι ταύτην ται λόγου τινός, ὅλως δὲ τὸ νομίζειν ἀρχὴν εἶναι ταύτην ἰκανήν, εἴ τι αἰεὶ ἢ ἔστιν οὕτως ἢ γίγνεται, οὐκ ὀρθῶς ἔχει ὑπολαβεῖν, ἐφ' ὃ Δημόκριτος ἀνάγει τὰς περὶ φύσεως αἰτίας, ὡς οὕτω καὶ τὸ πρότερον ἐγίγνετο.

options have in common. Both ‘a’ and ‘b’ err by assuming (*hupolabein*) without argument that motion is a principle. This is a failure that must be understood from the standpoint of the theory of science, as becomes clear from the continuation of the passage:

But [to think] that of that which holds, it is not required (*axioi*) to seek a principle (*archên zetein*) of what is always the case, this is correct (*orthôs*) to say this for some cases, but to say it for all is not correct (*ouk orthôs*). For instance, a triangle always has its angles equal to two rights; but all the same there is some further cause of its being everlasting. But of those principles which are everlasting there is no different cause. (my translation)³⁵

This is a complex passage the point of which depends on the theory of science to distinguish between the theoretical status of two kinds of eternal things. An *archê* that is everlasting has no cause other than its own nature and therefore cannot be demonstrated. It must, in the language of the *Posterior Analytics*, “be supposed (*hupothesthai*) or made evident (*phanera*) in some other way [than by demonstration], both that it exists and what it is” (*APo.* II 9.93b23-24). But not every everlasting thing is so because of its own nature. In other cases – and here Aristotle must be referring to the possibility of eternal motion as posited by Democritus – what it is cannot simply be posited (though *that* motion exists must, as we saw, be assumed by anyone properly investigating nature). As the definition of motion in Stage Two established, every kind of motion – including eternal motion – must be an attribute of something. Aristotle’s example is compressed. I take him to mean that the sum of the interior angles of a triangle is an eternal attribute of a substance-like mathematical object. The fact is eternal, but because it is so not through its own nature but because of something else, it cannot simply be posited or assumed to be such. Aristotle purposely ignores the ontological difference between mathematical objects and natural things in order to show what two different eternal attributes have in common from the standpoint of the theory of science. Both need to be explained in terms of something more fundamental even though both are said to be eternal. Democritus has fallen prey to a confusion about the scientific status of

³⁵ *Ibid.* 252a35-b5: δὲ αἰὶ οὐκ ἀξιοῖ ἀρχὴν ζητεῖν, λέγων ἐπὶ τινων ὀρθῶς, ὅτι δ’ ἐπὶ πάντων, οὐκ ὀρθῶς. καὶ γὰρ τὸ τρίγωνον ἔχει δυσὶν ὀρθαῖς αἰὶ τὰς γωνίας ἴσας, ἀλλ’ ὅμως ἐστὶν τι τῆς αἰδιότητος ταύτης ἕτερον αἴτιον. τῶν μέντοι ἀρχῶν οὐκ ἐστὶν ἕτερον αἴτιον αἰδίων οὐσῶν.

eternal things. Because he holds motion to be eternal, he believes it isn't necessary to seek a principle to account for it. Instead, just like the two proponents of non-eternal motion he wrongly posits motion – eternal in his theory, as in Aristotle's – as an *archê* in need of no further explanation.

Though the bulk of the argument of *Physics* VIII 1 is directed against proponents of option 'a', its final section shows that all previous approaches are theoretically inadequate. Though motion is a defining characteristic of nature and must be taken as such, it must be derived from and explained by something still more fundamental. Only those things (or that Thing) will have proper claim to being a principle, i.e., something of which there is no further, more ultimate cause. The first three stages of *Physics* VIII 1 show *that* motion must be eternal. The final stage shows what remains to be done: the need to explain *why*. This is a need no predecessor has recognized, much less accomplished. In pointing the way toward a theoretically adequate account of cosmic motion, the chapter provides an apodictically conditioned prolegomenon for Book VIII as a whole.³⁶ Thus, in a typically Aristotelian fashion, the chapter reaches not an end point but a starting point (an *archê* in a different sense) for further investigation.³⁷

Appendix: Fazzo on 250b13

Following my presentation of a version of this paper in London, Silvia Fazzo brought to my attention a variant textual reading of the opening passage of *Phys.* VIII 1.250b11-15 (J, Vind phil gr. 100), which is relevant to line 250b13 in particular. Fazzo's careful philological analysis in favor of J's text and its possible significance for the interpretation of VIII 1 is found elsewhere in this issue. I find her conclusions convincing. In this appendix I

³⁶ Graham refers to what I am calling the first stage of VIII 1 only as a prolegomenon; Graham (1999) p. 38. While I would apply the label to the entire chapter, I agree completely with his claim that VIII 1 raises ancient cosmology to a new level of theoretical sophistication.

³⁷ Versions of this paper have been given at conferences in Montreal and Ottawa, Canada, at the London Ancient Science conference in London, UK, and at the Consiglio Nazionale della Ricerche, Rome. I thank my audiences on those occasions for their helpful comments, particular Thomas Slabon, Mark Nyvlt, Bridget Brasher, and Silvia Fazzo.

want to ask what difference the J text of 250b13 makes for my paper and the understanding of VIII 1's logical structure.

Here is the text as preserved in J. The two variant readings are in bold, with Ross's OCT text in brackets.

Πότερον **δὲ γέγονέ** [γέγονέ] ποτε κίνησις οὐκ οὔσα πρότερον, καὶ φθίρεται πάλιν οὕτως ὥστε κινεῖσθαι μηδέν, ἢ οὔτ' ἐγένετο οὔτε φθίρεται, **ἀλλ' εἰ ἦν καὶ ἀεὶ ἔσται** [ἀλλ' ἀεὶ ἦν καὶ ἀεὶ ἔσται], καὶ τοῦτ' ἀθάνατον καὶ ἄπαυστον ὑπάρχει τοῖς οὐσιν, οἷον ζωὴ τις οὔσα τοῖς φύσει συνεστῶσι πᾶσιν;

Here is my translation, which differs from the translation included in the main body of my paper, though still based on Graham's translation:

But did motion come into being at some time, not having existed before, and does it perish again in such a way that nothing is in motion? Or, neither having come into being nor perishing, if it was and always will be, and being deathless and unceasing is present in things as if it were a kind of life belonging to everything composed by nature? (250b11-15)

What implications does J have for my interpretation of the argument and structure of *Phys.* VIII 1? I will try to answer that question in two parts, considering each of the two bolded variants in turn.

1. I will begin with the post-positive δὲ at 250b11, which does not figure in Fazzo's argument. In Ross's text, the δὲ is absent, appearing only in the apparatus. At the risk of engaging in an *ad hominem* attack, I find Ross's decision surprising. In the introduction to his edition, he argues that *Physics* VIII is part of a three-book sequence made up of our books V, VI, and VIII (Book VII is widely seen as interrupting the sequence), corresponding to the title *Peri Kinêseôs*, "Concerning Motion", found in ancient lists of Aristotle's works.³⁸ But scholars including Ross recognize that the presence or absence of a connecting particle can be a potent indicator of whether a book belonged to a larger sequence or not. Its presence typically indicates a continuation from one part of a sequence to the next.³⁹

Perhaps contributing to his devaluing of the connective δὲ (and thus of J), Ross contends that Book VIII was the latest composition included in our

³⁸ Ross (1936) pp. 1-19.

³⁹ See Ross (1949) p. 75 and n. 2.

Physics. Indeed, the relative dating of Book VIII continues to attract scholarly attention, with Graham in particular advocating for a later date for Book VIII.⁴⁰ If this is correct, then the absence of the particle could perhaps be accounted for by the book's having been composed after Books V and VI and being added to them to create a large sequence only later. These are important questions that far exceed what can be addressed here. I would simply ask why, if Aristotle was stitching together various shorter pieces, did he not add a connective particle? The absence of such a particle is one reason Book VII is not included in the sequence. Its presence in manuscript J seems to me to strengthen the claim that Books V, VI, and VIII constitute a deliberate sequence, even if it was created *ex post facto* the composition of Books V and VI.

2. The more important variant for understanding the argument of *Phys.* VIII 1 involves replacing ἀλλ' ἀεὶ ἦν with ἀλλ' εἰ ἦν. Fazzo deserves great credit for her meticulous detective work in favor of J. Her painstaking efforts show how much remains to be done on manuscript sources. I do not have anything like her philological expertise, so I will not question that part of her research. I will confine myself to the philosophical implications of J.

My initial observation is that the J manuscript offers additional support for my reading of the dialectical background of VIII 1 by strengthening the contrast behind the two main clauses. Here I am reinforcing a point already made by Fazzo and suggested even in the title of her paper. The interrogative *poteron* at 250b11 is answered by a hypothetical *all' ei* at b13. For my purposes, J strengthens the contrast I find in the dichotomy framing the entire chapter. The hypothetical character of the two options is crucial. Aristotle is not taking a stand. Rather, and consistent with the techniques of the *Topics*, he is posing a mutually exclusive pair of opposites derived (as I tried to show) from conflicting opinions of predecessors. Though he himself will ultimately endorse the fact of eternal motion, both alternatives are hypothetical at this point. And with good reason – Aristotle will ultimately reject both alternatives in the form in which they were advanced.

A second observation derives from my identification of what I have called option 'b', the eternity of the world based in a kind of vitalism, with

⁴⁰ Graham (1999) pp. xv-xvi, and as the main thesis in Graham (1996). Graham bases his translation on Ross's text.

the philosopher Democritus. Democritus is not named in *Phys.* VIII 1's opening passage. He is named, however, in the latter portion of Stage 4 of the chapter. There, as we have seen, Aristotle criticizes him for making motion a principle of nature without specifying a cause of its being so. Here is the passage, followed by my translation based on Graham, with the key phrase in bold:

ὅλως δὲ τὸ νομίζειν ἀρχὴν εἶναι ταύτην ται λόγου τινός. ὅλως δὲ τὸ νομίζειν ἀρχὴν εἶναι ταύτην ἱκανὴν, εἴ τι αἰεὶ ἢ ἔστιν οὕτως ἢ γίγνεται, οὐκ ὀρθῶς ἔχει ὑπολαβεῖν, ἐφ' ὃ Δημόκριτος ἀνάγει τὰς περὶ φύσεως αἰτίας, **ὡς οὕτω καὶ τὸ πρότερον ἐγίγνετο.**

But in general to think that this is a sufficient principle, that something always is or comes to be in this way, is not to assume correctly. In this way, Democritus reduces the causes concerning nature, **saying that this is how things happened in the past also.** (252a32-35)

Whether Aristotle is correct in attributing this reasoning to Democritus is not the point. It is certainly possible that he is imputing to the Atomist a position Democritus did not endorse explicitly. What is important with regard to manuscript J is that Aristotle does not say that Democritus said that motion always (*aei*) took place. What he attributes to Democritus is a more limited claim: it was this way with regard to motion in the past, and so (perhaps because motion is posited as an attribute of atoms – the very move Aristotle is objecting to), motion will continue in the future. If so, the language strikes a strong verbal parallel with 250b13. As for the *aei* at 252a32, this looks like Aristotle's inference from Democritus's position, not what Democritus himself had said.

To conclude, I want to thank Prof. Fazzo once again for a stimulating conversation both in person and in later emails and remotely about the implications of the variants in J for my reading of the passage, and for sharing with me the draft of her important paper.

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