THE ORIGIN OF EPICURUS' CONCEPT OF VOID

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IN BOOK 4 of the *Physics*, Aristotle argues forcefully against the existence of a void. Although he briefly mentions a void external to the cosmos (213b1–2), his discussion is directed to the possibility of a void within it, among the objects of our experience. Aristotle's principal targets are Leucippus and Democritus, although the Pythagorean use of void as a separation of the φύσεις (numbers) gets a passing nod (213b22–27). In chapter 6 Aristotle displays impatience with his predecessors who attempted to disprove the existence of void. They confused the serious problem of genuine void with the elementary one of the corporeality of air, a merely apparent void. "These people, then, did not tackle the question properly," he says (213b2–3), whereas the atomistic thesis at least comes to grips with a philosophically important notion.

Before beginning his formidable dialectical attack, Aristotle reviews what he considers to be the chief "physical" arguments for void: it is necessary for local motion; it is needed to explain the condensation and rarefaction of matter; it is needed to account for the phenomenon of growth (αὔξησις) and for some particular examples of mixture and combination. Aristotle passes quickly over the "ontological" problem of void as not-being (213b12–14), having settled his own approach to the paradox of the existence of not-being elsewhere. The definition of void as τὸ μὴ ὄν, or as οὐδέν, was indeed characteristic of the early atomists (Democr. D.-K. A 37, 38, 40, 44, 45, 49), but Aristotle was reasonably just in his presentation of the atomistic arguments for void. The definition of it as not-being was not an argument for void as much as a response to Parmenides' monistic ontology, a declaration of a metaphysical approach rather than an arguable point about physical principles.[1] In Aristotle's report of the atomists' arguments in *Physics* 4. 6, only one distortion is introduced. At 213a15–19 and at 213a31–b2 he interprets the Democritean not-being in terms of his own conception of place. This is not a fair representation of the atomists' notion of void (see n. 5) and forms the basis for Aristotle's main refutation of it (214a16–19).

F. Solmsen has argued that Epicurus' concepts of void and place were strongly influenced by Aristotle's discussion of these notions in *Physics* 4,[2] and this seems correct. My purpose is to strengthen his claim by a closer look at Epicurus' physical principles and at the argument Aristotle advanced against the earlier atomistic conception of void. These were not the

1. J. M. Rist, *Epicurus: An Introduction* (Cambridge, 1972), p. 56, notes that Epicurus let the terminology of not-being drop. Clearly, the problem of void could be separated from the ontological paradoxes.

2. "Epicurus on Void, Matter and Genesis," *Phronesis* 22 (1977): 263–81.

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only inspirations for the Epicurean theory of void, which was more sophisticated and explicit than the Democritean, and other features of it will also be considered. The main claim, though, is that there is additional, specific evidence to support the view that Epicurus knew the *Physics* and used it to refine his philosophical doctrines.[3]

Aristotle defined place, τόπος, as τὸ πέρας τοῦ περιέχοντος σώματος καθ' ὃ συνάπτει τῷ περιεχομένῳ (212a6–6a). When he turned to a consideration of void, he began from the premise that void is, if anything, a sort of place. Solmsen points this out in his discussion of the impact of *Physics* 4 on Epicurus' concept of void as place. He says, ". . . for the void too, if it has any meaning at all, must for Aristotle be some kind of place; his entire discussion of the concept rests on this view," and refers to 208b35, 213a15, 213b31, and 214a16–22 to support this claim.[4] He argues that Epicurus conceives of void as place, following Aristotle, as the ὅπου ἦν for the atoms and the δι' οὗ of their motion (Diog. Laert. 10. 40). Solmsen is right about this—no one had analyzed place as Aristotle did (see 206b16–17) and the identification of void with place was not a part of Epicurus' atomistic inheritance (see n. 5). But Solmsen fails to press the similarity. Aristotle conceives of place as the inner boundaries of the surrounding medium; this is the immediate τόπος of an object, not its ultimate place, which was for all things the circle of the outer heaven (211a23–29). But, as Aristotle himself seems to grant, when we speak of void as that "in which" an object is, we are referring to the medium, not to its boundaries, as place. "In which" is the phrase Aristotle analyzes in order to define place (chs. 3 and 4) and, when he defines place strictly as a boundary, he is not excluding a reference to place as the immediately surrounding body; "we say an object is in the air because of its extreme edge, which surrounds it" (211a25–26). An object is not said to be "in" its boundaries as naturally as it is said to be "in" the surrounding medium. Hence the emphasis on the medium at 212a6–6a: place is "the limit of surrounding body, where it [*sc.* the body] is in contact with the object it surrounds." (At 212a19 "the whole river," not the ship's boundary, is place.) Thus, for Aristotle an object's place is, strictly but not

3. E. Bignone, *L'Aristotele perduto e la formazione filosofica di Epicuro* (Florence, 1936), and D. Furley, *Two Studies in the Greek Atomists* (Princeton, 1967) and "Aristotle and the Atomists on Infinity," *Naturphilosophie bei Aristoteles und Theophrast*, ed. I. Düring (Heidelberg, 1969), pp. 85–96, have argued a similar case for Epicurus' use of Aristotle. Particularly useful is Furley's brilliant discussion of Epicurus' reaction to *Physics* 5 (*Two Studies*, pp. 111–27); cf. Rist, *Epicurus*, pp. 46–52, and Furley, "Aristotle and the Atomists," p. 94, where Furley suggests that Epicurus found answers to the void-as-place arguments and those from motion in a void. More recently, F. Jürss, "Epikur und das Problem des Begriffes (Prolepse)," *Philologus* 121 (1970): 215, has suggested another case of the same kind. At *Part. an.* 640b29–641a7, Aristotle criticized Democritus' definition of man in terms of shape, color, etc., on the ground that even a corpse would be human on this account. Epicurus then defined man as τοιουτονὶ μόρφωμα μετ' ἐμψυχίας (Us. 310 = Sext. Emp. *Math.* 7. 267). I see little to support a recent attempt to emphasize the role of Diodorus in the transmission of the Aristotelian arguments to Epicurus; D. Sedley, "Diodorus Cronus and Hellenistic Philosophy," *Proceedings of the Cambridge Philological Society* 203 (1977): 86–88. Of course, Diodorus did contribute to the debate on the proof of void from the existence of motion (*Math.* 8. 333, pointed out to me by Sedley in correspondence); but the Diodorean arguments we know about are quite general, and the connection of Aristotle's discussions to Epicurus' theories is a good deal more direct than that.

4. "Epicurus and Void," p. 265 and n. 10.

exclusively, the boundaries of the air (211a27–29) or water (212a16–18) surrounding it, for these are the basic fluid bodies in his world (see pp. 278–80).

What Solmsen has missed is the striking similarity of Epicurean void, as place, to Aristotle's fluid, immediate place for moving objects. This may be because he does not work with a clear conception of void in Epicureanism. Epicurus had an explicit concept of void; it was not a sort of extension that could be filled or not filled. It was simply an ἀναφὴς φύσις surrounding the distinct, constantly moving atoms. Epicurean physics recognized nothing but body and void as truly existing. Void is accepted as the absence of body, but not, on that account, as the unoccupied part of an extended space. The details of Epicurus' conception of the ἀναφὴς φύσις will be discussed below. But to point the contrast with void as extension: for Epicurus, an atom did not strictly speaking occupy space; it was simply surrounded by the absence of body.

Part of the argument will be that Epicurus adopted Aristotle's description of place as that which surrounded a body, focusing on place as the surrounding medium, not as a boundary (in keeping with Epicurus' dislike of geometry), and that void and place were identified in this sense. Thus, the identification of void and place was Epicurus' reaction to the Aristotelian attack on the atomists which had used the premise that void is place. The Democritean notion of void which Aristotle criticized was much less precise than Epicurus'.[5] Epicurus refined Democritus' theory and in so doing he seems to have taken careful note of these criticisms.

It was once thought that Epicurean void was conceived as space or

5. The evidence for Democritus' concept of void falls into two groups. The majority of our texts simply report it as τὸ μὴ ὄν or as οὐδέν, or as "the empty" in contrast to "the full" (νανστόν, πλῆρες). Evidence for this comes from several sources outside the Aristotelian tradition (Luria 191, 192, 194; D.–K. A 40 and A 49 where Galen calls void χώρα—a noncommittal word) as well as from within it (*Metaph.* 985b4, *Gen. corr.* 325a23–32; Luria 172, 249 = *Phys.* 215a11 and Themistius ad loc.).

Other texts report the identification of void and place: of all these, only Luria 253 (Theodoretus) is not directly dependent on Aristotle and even Luria 253 attributes the identification to "those around Democritus." This shows a suspect disregard for the distinction between Epicurus and Democritus (as also in Us. 273, 274; cf. p. 279).

The other evidence consists of the following: Simplicius *In cael.* 294. 33–35 (Luria 172; D.–K. A 37), *In phys.* 394. 25–395. 2 and 397. 2–4 (Luria 250), 533. 14–19 (Luria 251), and 571. 22–29 (Luria 254). Of these, the last obviously attributes Aristotle's definition of place to Democritean void; this should be proof that the testimony is worth no more than Aristotle's similar interpretation in *Physics* 4 and is in fact based on it. In Luria 251 Simplicius elaborates on a text of Eudemus which does not attribute the identification to Democritus; the comment of Simplicius, however, reflects his acceptance of Aristotle's attribution to Democritus. Luria 250 also shows Simplicius following Aristotle's polemical application to void of his own conception of place (cf. *Phys.* 4. 7, esp. 213b31 and 214a16–19). Luria 172 is based on Aristotle's special treatise on Democritus. But even though we lack the original context, it is clear that Aristotle's position is the same as it is in the *Physics*. G. S. Kirk and J. E. Raven, *The Presocratic Philosophers* (Cambridge, 1957), p. 408, have recognized the unreliability of this testimony.

There is, then, no independent testimony for Democritus' alleged identification of void and place. Aristotle has thrust his own concept of place on Democritus for the purpose of attacking the existence of void. Our evidence for Democritus tells us little about void except (1) that it was called "not-being," (2) that it was contrasted with "the full," (3) that it permitted the movement of atoms. Obviously it was described vaguely enough to allow Aristotle to interpret it as he wished.

extension. C. Bailey,[6] following C. Giussani,[7] maintained that Epicurean void was a sort of space to be filled or not filled, a continuous entity subsisting everywhere in the same degree and manner, both where bodies are and where they are not. This view had earlier been attacked by G. Teichmüller[8] and A. Brieger.[9] Nonetheless, the view of Bailey and Giussani was for some time the orthodoxy.

The brief discussion of Rist goes a long way toward clarifying the point that Epicurus had a conception of void only, not of space which can be filled.[10] His reference, however, to a "potential void" is disconcerting in view of Giussani's use of *vuoto in potenza* to refer to the filled portions of uniformly extended space.[11] Solmsen is clearer about this aspect of the basic physics, but still makes the disturbing statement that "Epicurus . . . may indeed think of bodies not so much as 'filling' but as being in the void."[12] In fact, the hesitant "may" is unnecessary. Epicurus' position is clear; in presenting it, one should emphasize two aspects of the concept of void more sharply than Solmsen has done. These are the role of the strict Epicurean methodology and its close relation to *Physics* 4.

Let us consider the methodology first. There are two approaches to the problem of the foundation for Epicurus' concept of void, logical and epistemological. The logical approach provides the valid argument needed to prove the existence of an imperceptible ἀναφὴς φύσις.[13] But the definition of void as intangible is logically prior to the proof of its existence. It is this stage, the definition of the two basic entities, atoms and void, that constitutes the more important part of the foundation for the concept of void.

The Περὶ φύσεως, Epicurus' systematic work on physics, began with a statement of the existence of the two fundamental entities. We cannot recover the exact wording of this statement (see Us. 74–76, 92; Diog. Laert. 10. 39, 10. 86), but its content is clear and perhaps the following will serve as a working version: τὸ πᾶν ἐστι σώματα καὶ κενόν[14]. These two entities were almost certainly defined before their existence was proved. Not only is it hard to see how a proof for an undefined entity could be given, but fragment 92 Usener provides some evidence that definition of a deliberate kind was used by Epicurus: διαιρῶν γὰρ τὸ πᾶν εἴς τε ἄτομον καὶ κενὸν ὅροις ἐχρήσατο λέγων ὅτι σῶμα στερεὸν ἀμέτοχον κενοῦ παρεμπλοκῆς· κενόν ἐστι φύσις ἀναφής. . . .[15]

6. *The Greek Atomists and Epicurus* (Oxford, 1928), pp. 294–96.
7. *T. Lucreti Cari "De rerum natura" libri sex*, vol. 1: *Studi Lucreziani* (Turin, 1896).
8. "Der Begriff des Raumes bei Lukrez," *RhM* 33 (1878): 310–13.
9. "Epikurs Lehre vom Raum, vom Leeren und vom All und die Lukrezischen Beweise für die Unendlichkeit des Alls, des Raumes und des Stoffes," *Philologus* 60 (1901): 510–40.
10. *Epicurus*, pp. 56–58.
11. *Studi Lucreziani*, p. 24.
12. "Epicurus on Void," p. 267.
13. Rist, *Epicurus*, p. 43.
14. The attempt to substitute τόπος for κενόν here by reference to its presence at Diog. Laert. 10.39 fails because of the prevalent rejection of Usener's and Bailey's restoration of τόπος to the lacuna. See Rist, *Epicurus*, p. 56, n. 1, and Solmsen, "Epicurus on Void," p. 266, n. 15.
15. It must be said that this quotation is not definitely connected with the opening of the Περὶ φύσεως.

The words διαιρῶν γὰρ τὸ πᾶν are echoed in other accounts of the opening of Epicurus' work, and it is this recurrent phrase which demands attention. Plutarch comments: ὡς μιᾶς οὔσης εἰς δύο πεποίηται τὴν διαίρεσιν (Us. 74). Cicero's version is similar: "qui ita dividit, omnium quae sunt naturam esse corpora et inane quaeque his accidant" (Us. 75). Sextus Empiricus (Us. 75) does not refer to διαίρεσις, but his words suggest the same logical form: τήν τε τῶν σωμάτων καὶ τὴν τοῦ κενοῦ φύσιν ὅλον τε καὶ πᾶν.

The passage from Cicero also suggests the use made of this division of τὸ πᾶν to analyze all phenomena into the two basic entities. This division seems, moreover, to be an exhaustive and exclusive division into contradictories; this is a stronger claim than the one Solmsen makes about the "opposition" of body and void.[16]

Every division into contradictories, as this seems to be, has a *fundamentum divisionis*, a basis for the definition of the two exhaustive subgroups. It is properly of the form "A and not-A." But the definitions of body and void as given by the scholiast in Usener 92 are not so tidy. It would have been neater to have "solid and not-solid" or "tangible and intangible" instead of "solid and intangible." The problem is only verbal and may even be a result of loose quotation, for the plausible assumption that "tangible" was for Epicurus an equivalent to "solid" yields the required form.[17]

If this is correct, it becomes more likely that Epicurus began the Περὶ φύσεως by laying down a *divisio* of everything (τὸ πᾶν) into two entities as defined by a strict *fundamentum divisionis*. Since it is a logically proper *divisio*, it can, once confirmed by empirical proofs, be used as a reliable tool of analysis (Us. 75). Its exhaustiveness, referred to by Lucretius at *De rerum natura* 1. 503–10, 520–27 in terms of mutual exclusion and at 1.

16. "Epicurus on Void," p. 269. The relation of body and void is one of contradiction, not contrariety, which ensures its exhaustiveness and makes it more useful for the reduction of the phenomena of the world to the two basic entities—for the reduction is thus guaranteed to be complete. The logical foundation obeys the Canonic insofar as the *fundamentum divisionis* used to define the entities is empirical. See p. 277.

17. This assumption is confirmed by the Lucretian version. At 1. 434–39 the contrast of *tactus* and *intactile* is used to argue for the exhaustiveness of the division, which is what a proper *fundamentum divisionis* guarantees. In 1. 454, which probably should not be excised, *tactus* and *intactus* are given as examples of characteristics in constant conjunction with body and void, respectively. The use made of the terms "solid" and "tangible" also suggests their equivalence. The *Letter to Herodotus* shows on a large scale what is seen in *De rer. nat.* 1. 437–38 "sin intactile sit, nulla de parte quod ullam / rem prohibere queat per se transire meantem." Intangibility is the reason for the void's complete yielding, its complete lack of resistance or solidity. Note the opposition of *officere atque obstare* to *cedendi* at 1. 336–39; cf. 1. 1074–82. Thus, although void is defined as the intangible entity (Us. 92; Diog. Laert. 10. 40, 10. 86), it is always referred to in connection with its lack of resistance to moving bodies (Diog. Laert. 10. 40, 42, 44, 46, 61). Moreover, the scholiast to Diog. Laert. 10. 43 attributes εἴξις to the void, while the text refers to intangibility. Compare, too, *De rer. nat.* 1. 454 with Sext. Emp. *Math.* 10. 221–22, where ἀντιτυπία and εἴξις are used to illustrate συμβεβηκότα of atoms and void. Although the terminology in Sextus Empiricus may be under Stoic influence, it does suggest that Epicurus made explicit the identification of solidity or resistance with tangibility in some lost portion of his physics. And ἀντιτυπία, at any rate, is a good Epicurean term. On the tangibility of atoms, see *Phys.* 4 (214a6–11) and Bailey, *The Greek Atomists*, pp. 294, 303, n. 4.

658,[18] can only be exploited if there are techniques of reduction to bring all phenomena under the two basic entities.[19]

The importance of the *divisio* for the motion argument for void is seen at *De rerum natura* 1. 395–97. There is an oblique reference to a criticism of the motion argument: if matter were elastic, motion could occur in a plenum by the contraction of matter in the area toward which an object was to move and the expansion of the matter behind. But this elasticity cannot obtain on the level of the basic entities because of the absoluteness of the matter-void disjunction.[20]

The logical foundation for void obeys the rules of Canonic, for the definition of the two basic entities is based on the experience of touch (see n. 17). But Epicurus should have been able to explain how the concept of void with which he worked could be derived from our experience.[21] There had to be a πρῶτον ἐννόημα of void,[22] to serve as the basis for the derived concept of void, an ἄδηλον.[23]

There must, then, be some experience on which we can model our concept of void, by which this concept must be understood. Moreover, insofar as arguments by contraposition are logically dependent on analogical generalizations,[24] analogies to void within our experience are also needed to prove the existence of void by means of the standard argument from motion.

What phenomena did Epicurus think of as providing a model for void? Sedley suggests as an example the picture of an empty box, which permits

18. Pure void is only meaningful in opposition to pure matter; cf. also *Phys.* 4 (213b30–34).

19. For these, see Diog. Laert. 10. 40–41; Us. 75; *De rer. nat.* 1. 449–82, 483–84. In Lucretius, these reduction techniques follow the proof of the exclusive reality of the entities (1. 418–48). Cf. the similar reduction of time by Epicurus in Diog. Laert. 10. 72–73.

20. Bailey, *The Greek Atomists*, pp. 280–81, refers only to Epicurus' reliance on common sense to support the argument from motion, but common sense provides examples of elastic matter. S. Sambursky, *The Physics of the Stoics* (London, 1959), pp. 44–45, shows his appreciation of the importance of the basic opposition: he recognizes that atomistic physics was determined by "the mutual relation of these entities" and that this set it in radical contrast to the plenum theory with its elastic matter. "The possibility of a mixture of 'void' and 'solid' would imply a porous structure of the smallest particles . . . and this would lead in the last instance to a negation of the basic assumption of the theory," i.e., the opposition of atoms and void. The Lucretian text here considered argues against elasticity, and it is only fair to recognize that the argument is based on a similar assumption. The critical importance of the theoretical assumptions used for any empirical argument about void is also noted by C. B. Schmitt, "The Experimental Evidence for and against Void: The Sixteenth Century Arguments," *Isis* 58 (1967): 362–63. His point is general, but there is no doubt that the radical *divisio* of Epicurus is such a basic theoretical assumption.

21. On Canonic, see Rist, *Epicurus*, pp. 26–30, and Sedley "Epicurus *On Nature*, Book XXVIII," *Cronache Ercolanesi* 3 (1973): 15–23.

22. See especially Sedley, "Epicurus *On Nature*," p. 19, on the philosophical terms, and pp. 20–21; also Diog. Laert. 10. 32–33, 37–38.

23. On προλήψεις as self-evident, see Rist, *Epicurus*, pp. 26–30. As a criterion, the πρόληψις is evidence for the existence of certain experiences which we may not recall or consciously employ as an analogy for an unseen entity, but which could in principle be used to construct an analogical argument from the seen to the unseen.

24. Phld. *De sign.* coll. 8 (pp. 40–42), 35–36 (pp. 104–8), and 37–38 (p. 110); I refer to the edition by P. H. and E. A. de Lacy, *Philodemus: "On Methods of Inference"* (Philadelphia, 1941). The new edition (Naples, 1978) was unavailable to me. Jürss, "Epikur und das Problem," pp. 218–19, has recently discussed the question of the formation of the concept of void. He adds little to Sedley's treatment, unaware of the latter's new edition of Περὶ φύσεως Book 28. The major flaw in Jürss' discussion is his failure to realize that arguments from contraposition are based on empirical analogy, just as is ordinary concept formation.

the hand to move inside it as a full box would not.[25] Brieger suggests rather the gaps between the objects of our experience (*Zwischenraüme*), and this does the job too.[26] The example of fish moving through water found in Lucretius (1. 370–83) in connection with ἀντιπερίστασις is also possible,[27] and is developed by Teichmüller.[28] In *De rerum natura* 2. 112–41 the motion of motes in the air is explicitly presented as a basis for an analogical conjecture. Philodemus (col. 8, p. 42) suggests that many, perhaps quite different, instances would be used; at coll. 35–36 (pp. 104–6) he has in mind perceptible bodies in motion.

We have in fact lost the original model used by Epicurus, but it was most likely based on the motion of objects in our experience, through air and water, which are perceived as corporeal fluids. Thus, Teichmüller refers to void as a sort of "physisches Fluidum,"[29] and P.-R. Schulz calls this kind of void "eine Art ideale Flüssigkeit."[30] This suggestion may gain support from a consideration of Aristotle's physics. (On the use of air and water as the places of moving bodies, see pp. 274 and 278–80.) At 216b17–20,[31] Aristotle notes, "For air is something real, but does not seem so—neither would water, if fish were made of iron. For touch provides the test for what is tangible." Fish moving through water could, if the proportions were right, find fluid water to be as void-like as we find air. This recalls Lucretius' use of the fish example. If the analogy is extended from water to air to an ideal fluid yielding to atoms, which are perfectly solid bodies (εἶξις, n. 17), then motion in a void is conceivable by empirical analogy.

Aristotle noted that the fact of local motion was a major reason for the hypothesis that void exists (211a12–13). This was true for Democritus and it remained true for the Epicureans, who argued for void from the fact of motion. But Democritus does not seem to have explained how void made possible the motion of atoms; Epicurus filled this theoretical gap by attributing to void the ability to yield to atoms. This yielding, identical to void's lack of resistance and intangibility (n. 17), was conceived as analogous to the yielding of fluids to objects on the phenomenal level.

The problems raised by ἀντιπερίστασις on the phenomenal level do not arise for the ideal fluid, void. A physical fluid must have some place to go before an object can move (*De rer. nat.* 1. 370–83). But the ideal fluid is

25. "Epicurus *On Nature*," p. 21.

26. "Epikurs Lehre vom Raum," pp. 513–14.

27. Bailey in his commentary ad loc. (pp. 658–59) gives a history of the notion. Lucretius uses the example rather differently, but note how *spatium* as the room for an object to move into is used in a parallel fashion of the phenomenal (1. 379) and the φύσει levels. The intent to draw an analogy is not explicit, but the similarity of usage shows how an analogy could be developed.

The προληπτέον of Sext. Emp. *Math.* 10. 2 is not an indication of the basis for the notion of void. It is a nontechnical word in Sextus Empiricus' philosophical vocabulary and indicates his own presumption that this was in fact Epicurean doctrine (see also pp. 280–81 on this passage).

28. "Der Begriff," pp. 24–25.

29. Ibid., p. 312.

30. "Das Verständnis des Raumes bei Lukrez," *Tijdschrift voor philosophie* 20 (1958): 29.

31. This passage is needlessly challenged by Bekker because the Greek commentators ignore it. It is in all the MSS and in the Arabic versions.

not material; it is the mere absence of body. Consequently, the question of where the displaced ideal fluid goes need not arise.

We now return to the relationship between void and place. The doxography of Aëtius tells us that Epicurus equated void and place: Ἐπίκουρος ὀνόμασιν παραλλάττειν κενὸν τόπον χώραν.[32] He also characterized void as the intangible, which seems to be equivalent to nonsolid and to be the basis for void's characteristic εἶξις (Sext. Emp. *Math.* 10. 221–22) and nonresistance (n. 17). If the διαίρεσις is strictly respected, as it seems to have been, and if void is a real φύσις, although ἀναφής, not a Democritean οὐδέν, then a body could not occupy a piece of void. Aristotle saw this, for he charged that the Democritean version of void, not characterized by the yielding which is a consequence of the strict διαίρεσις, involved having two "things" in one place (211b14–29, 216a26–b16).[33] This criticism was only possible because void did not yield in Democritus' system. Epicurus could, therefore, avoid this criticism by defining void as a φύσις that yielded. It escaped the advent of an atom, perhaps just as water flows around a fish—in fact, it behaved very much like the fluids which Aristotle set up as the primary place of objects in motion. Epicurus defended void by reforming his conception of it by means of the διαίρεσις and by incorporating Aristotle's theory of place into his πρόληψις of it. Aristotle himself claimed that the motion of objects provided the impetus for our conception of place. Small wonder, then, that the motion of objects in air or water gave Epicurus his model for void as an ideal fluid, in a physical system which admitted no stationary bodies.

This reconstruction of Epicurus' concept of void has a paradoxical look to it, and three objections to it can be raised. All of them prove on closer examination to be insufficient.

First, Sextus Empiricus *Adversus mathematicos* 10. 2 and Usener 273 (Simplicius and Themistius) indicate that Epicurus had a less novel theory of void. The Aristotelian commentators attribute to Epicurus a concept of void much like that which Aristotle assigned to Democritus (n. 5). They, however, are obviously assimilating Epicurean theory to the "Democritean" one already refuted by Aristotle. Failure to distinguish Epicurus' revisions of early atomism is frequent and unsurprising in the commentators. The low esteem in which atomism was generally held discouraged serious examination of later refinements, when Aristotle's refutations could conveniently be presumed to sweep away the entire atomistic system.

In *Adversus mathematicos* 10. 2 Sextus Empiricus has attributed to Epicurus a position essentially identical to the Stoic doctrine (distinguishing the terms τόπος, κενόν, χώρα) which follows. He says that the intangible entity is called void when there is no body occupying it, place when a body

32. Us. 271. See Brieger, "Epikurs Lehre vom Raum," pp. 514–55. The text of Stobaeus which tells us this—H. Diels (ed.), *Doxographi Graeci* (Berlin, 1879), p. 318—obviously corrects the assimilation of Epicurus to the Stoics by pseudo-Plutarch (*Doxographi Graeci*, p. 317), which seems to be followed by Sext. Emp. *Math.* 10. 2 (see p. 281. This error arose no doubt in the doxographies of the Peripatetic tradition. Cf. also *Doxographi Graeci*, p. 616. 23–25.

33. See p. 284.

does occupy it, and space (χώρα) when a body is moving through it. This cannot be correct for Epicurus' physics; since all atoms are always moving, space would be possible but place which presupposes stationary bodies would not be found.

Sextus Empiricus' error is also found in the doxography of pseudo-Plutarch (*Doxographi Graeci*, p. 317), who attributes to the Stoics and Epicureans a similar three-way distinction.[34] But the parallel text from Stobaeus correctly restricts this view to the Stoics and adds on page 318 the correct account (Us. 271; see n. 32). Sextus Empiricus may have been led astray by reliance on a mistaken doxography like that of pseudo-Plutarch, or he may have been misled by a Stoic critique of the Epicurean doctrine. Whatever the source of the error, he is clearly wrong, for his testimony flatly contradicts that of Stobaeus at *Doxographi Graeci*, page 318. This text makes the terms place, void, and space fully equivalent; and this is what is found in Diogenes Laertius 10. 40 and in Lucretius. But the crucial objection to Sextus Empiricus' characterization of Epicurus' theory of void is this: it provides a concept of void for which the well-attested εἴξις makes no sense, which violates the strict διαίρεσις, and which leaves Epicurus open to Aristotle's charge of having two things in the same place at the same time (see p. 280).

The second objection also concerns the ancient evidence. If void yields, it moves. Sextus Empiricus (*Math.* 3. 98 = Us. 273a) says, however, that the Epicureans described the void as not moving, either as a whole or in part: ἡ τοῦ κενοῦ εὐθεῖα εὐθεῖα μέν ἐστιν, οὐ στρέφεται δὲ διὰ τὸ καὶ αὐτὸ τὸ κενὸν μήτε ὅλον μήτε κατὰ μέρος κίνησιν ἐπιδέχεσθαι. This is in connection with an obscure point of Epicurean geometry, and Sextus Empiricus is using the "Epicurean" doctrine to criticize, somewhat shallowly, a Euclidean definition of the straight line. Serious doubt about its value as evidence for Epicurus is in order.

Aristotle also refers to place as unmoving (212a18–20); if Epicurus modelled his void on Aristotelian place, perhaps void too should be unmovable? We need not leap to this conclusion. Aristotle distinguished the primary place of an object from place in a broader sense (211a23–29; cf. 212b20–22), and he regarded the primary place as basic. Epicurus' void as place corresponds to this primary place in Aristotle. Aristotle has not satisfactorily reconciled his preference for motionless place (212a18–20) with the fact that objects move in their allegedly stationary places (212a9–10). For the boundaries of a moving object must themselves move. Epicurus had no motive for preferring place to be stationary since there are no

34. In Sextus Empiricus the Epicurean χώρα is that through which bodies move (χωρεῖν), while according to the basic Stoic definition it is a partially occupied space. This definition is the one attributed to the Stoics by Stobaeus and to the Stoics and Epicureans by pseudo-Plutarch. Sextus Empiricus' Epicurean χώρα comes to the same thing, for, as an object moves through a space, it must at each moment occupy part of that space and not occupy the rest. Space for something to move is thus partially occupied extension. Pseudo-Plutarch compares this to wine in a jar. Presumably he refers to wine moving about in a partly filled jar, i.e., ἀντιπερίστασις of the wine and the air. As the example suggests, the Stoic and false Epicurean doxographic accounts clearly reveal the influence of the Aristotelian conception of void as unoccupied extension.

stationary objects in the world of atoms and void. It is one of the advantages of his simplified physical principles that he could avoid the tension between moving and motionless place in the Aristotelian theory which he adapted.

The third problem is conceptual. The concept of void as an intangible, immaterial entity that yields to solid atoms may, in fact, involve a contradiction, for we may share Aristotle's view (216a33–34) that only bodies can be displaced or yield. But if so, the contradiction is not a blatant one. Epicurus' Canonic required that he have some empirical analogy for his notion of void. Such an analogy and not the strict modern or even Aristotelian standards of logic was Epicurus' criterion for acceptability. If the ideal fluid model of void is related to empirical fluids in the same way that, for example, absolutely solid atoms are to the very hard and dense but still breakable objects of experience, then this model of void would satisfy Epicurus' standards of empirical method.

This is a more precise and explicit use of Aristotle than Solmsen attributes to Epicurus. It can be supported by a consideration of other ways in which Epicurus seems to react to criticisms in *Physics* 4. Aristotle summarizes at 210b32–211a6 ὅσα δοκεῖ ἀληθῶς καθ' αὐτὸ ὑπάρχειν αὐτῷ—the elements of the common conception of place. All but the last of these, the "fact" of natural place and natural motion to it, which Epicurus rejected as a mere φαινόμενον otherwise explicable, could also apply to void as here envisaged. This is in keeping with the emphasis Aristotle places on the phrase ἐν ᾧ in his analysis of place (chs. 3–4; 211a23–b5) and on the importance of moving bodies for our notion of place (211a12–13). One recalls the ὅπου ἦν and δι' οὗ κινῆται of the *Letter to Herodotus*.[35] For both Aristotle and Epicurus, then, place is the boundary of the περιέχον—the surrounding body or φύσις, respectively.

Of course, Epicurus' main argument for void from motion was taken from the early atomists. No one would claim that he needed *Physics* 4 to learn the atomistic thesis reported in chapter 6. But this is one of the arguments for void which Aristotle attacked most sharply (ch. 8). Epicurus can be shown to have reacted to this critique and to have taken its arguments into consideration in his own theory of the motion of atoms. Let us proceed then to the other evidence that Epicurus knew *Physics* 4.

When Aristotle directs his attention to the arguments for void from motion, Epicurus can answer either directly or by undermining the basis

35. Diog. Laert. 10. 40, 42. It is both the place for objects to be in and that through which they move. This dual role is seen in Lucretius too, e.g., 1. 343–44, 421, 427–28, and esp. 482 "loci, res in quo quaeque gerantur." It has been said that this aspect of void implies a concept of occupied, extended space. Bailey, *Commentary*, p. 653, and *The Greek Atomists*, p. 296, and Giussani, *Studi Lucreziani*, p. 25, state that atoms are in constant motion and that this eases the contradiction they see in the atomistic conception of space. A more accurate observation is that the constant motion of atoms collapses any distinction between void as the place an object is in and as the medium through which it moves. The distinction is unnecessary in an empirical materialism if there are no stationary atoms. Thus, the "in which" and the "through which" are the same fact under different descriptions. An Epicurean, of course, admits that phenomenal bodies are stationary; but all φύσει σώματα are in motion constantly. Rest is an epiphenomenon, no more important for the underlying entities than the phenomenal variations in speed which are analyzed (Diog. Laert. 10. 62) in terms of ἄτομοι ἰσοταχεῖς.

of the criticism. Thus, arguments based on the alleged fact of natural motion (214b13–17, 215a1–14), in which Aristotle claims rightly that an undifferentiated void can have no "up" or "down," are handled directly by Epicurus' own analysis of "up" and "down" and his claim that atoms naturally have a single uniform motion because of their weight. Diogenes Laertius 10. 60, misguided though it may be, is a response to 215a6–14. Aristotle demands a διαφορά if "up" and "down" are to exist, and the weight of atoms is Epicurus' candidate—void itself can remain undifferentiated. The "fact" of the natural motion of the elements was also explained away by a passage, now lost, in the Greater Epitome—it survives in Lucretius (2. 184–215). Arguments based on a natural motion are, then, easy for Epicurus to handle. Similarly, Aristotle (216b33–217a3) makes a misguided or ironic criticism of void as the cause of motion which Epicurus can justly ignore. Not only does it rest on the presumption that there is natural motion, but it is aimed at a straw man of Aristotle's own making: that void is a cause of motion by producing rarity in objects and so upward motion only.

At 214b17–22 (see 215a22–24) the charge is that *any* directedness of motion is an absurdity in a void: "For how will it move or remain at rest?" This attack and the one at 215a14–19, that in a void nothing would move because there is no way for motive power to be continuously communicated to an atom, are met with the claim (Diog. Laert. 10. 61) that atoms move in a straight line by their own impetus or weight until they collide or swerve. Again, a deviation from Democritus which defuses Aristotle's criticism.

When Aristotle says that the uniformity of void leaves no reason for atoms to move in one direction rather than another, he is repeating his demand that a distinction should exist which would act as a cause for the motion's direction and speed. Aristotle himself located this distinction in the environment of the moving object. He claimed that the atomists did not have any such διαφορά; an object must rest forever (214b32–33 "for there is no place it would move more or less ⟨than another⟩") or go off in all directions at once (215a22–24). Epicurus responded by making the distinction which determines an atom's motion internal to it; that is, its speed and direction are determined between collisions by its impetus and inertia, based on its weight and primal motion as altered by its history of contact with other atoms.

To Aristotle's suggestion (215a19–22) that in a void bodies can never rest, Epicurus has reacted by simply grasping quite happily one horn of the dilemma. The charge: "So that ⟨the object⟩ will either rest or it must move forever, unless something impedes it." Epicurus responds to this dilemma by dealing with it below the phenomenal level, on which the facts would indeed make either alternative impossible. He boldly posits that at the invisible level of the underlying entities the second horn of the dilemma applies (Diog. Laert. 10. 61): "For as long as [or: as far as] either ⟨of the motions⟩ prevails, ⟨the atom⟩ will continue its motion as fast as thought,

until it is checked either by something external or by its own weight resisting the force of that which struck it." As Aristotle says, in a void motion must continue forever until a collision occurs; Epicurus agreed that it did.

Aristotle advances in great detail arguments based on the relative speeds of light and heavy objects through different media (215a14–216a21). Epicurus counters with another refinement on Democritus: his postulate of ἰσοτάχεια and movement that is as rapid as thought (ἅμα νοήματι). Not only does Diogenes Laertius 10. 61 echo Aristotle's emphasis on light and heavy objects, but the scholiast at 10. 43 confirms that Epicurus' views on atomic speed were a reaction to Aristotle's criticism (esp. 215a29–30). He said that equal resistance to moving objects by the void would mean a paradox: ἰσοταχῆ ἄρα πάντ' ἔσται· ἀλλ' ἀδύνατον (216a20–21). Epicurus simply accepts the alleged paradox. This impossibility has become a simple fact about the Epicurean world. The criticism is embraced, just as Epicurus grasped the horn of the constant motion dilemma.

In all of these cases, Epicurus' response is based on his bold and explicit hypothesis of fundamental unseen atomic motions of a simple nature. Unlike Aristotle, who attempts to save all the appearances, Epicurus bases his hypothesis on a selection of them and then analyzes the rest in terms of the ἄδηλον posited.

The new and more explicitly thought-out concept of void as place is a response to the notion of void as "place deprived of body" which Aristotle attributes to the early atomists in chapter 7 (214a16–17; cf. 208b25–27). It was Aristotle, not Democritus, who claimed that void was place; and in doing so, Aristotle thrust on Democritus a conception of void as empty place. This would indeed involve the absurdities Aristotle alleges at 211b14–29 (see 212b25–27) and especially at 216a26–b16 (see p. 280): two things would be in one place if place is a void which can be filled. For void is an entity, in Epicurus' terms; it is a subject of discourse. Thus, when it is occupied, there will be two or more things ἐν τῷ αὐτῷ at the same time. This may be a bad argument; for example, it would be worthwhile to ask Aristotle: "In the same *what?*" Perhaps some sorts of things can quite happily take up residence together. But Epicurus did not see that the charge itself had flaws. He instead employed the διαίρεσις to produce a new concept of void as place. In so doing, he denies Aristotle's contention that since void was not itself a body it could not be displaced (216a33–34). This ability of void to be displaced by a moving body is the εἶξις, its *ideale Flüssigkeit.* Epicurus defended this attribute of void by means of the logic of the division of entities and by the use of an empirical analogy from the fluid media of motion, which Aristotle had used in his theory of place—media like air and water whose existence and role in motion are evident on the phenomenal level of ordinary experience. As in the case of atomic motion, Epicurus' defense of atomism involves, first, a great refinement of analysis beyond Democritus' treatment of physical principles; second, a partial incorporation of the Aristotelian criticism; and third, a bold postulate about unseen entities which the new epistemology made possible.

Similarly in chapter 9 Aristotle attacks the necessity of void for the explanation of density and rarity, using instead his own conception of qualitative change and naturally different densities. The earlier atomists, like Epicurus, rejected the idea that matter was susceptible of change. Epicurus, however, had a new argument to use against this thesis, the διαίρεσις as outlined here. Qualitative change in matter involved, for Aristotle, change in volume. Matter had to be elastic in order to account for variations in density in this way. But Lucretius (1.395–97 and 1. 358–69) shows how the διαίρεσις could be used to prove that matter cannot be elastic (n. 20).

In several ways, then, Epicurus employed Aristotle's criticisms of void and his discussion of place to develop a new concept of void that could escape the criticisms to which Democritus' less precise theory was open. First, he dropped the language of not-being and spoke of void as an entity. Second, the διαίρεσις gave Epicurus a reasoned basis for rejecting the elasticity of matter which Aristotle used to explain the variations in the density of matter. Third, he advanced a new theory of atomic motions to answer Aristotle's criticisms of motion in a void. Finally, Epicurus used the διαίρεσις and his analogical epistemology to create a conception of void as an ideal fluid. This made it possible for him to accept the identification of void and place in a sense different from that which Aristotle tried to thrust upon the earlier atomists and to avoid the absurdities alleged against that form of the identification. This was made easier by his recognition of void as an entity, not a nonbeing. In so doing, Epicurus took over Aristotle's own analysis of place as the boundary of the surrounding body into his own system.

On the basis of this four-fold response to *Physics* 4, a stronger case than Solmsen's can be made that Epicurus here too knew and used Aristotle's work in order to construct his own physical system.[36]

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