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Eudemus' Objection to the Ash-Argument for the Existence of the Void*

Robert Mayhew

Abstract: Aristotle devotes *Physics* 4.6–9 to the void (τὸ κενόν), the existence of which he rejects. His discussion includes a brief presentation of the five arguments offered in favor of the existence of a void, and of his objections to four of those arguments. This essay focuses on one of those arguments for the void, namely the ash-argument: The defenders of the void, Aristotle says, 'produce as evidence the business about the ash, which accepts an equal amount of water as the empty vessel.' Eudemus of Rhodes (ca. 370–300 BC), a student and then colleague of Aristotle, discussed this topic in his own (now lost) *Physics*. The sole fragment from his *Physics* dealing with the void, preserved by Simplicius in his commentary on Aristotle's *Physics*, is an objection to the ash-argument not found in Aristotle. This text has received little scholarly attention. I argue that Eudemus' objection represents a (minor) disagreement with Aristotle, though he is committed to the Aristotelian view that a void does not exist. The essay ends by underscoring the distinctiveness of Eudemus' views on this issue by contrasting them with those of two other Peripatetic thinkers: the unknown author of *Problemata physica* 25.8 and Strato of Lampsacus.

Keywords: Eudemus, Aristotle, void, ash

Aristotle devotes *Physics* 4.6–9 to the void (τὸ κενόν). There he describes what is meant by the void (according to those who claim there is one), sketches five arguments offered in favor of the existence of a void, presents arguments against the existence of a void, and, finally, offers objections to four of the five arguments in favor of the void. Eudemus of Rhodes (ca. 370–300 BC) dealt with this topic in his lost *Physics* 3.¹ In the sole Eudemus

* This essay had its origins in one half of a paper ('Two studies on Eudemus' *Physics* 2–3') that I presented at a Project Theophrastus conference on Eudemus of Rhodes (September 2015, University of Rome). I am grateful to the audience members there, and especially to Peter Stork for sharing a draft of his edition of the fragments of Eudemus (which unfortunately has not yet been published). Many thanks as well to István Bodnár (also present at the Rome conference), and to an anonymous referees for the journal, for their helpful feedback on a more recent draft of this essay. (As to what became of the other half of the paper, see Mayhew (2025)).

¹ Simpl. *In Phys.*, p. 662.25 (the opening of fr. 81 Wehrli, quoted below) indicates that Eudemus discussed the void in book 3. (Throughout, in citing Simplicius' commentary on the *Physics*, the page and line numbers refer to Diels (1882) = *CAG* vol. 9. The sole exceptions—from *CAG* vol. 10—appear below in notes 30 and 31.)

fragment directly addressing the void and Aristotle's discussion of it (fr. 81 Wehrli),² Eudemus supports Aristotle in answering one of the arguments in favor of the void.³ What follows is a brief study of this fragment, which has received very little scholarly attention.⁴

Here in brief are the five arguments that Aristotle says have been offered in favor of the void (nos. 2–4 being important in the present context):

1. The argument from locomotion (4.6, 213b4–15): Motion is not possible without the void, i.e. without a space to move into.
2. The argument from compression (b15–18):⁵ That the same quantity of matter can be compressed into a smaller space implies the existence of empty spaces—a void(s) into which the matter (e.g., wine) is squeezed: 'for instance, they even claim that the wine-jars receive the wine with the wineskins' (οἶον καὶ τὸν οἶνον φασὶ δέχεσθαι μετὰ τῶν ἀσκῶν τοὺς πίθους).⁶
3. The argument from growth (b18–20): 'growth [i.e. from nutrition] seems to everyone to occur owing to a void, for nutrition is body, but it is impossible for two bodies to exist [sc. in the same place] at the same time' (ἡ αὖξῆσις δοκεῖ πᾶσι γίγνεσθαι διὰ κενοῦ· τὴν μὲν γὰρ τροφήν σῶμα εἶναι, δύο δὲ σώματα ἀδύνατον ἅμα εἶναι).⁷

² It may be possible to extract a bit more information about Eudemus on the void from the fragments on place (72–80 Wehrli)—see for instance Algra (1995), 250–2—though my concern here is exclusively fr. 81 and the ash argument.

³ There is no reason to think that Eudemus' conception of the void was different from Aristotle's. In *Phys.* 4.7, Aristotle says 'it is thought to be a place in which there is nothing' (δοκεῖ δὴ τὸ κενὸν τόπος εἶναι ἐν ᾧ μηδὲν ἐστὶ, 213b31); 'it must be a place in which there is an interval between tangible body' (δεῖ ... τόπον εἶναι ἐν ᾧ σώματος ἐστὶ διάστημα ἀπτοῦ, 214a5–6; cf. 214a19–20); 'another sense is a place in which there is neither "some this" nor some bodily substance' (ἄλλον δὲ τρόπον, ἐν ᾧ μὴ τόδε τι μηδ' οὐσία τις σωματική, 214a11–12); and, 'if it exists, the void is necessarily a place deprived of body' (τὸ κενὸν ἀνάγκη τόπον εἶναι, εἰ ἔστιν, ἐστερημένον σώματος, 214a16–17). The text of the *Physics* I have used is Ross (1936). Unless indicated otherwise, translations from the Greek are my own.

⁴ Like most of our evidence for Eudemus' *Physics*, this fragment comes from Simplicius' commentary on Aristotle's *Physics*. I cannot here defend the reliability of Simplicius as a source, except to note that, as Baltussen (2006), 4 comments: 'The amount and detail of Simplicius' information, illustrated in particular by the numerous references to individual books..., make it more than probable that he had a copy of Eudemus' work.' See also Menn (2022), 19–22. On the nature of Eudemus' *Physics*, see Baltussen (2002) and (2006) and Sharples (2002).

⁵ For more on compression in connection with the notion of the void, see *Physics* 4.9.

⁶ Philoponus claims that this occurs 'in the case of new [or "sweet"] wine only' (ἐπὶ τοῦ γλεύκους μόνον), and that the reason is obvious (*In Phys.*, CAG 17 p. 609.29–30 Vitelli)—though it is not obvious to me. Hussey (1983), 124 comments: 'Wine was carried in skins and stored in jars. The alleged fact is that a wine jar can be made to contain *both* the normal quantity of wine *and* the wineskins it was carried in.' Cf. Bostock apud Waterfield (1996), 259: 'We do not know how it came to be believed that this is a fact.'

⁷ This argument seems to involve the main point of the first objection—food requires an empty space to move into—applied in a special (not fully clear) way to the phenomenon of bodily growth.

4. The ash-argument (b21–22): ‘They also produce as evidence the [business] about the ash, which accepts an equal amount of water as the empty vessel’ (μαρτύριον δὲ καὶ τὸ περὶ τῆς τέφρας ποιοῦνται, ἥ δέχεται ἴσον ὕδωρ ὅσον τὸ ἀγγεῖον τὸ κενόν).⁸ This is the argument that concerns me here.
5. A Pythagorean argument (b22–27), which seems to claim that the existence of a void is necessary for there to be distinct things in the world, including distinct numbers.⁹

I take Aristotle to be here presenting five distinct arguments.¹⁰ Not every scholar sees it this way, however, and (4) is relevant where there are disagreements. For instance, Hussey (1983), 124 at first seems non-committal: ‘It is not clear here whether Aristotle counts this [sc. the ash-argument] as a full-scale argument, as something weaker, or as a variant of, or supporting evidence for, (3) or (2)’; later (p. 127), however, he is less so: ‘The fact that this [sc. the ash-argument] is not separately answered [in *Phys.* 4.7] suggests that it is a variant of (2) or (3).’¹¹ But this does not follow, especially if (as I think likely) Aristotle presented these as five arguments because they were distinct arguments (however related or similar) presented by various defenders of the void. Moreover, argument (5) is not answered at all in *Phys.* 4.7, and as far as I can tell it is not a variant of any of the other four.

The ash-argument claims that a vessel filled with ash is capable of receiving the same amount of water as the vessel does when it is empty. The advocates of the void (usually taken to be the Atomists)¹² argue that this phenomenon can be explained only by positing the existence of void within the ash, into which the water seeps.¹³ In any case, the description of the relevant phenomenon cannot be true as stated, though ash is light and airy enough for this to be close to the truth. As Ross (1938), 583 comments:

Gomperz [(1905), 1: 352] remarks that the Atomists can only have meant that the fact that a vessel with ashes in it will hold *nearly* as much water as when there were no ashes in it, proves the existence of a large amount of vacuum in the ashes. They must surely have noticed that it does not hold quite as much water.¹⁴

I would agree that the argument works nearly as well (and is just as susceptible to the objections leveled against it) if the vessel filled with ash holds *almost*, but not exactly, as much as the empty vessel.¹⁵

⁸ I borrow ‘business about the ash’ translation (for τὸ περὶ τῆς τέφρας) from Hussey (1983), 32; see also Todd (2003), 37. At *Phys.* 4.7, 214b3–4, Aristotle refers to it as the argument (λόγος) about pouring water on to ash, and Alexander and Simplicius as the ἀπορία of the ash (as we shall see).

⁹ On this argument, see Ross (1936), 583–4; cf. *Phys.* 3.4, 203a4–8.

¹⁰ Ross (1936), 378, too, presents these as separate arguments.

¹¹ Cf. Hardie and Gaye (1930), which treats (4) as further evidence for (3).

¹² E.g. 67A19 DK = *Phys.* 4.6, 213b4–22 (i.e. arguments 1–4). Cf. *GC* 1.8, 325a23–b5.

¹³ The argument would also seem to require there being *some* void within the water, which is compressed as it fills in the void in the ash; but this is at best left to implication here.

¹⁴ Cf. Bostock apud Waterfield (1996) 259: ‘again, we do not know how it came to be believed that this is a fact.’

¹⁵ If we do not allow that the Atomists had in mind a vessel with ash holding *nearly* as much water as when there was no ash in it, then the argument is, as Todd (2003), 91 puts it, ‘a sitting

I expect the difference between (2) and (4) is that in the case of (4), as just described, one body (water) is said to fill the void within another (ash), whereas in the case of (2), the claim is 'that a compressed body' (e.g., wine in the example) 'contracts into the voids within it' (ὥς εἰς τὰ ἐνόντα κενὰ συνιόντος τοῦ πυκνουμένου σώματος, 4.6, 213b17–18). But it seems to me that one can just as well apply (2) to ash and water and (4) to wine in a wineskin, or see both cases as involving both processes.¹⁶ Simplicius, *In Phys.*, p. 651.11–22, claims that the ash-argument is 'somewhat the same' (ταὐτόν πως) as the wine-argument, as they both involve compression, though he speculates about their differences. [Aristotle] *Pr.* 25.8 operates on the assumption that (2) and (4) involve the same problem; and according to Simplicius, Strato of Lampsacus reduced the first four arguments to two, the argument from motion and the argument from compression (*In Phys.* 4.6, 213b22–27, p. 652.18–25 = 28A Sharples).¹⁷

That there are five separate arguments presented in *Phys.* 4.6 does not preclude some arguments from being treated together when Aristotle turns to presenting his objections to them (nor when Eudemus discusses them). And in fact, in *Phys.* 4.7 there is no straightforward one-for-one presentation of an objection for each of the five arguments. Ross (1936), 378 and Hussey (1983), 127 take there to be an individual objection for each of the first three arguments, (1) receiving by far the most attention: objection to (1), 214a22–32; objection to (2), 214a32–b1; objection to (3), 214b1–3. They diverge somewhat at this point (214b3–11): Ross thinks the rest of the chapter is devoted to an objection applicable to both (3) and (4), Hussey that in answering (4) Aristotle treats it as a variation of (2) or (3). I think the situation is even messier, in that what Ross and Hussey consider objections to (2)–(4) are in fact a set of objections that apply in some cases to more than one of these, and it is not always clear which argument(s) is Aristotle's target.

However one interprets *Phys.* 4.7, here is the terse set of objections that I believe are relevant to understanding Eudemus' own objection to the ash-argument (214a32–b5):

(i) ἐνδέχεται δὲ καὶ πυκνοῦσθαι μὴ εἰς τὸ κενὸν ἀλλὰ διὰ τὸ τὰ ἐνόντα ἐκπυρηνίζειν, οἷον ὕδατος συνθλιβομένου τὸν ἐνόντα ἀέρα, (ii) καὶ αὐξάνεσθαι οὐ μόνον εἰσιόντος τινὸς ἀλλὰ καὶ ἀλλοιώσει, οἷον εἰ ἐξ ὕδατος γίγνοιτο ἀήρ. (iii) ὅλως δὲ ὁ τε περὶ τῆς αὐξήσεως λόγος καὶ τοῦ εἰς τὴν τέφραν ἐγχεομένου ὕδατος αὐτὸς αὐτὸν ἐμποδίζει. κτλ.

(i) It is also possible [sc. for something] to be squeezed, not into the void but by squeezing out what is inside it, for instance when water is compressed the air inside it [is squeezed out]; (ii) and [sc. it is possible for something] to grow not only when something enters it but also by alteration, e.g., if air comes to be out of water. (iii) In general, both the argument about growth and [the argument about] pouring water on to ash impede themselves. Etc.

Regarding (iii), it should become clear that this is not directly part of the context necessary for understanding Eudemus' objection to the ash-argument, even though it contains the only reference to the ash-argument.¹⁸ The first part of this text (i) seems to

duck'. Themistius seems to dismiss the argument on these grounds: see *In Phys.* 4.7, 214b9–10, CAG vol. 5.2 p. 127.20–28 Schenkl.

¹⁶ See above note 13.

¹⁷ I return to *Pr.* 25.8 and Strato of Lampsacus at the end of this essay.

¹⁸ And even though the lemma preceding the text containing the Eudemus fragment is 214b3–11 (see Simpl. *In Phys.* p. 661.16–17). This response to the growth-argument and ash-

be (or could be taken to be) directed at both the argument from compression and the ash-argument: void is not necessary to explain such compressions; rather, in the ash-argument, for example, it is explained by the pushing or squeezing out of the abundant air in the ash. Absent the air, the ash is greatly reduced in size, and that large volume in the vessel that was the air in the ash is replaced by the incoming water.¹⁹ The second part (ii) is clearly directed at the argument from growth (though it likely relies on a premise operative in the first part as well, namely, that a void is not necessary to explain one material entering another): Food and drink enter the body of the animal consuming them and fill in the ‘empty’ spaces—pushing out the air, not filling actual voids. This material is altered (specifically, concocted) and so is changed into blood and bone and flesh etc. in such a way that the animal grows (despite some material being expelled as waste).²⁰ According to Aristotle, this growth has nothing to do with an expanding void inside the animal, or with incoming materials filling a void, but with the addition and alteration of the incoming materials. His objection implies that the altered material that remains (e.g., blood, bone, flesh) has a greater volume than the incoming food and drink.²¹

In my view, Eudemus’ innovation in contributing to Aristotle’s objections to the arguments in favor of the void—or at any rate, the only one that Simplicius reports—is to level the second part of this passage (referring to alteration) against the ash-argument. Eudemus is referring not to an alteration leading to growth, however, but to an alteration resulting in a *decrease* in volume owing to the transformation of water into vapor.

Here is the Eudemus fragment (Simpl. *In Phys.*, p. 662.24–31 = fr. 81 Wehrli):

λύει δὲ τὴν τῆς τέφρας ἀπορίαν ὁ Εὐδημος ἐν τῷ τρίτῳ τῶν Φυσικῶν λέγων ὅτι ἐνδέχεται καὶ ἄνευ τῶν κενωμάτων συμβαίνειν τὸ λεγόμενον· θερμὸν γὰρ ἐν τῇ τέφρᾳ περιλαμβάνεσθαι τι δοκεῖ καθάπερ ἐν τῇ τιτάνῳ. δῆλον δὲ· ἐπιχειομένου γὰρ ὕδατος ἀμφοτέρω ταῦτα καίει, ἡ μὲν τίτανος αὐτῇ, ἐπὶ δὲ τῆς τέφρας τὸ διὰ τῆς τέφρας διηθούμενον ὕδωρ καίει τὰ σώματα. τούτου δὲ συμβαίνοντος ἀτμὶς ἀποπορεύεται πολλή, ὥστε μειοῦσθαι τοὺς ὄγκους διὰ τὴν ἀτμίδα.

Eudemus solves the *aporia* of the ash²² in the third [book] of his *Physics*, saying that what is described can also happen without the voids. For some heat seems to be included in the ash just as in lime. It is clear: for when water is poured in, these both burn, on the one hand the lime itself, on the other, in the case of the ash, the water filtering through the ash burns

argument continues to 214b11. Each argument impedes itself (i.e., is self-defeating) by leading the defenders of the void to impossible conclusions: for instance, that no part of the body increases, or that there could be two bodies in the same place. For brief analyses, see Ross (1936), 380, Hussey (1983), 127–8, and Reeve (2018), 268–9.

¹⁹ Again, this reply works only if the vessel contains *nearly* as much water, when the ash is compressed, as it does when the vessel is empty.

²⁰ On Aristotle on concoction (πέψις), see especially *Mete.* 4.2–3.

²¹ In *Phys.* 4.9, Aristotle argues that when one substance is altered and becomes another (e.g., when water becomes air), the volume does not necessarily remain the same (217a26–b11).

²² Cf. Alex. Aphr. (schol. 113 p. 241 Rashed): ἡ περὶ τῆς τέφρας ἀπορία.

the bodies.²³ And as this happens, a great deal of vapor departs, so that the volumes²⁴ diminish because of the [departing] vapor.²⁵

As my 'knowledge' of chemistry is limited to the contents of Aristotle's *Meteorology* 4, I found it helpful to look up the definitions of the two substances referred to in this passage (besides water), and I think it worthwhile presenting them here (from the *OED*):²⁶

lye n. 1. a: Alkalized water, primarily that made by the lixiviation of vegetable ashes....

lime n. 3. a: The alkaline earth which is the chief constituent of mortar... It is obtained by submitting limestone ... to a red heat, by which the carbonic acid is driven off, leaving a brittle white solid, which is pure lime (or quicklime). It is powerfully caustic and combines readily with water, evolving great heat in the process....

In our text, Eudemus is clearly referring to lye (primarily) and to lime (as an analogue).²⁷ And he understands that lime is itself caustic (i.e., it not only contains heat, but is in itself capable of burning), before being mixed with water (though the lime-water mixture is caustic as well); whereas ash, though containing heat, does not become caustic until it is mixed with water to produce lye.²⁸

The thrust of his objection to the ash-argument is clear: Ash (like lime) contains some heat, such that when water filters through the ash, the ash heats or burns the water (just as lime does), producing lye, and as this happens, some of the water in the vessel is

²³ It is unclear what these bodies are, though perhaps they are the particles that make up the ash and the water. But see Galen, *SMT* 4.3 (vol. 11, pp. 628.15–630.12 Kühn = Theophrastus fr. 426 FHS&G), which refers to an ash-water mixture strained 'through certain bodies of moderately loose texture' (διὰ τινῶν σωμάτων ἀραιῶν συμμέτρως). Perhaps these are the burned bodies in our Eudemus-text. Galen says in this passage that the hot parts are carried away with the water and not left in these bodies. Would the water carrying away the hot parts thus be vaporized?

²⁴ Somewhat unclear as well is the point of the plural (τοὺς ὄγκους) here. Perhaps Eudemus is referring to multiple cases of water being filtered through ash; or perhaps he is claiming that the volumes of both the ash and the water are decreased.

²⁵ As I said earlier, this text has received little scholarly attention. Here is Wehrli's sole comment (1955) 104: 'Das beschriebene Phänomen war für die Atomisten ein Argument für die Annahme von κενόν, das Aristoteles zusammen mit dem aus dem Wachstum gewonnenen zurückweist, ohne den Vorgang dabei selbst zu erklären (Physik [4.7] 214 b 3; cf. [4.6] 213 b 21). E.s Deutung scheint aus der naturwissenschaftlichen Zetemata- oder Aporemataliteratur zu stammen, jedenfalls kommt sie derjenigen in den ps.aristotelischen Problemata [25.8] 938 b 33 nahe.' (More below on Eudemus and *Pr.* 25.8.) Sharples' (2002), 114 brief account of it as well is discussed below.

²⁶ I assume *Mete.* 4 is authentic. This is contested by Gottschalk (1961), but see Furley (1983).

²⁷ Although in the texts that concern us τέφρα refers to *ash*, κόνια to *lye*, and τίτανος to *lime*, in other authors τέφρα and κόνια are also used to refer to lime (LSJ svv. τέφρα, κόνια, and τίτανος).

²⁸ Eudemus, too, may have learned chemistry from *Meteorology* 4. In *Mete.* 4.11, Aristotle mentions ash and lime together as examples of earthen mixtures containing heat (389a25–28), and a few lines later he says that water strained through ash contains heat from the ash, as everything that has been burned contains heat (389a32–b5).

vaporized, and this vapor departs the vessel.²⁹ Consequently, the volume of water is diminished by just that much. And this decrease in volume explains, or helps to explain, how the vessel filled with ash can receive (nearly) as much water as the empty vessel.

Robert Sharples, in an essay on Eudemos' *Physics*, specifically in a section titled 'Compression and Expansion,' (2002), 114, considers Eudemos' response to the ash-argument an example of *expansion*: Eudemos, he says, 'goes further [sc. than Aristotle] in explaining why the phenomenon occurs: there is heat in the ashes which vaporises some of the water. The presence of heat is shown, he says, by the burning effect of water that has been filtered through the ashes—i.e. lye.' But Eudemos' reply to the ash-argument may not simply be a case of expanding on Aristotle. Rather, that he would make the original move of referring to alteration in his objection, might imply that he was (at least to some extent) dissatisfied with Aristotle's reliance on compression (alone) to answer the ash-argument. That is, I think it is likely that Eudemos believed compression could not on its own adequately explain the phenomenon of a vessel filled with ash receiving (nearly?) the same amount of water as it does when it is empty. In this sense, or to this extent, Eudemos is *correcting*, and not simply supplementing, Aristotle. (This is not to say that Aristotle would not have welcomed this correction.)

According to Simplicius, Eudemos followed Aristotle in everything.³⁰ If am right that Eudemos was here likely correcting Aristotle's argument, how should we understand this claim? I do not think Simplicius is claiming that Eudemos slavishly followed Aristotle in everything. What he says is accurate in the sense that Eudemos agreed with Aristotle completely in rejecting the existence of a void, but that does not (or it should not) mean that Eudemos was never willing to revise what his master said and even disagree with him in defending their common convictions.³¹

To get a better sense of the extent to which Eudemos is distinctive here, in what follows I briefly compare his reply to the ash-argument to the relevant views of two other Peripatetics, namely, the unknown author of *Problemata physica* 25.8 and Strato of Lampsacus.³²

Pr. 25.8 begins by asking (938b14–17):³³

Διὰ τί, ὅταν διαχυθῇ τὸ ὑγρὸν εἰς ἀσκούς, οὐ μόνον τὸ ὑγρὸν δέχεται ὁ πίθος μετὰ τῶν ἀσκῶν, ἀλλὰ καὶ ἄλλο προσλαμβάνει; ἢ ὅτι ἐν τῷ ὑγρῷ ἐνυπάρχει ὁ ἀήρ; οὗτος οὖν ὅταν μὲν ἐν τῷ πίθῳ ἐνῇ

²⁹ In this summary, I leave out any mention of the bodies which ash burns. See above note 23.

³⁰ ὁ Εὐδημος δὲ τῷ Ἀριστοτέλει πάντα κατακολουθῶν κτλ. (*In Phys.* 1.3, p. 133.21–22). Cf. *In Phys.* 3.1, p. 411.15–16, *In Phys.* 6 proem, *CAG* vol. 10 p. 924.16–19, *In Phys.* 6.6, *CAG* vol. 10 p. 991.27–29, and *In Phys.* 7 proem, *CAG* vol. 10 p. 1036.13–15.

³¹ At one point Simplicius calls him 'the truth-loving Eudemos' (ὁ φιλαλήθης Εὐδημος, *In Phys.* 6.9, *CAG* vol. 10 p. 1024.7).

³² One might wonder why I do not consider Theophrastus, Aristotle's heir and Eudemos' colleague. Galen tells us (*Hipp. Elem.* 1.9, p. 54.4–8 Helmreich = Theophrastus fr. 239 FHS&G) that Theophrastus presented objections to the arguments for the existence of a void, but not enough information exists even to speculate about how he might have replied to the ash-argument.

³³ The translation of *Pr.* 25.8 is from Mayhew (2011), 143–5, slightly revised.

Why, when liquid is poured into wineskins, does the jar receive not only the liquid with the wineskins, but it also takes in something else besides? Is it because air is present in the liquid...?

There is an implied 'Yes' to this second question, followed by an explanation, which I can skip. The author then turns to the ash-argument (938b24–32):

ὁμοιον δὲ τούτῳ καὶ τὸ ταύτῳ ἀγγεῖον τὴν τε κονίαν καὶ τὸ ὕδωρ χωρεῖν ἅμα, ὅσον ἐκάτερον χωρὶς ἐγγεόμενον. ἔοικε γὰρ πολλὰ εἶναι τὰ διάκενα τῆς τέφρας. ἅτε οὖν λεπτότερον τὸ ὕδωρ διαδύνει μᾶλλον καὶ συσσάττει ἤδη ὥστε πυκνοῦσθαι, καὶ διὰ τὸ παρ' ἑκάστου τῶν μερῶν εἶναι τὴν σάξιν, μᾶλλον γὰρ σάττεται κατὰ μικρὸν σαττόμενον ἅπαν ἢ ἀθρόον, τούτου δὲ γινομένου ὑποκαταβαίνειν τὴν κονίαν· ἅμα δὲ καὶ ἡ τέφρα εἰς αὐτὴν δέχεται τὸ ὑγρὸν διὰ τὸ ἔχειν κοιλίας.

And similar to this too, the same vessel can contain as much lye (κονίαν)³⁴ and water together as it can of each poured in separately. For there seem to be many empty spaces in the ash (τὰ διάκενα τῆς τέφρας). Therefore, as the water is finer, it slips into [the ash] more and then packs it together, so that it becomes dense, indeed because the packing is by each of the parts individually, for anything being packed minutely becomes more packed than if it happens as a block, and when this happens the ash settles down; and at the same time the ash also receives the liquid into itself because it contains cavities (κοιλίας).³⁵

I think this is a good example of a Peripatetic author (implicitly) expanding on Aristotle's reply to the ash-argument, without correcting it or contradicting it. The author is not explicitly dealing with this phenomenon as supposed support for the existence of the void (that is not part of the problem, as stated), but it could clearly serve that purpose. He seems to avoid the language of the void (using διάκενα and κοιλία instead of κενόν), which perhaps is a further indication that he rejects the void. In any case, he explains the relevant phenomenon in terms of compression alone but expands on Aristotle's account by making explicit what is merely implicit in *Phys.* 4.7: that the water, which is heavier than air, not only pushes out and replaces the air but also (by virtue of being heavier) packs down the ash.

An example of an early Peripatetic who moved much further from Aristotle than Eudemus did on the issue of the void is Strato of Lampsacus, scholarch of the Lyceum after Theophrastus. For although he rejected the idea that there exists a void outside of the world (the *kosmos*), he believed there did exist void inside the world, in the form of small pores (πόροι), which scholars have dubbed micro-voids.³⁶ Now, on the one hand, Strato did not believe positing the existence of void was necessary to explain the movement of (certain?) macroscopic objects (his example being a pebble moving through water); for mutual replacement (ἀντιμεταστάσις) alone can explain this.³⁷ On the other hand, he

³⁴ It is unclear why the author of *Pr.* 25.8, in turning to the ash-argument, first refers to lye (κονία) and only thereafter to ash (τέφρα).

³⁵ *Pr.* 25.8 continues for many more lines (938b32–939a9), discussing (*inter alia*) what happens when ash is poured into hot water, in contrast to water poured into ash.

³⁶ The relevant fragments are 26A – 30B Sharples. According to Diogenes Laertius 5.59, Strato wrote a work *On the Void* (Περὶ τοῦ κενοῦ). On Strato's account of the so-called micro-voids, see Furley (1985) and Sanders (2011). I have profited from discussion of this topic with István Bodnár, though one should not assume that he agrees with what I have written here.

³⁷ See fr. 29 = Simpl. *In Phys.*, p. 659.22–26.

argued that ‘neither light nor heat nor another [such?] body (ἄλλο σώματος)’ could pass through water or air without the existence of these micro-void pores.³⁸ It is unclear, however, how Strato would have responded to the ash-argument, as water poured into ash is not quite the same as either light passing through water or a pebble passing through water.³⁹

As I mentioned earlier, Strato reduced the first four arguments for the void to two: the argument from motion and the argument from compression.⁴⁰ I assume he held the ash-argument to be an example of the latter. If Sanders (2011), 272–3 is right that ‘an argument from compression is one that by its nature is better suited to the establishment of microvoids within matter,’ then Strato likely employed micro-voids in his response to the ash-argument. Moreover, if Strato actually did maintain that there are micro-voids that exist in the world (in water, for instance) then it would make sense to think that on his view they might play *some* role in explaining the case of water poured on ash—a form of the argument from compression—even if they play no role in the case of something the size of a pebble falling through water. We cannot be certain about this;⁴¹ but if it is true, then Strato would have moved further from Aristotle than Eudemus: not simply in general, in positing the existence of micro-voids, but also in his own response to the ash-argument.

Seton Hall University

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³⁸ See fr. 30A = Simpl. *In Phys.*, p. 693.10–29. Hero, *Pneumatica* 1, p. 24.20–28.11 Schmidt (= fr. 30B) overlaps 30A a great deal, though it does not name Strato.

³⁹ If everything included in fr. 30B did in fact come from Strato, then he almost certainly employed micro-voids in replying to the ash-argument. But there is no reason to assume it does, as only the first 16 lines of the 42 included in Sharples’s edition clearly come from Strato, as they match fr. 30A. See the previous note.

⁴⁰ See fr. 28A = Simpl. *In Phys.*, p. 652.18–25.

⁴¹ Louis (1993), 185 argued against the authenticity of *Pr.* 25 in part by noting what he sees as a closer connection between *Pr.* 25.8 and the views of Strato than between *Pr.* 25.8 and Aristotle. Cf. Flashar (1962), 668. In light of the preceding, I consider this mistaken. Furley (1989), 153 correctly omits *Pr.* 25.8 from his list of *Problemata*-chapters with parallels to Strato on the void; one should instead consider *Pr.* 25.9 and 25.22.

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