Body[*]

(*M* 9.359-440)

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1. Introduction

In view of the prevalent corporealism of the Hellenistic schools, one may expect that Sextus' examination of body will be of special importance in the whole of *Against the Physicists*. Sextus' introductory remarks only reinforce this expectation. Yet Sextus almost immediately appears to leave behind the corporealist natural philosophers and other protagonists of the previous chapters of *Against the Physicists* to turn to an examination of the mathematicians' conception of body. By far the largest part of the chapter is then consecrated to arguments against the conceivability of fundamental geometrical notions, making long sections of our chapter basically identical with the main bulk of *Against the Geometers*.

The chapter in many respects is at odds with Sextus' more usual sceptical strategy. Because of its almost exclusive focus on the mathematicians conceptions, it is not a systematic consideration of alternative positions of different schools, although, as we shall see, Sextus is well aware of the variety of options, and the motivations why one may prefer one conception over another. In particular, he spends very little time and energy on that conception of body which can be ascribed to the most important members of the corporealist camp, i.e. the Stoics and the Epicureans. He does not discuss in an explicit manner whether, and if so how, the arguments against the conceptions of the mathematicians would affect the

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corporealists' views. In particular, it is not examined whether the question of the conception and existence of bodies can be separated from the question of the existence of fundamental geometrical objects.

The arguments of the chapter are moreover exclusively negative; we are not presented with arguments for the existence of body and fundamental geometrical objects. The conclusion of each series of arguments is that body—and the fundamental geometrical objects—thus conceived cannot exist. We can assume that the reader should provide the positive side on the basis of the common opinion, shared by theoreticians and laymen alike, that bodies exist.[1] The question is, however, more complicated in the case of geometrical objects, for their ontological status was vigorously debated. Yet even in their case, Sextus provides little, if anything, in defence of their existence.

A structural overview may help the orientation in this long and fairly complex chapter:[2]

A. The doxography of primary elements (359-64)
B. Transition to the investigation of body (365)
C. The capacity to act or to be acted upon (366)
D. The relation between body and dimensions (367-75)
1. Body is conceptually separate from the three dimensions (368)
2. Body is the complex (*athroisma*) of the three dimensions (369-74)
    2.1 Dimensions are incorporeals (369-70)
    2.2 Each dimension contains corporeality and the *logos* of body (371-2)
    2.3 Body supervenes on the conjunction of the three dimensions (373-5)
        2.3.1. After conjunction they retain their incorporeality (373)
        2.3.2. After conjunction they become corporeal (374)

E. The non-existence of dimensions and the conceivability of fundamental geometrical objects (375-433)
1. Introduction: the connection between length and line
2. The inconceivability of point (377-8)
    2.1 The point is corporeal (377)
    2.2 The point is incorporeal (378)
3. The inconceivability of line (380-429)
    3.1 Line is a point which has flowed (380-5)
        3.1.1 The point occupies the same places (381)
        3.1.2 The point changes its place (382-5)
            3.1.2.1 Leaving one place and taking up another (383)
            3.1.2.2 Occupying one place and extending to another (384-5)
                3.1.2.2.1 Extending to an indivisible place (384)

[1] For the parallel case in the discussion of time, see Warren (2003) 314-5 with important qualifications in Bobzien xxx in this volume; cf. also Dye and Vitrac (2009) 163 for the geometrical notions.
[2] The hierarchical ordering of the sections is not always as clear as it might appear from my numbered list.

5.2 What happens when the limits of bodies are juxtaposed? (431-3)
5.2.1 Limit touches limit (432)
5.2.2 Limited touches limited (432)
5.2.3 Limited touches limited and limit touches limit (433)
5.3 Surface is:
5.3.1 A body (434)
5.3.2 Incorporeal (435)
5.4 Conclusion: The absurdities following from the conception of surface as limit of the body leads to suspension of judgement

F. Is body perceptible or intelligible (437-9)
1. Body as such is not perceptible (437)
2. Body is not intelligible (438-9)

G. Conclusion and transition to the examination of incorporeals (440)

I shall follow the structure of Sextus' discussion and speak about each section in turn. Yet, as mentioned above, Sextus' attack on fundamental geometrical notions in the long section E overlaps to a large extent with the corresponding parts of *Against the Geometers*. Now *Against the Geometers*, and its individual arguments, have recently been examined in considerable detail by other scholars. After Ian Mueller's pioneering paper, originally read at a previous *Symposium Hellenisticum*, Luciano Floridi has set Sextus' place in the broader history of 'mathematical scepticism' in a series of studies, whereas Wolfgang Freytag has published a book-length study of Sextus' arguments against the fundamental concepts of the mathematicians concentrating on the twin texts in *M* 3 and *M* 9.[3] In an even more recent study Guillaume Dye and Bernard Vitrac have examined the sources and targets of Sextus' attack on geometry.[4] In view of these studies, I shall concentrate primarily on structural questions, Sextus' argumentative strategy, and the sections before and after Section E. In an Appendix I shall present additional remarks on the doxographical material presented in the chapter, including a comparison with parallel texts.

[3] Mueller (1982), Floridi (1998), (2000) and (2004), Freytag (1995).
[4] Dye and Vitrac (2009). I received this valuable study shortly before I had to submit this paper for publication. In some cases Dye and Vitrac and I have arrived at similar conclusions independently of each other; I note these points in footnotes.

2. Setting the agenda

In the last sentence of the previous chapter in 358, Sextus announces the successful completion of the investigation concerning the active principle, and indicates that he will now turn to a general, more common treatment of the active and the material principles. It means that we have arrived at the end of the discussion which started at the very beginning of the book, at *M* 9.13. As the reader may still remember, Sextus started the treatise with a methodological introduction in which he recommended an attack on what constitutes the principal, most comprehensive and essential (τὰ κυριώτατα καὶ συνεκτικώτατα, *M* 9.1), because, as he argued, an assault on what is common to the individual elements of the doctrine is 'the more graceful' (χαριέστερος, *M* 9.3) way of demolishing the dogmatic edifice of the opponent. He put into practice this recommendation by stating, first, that the physicists customarily distinguish between two (kinds of) principles of the universe, active and passive, and by turning, in the next step, to an attack on the notion of god as the active principle. The last sentence of 358 marks the end of the extended discussion of the active principle, the ensuing discussion of cause, and the chapter on parts and wholes.

The reader would expect that Sextus now turns to a discussion of the passive principle. And this is indeed what we get in the introduction of the parallel section in *PH* 3.30: having finished the discussion of the active principle, Sextus announces that he will now continue by an investigation of the material principle (ὑλικὴ ἀρχή), and first of all provides a doxographical survey of the relevant views. In the articulation of the topics, as well as in formulating the transition, Sextus in *PH* 3.30 is closely following his doxographical source, as the clear parallel with Pseudo-Galen's *De Historia Philosophica* shows (for an analysis of the doxographical survey, as well as the nature of the relationship between Sextus and Pseudo-Galen, see the Appendix). In *PH* 3 after the doxographical survey, Sextus immediately points out and exploits the *diaphonia* among the different views about the material principle(s), and it is only at this point that he turns to a discussion of body. He says that the infinite variety of views about the material principle would in itself suffice to demonstrate the inapprehensibility of the material principle, but let us treat the question more generally, by showing the inapprehensibility of body.

In *M* 9, Sextus presents what is basically the same material as part of a different strategy. Instead of turning to the material or passive principle, Sextus immediately

announces the more general discussion, which could provide a common treatment of the two principles, and thus a new beginning. Moreover, if it is true that the discussion he announces here will give a more common (κοινότερον) treatment of the principles, and Sextus sticks to his methodology privileging an assault on what is more common, then we should expect that the attack on the physicists reaches its peak in this chapter. Indeed, we may ask why he did not start the whole treatise with what he promises to do now—in so far as this approach is even more general, it may have made *Against the Physicists* even 'more graceful'.

A general discussion of body could in fact fulfil the role of a more general attack on most of the physicists and also a common investigation of both principles in so far as, at least according to some schools of thought, both the active principle, or god, and the passive principle are bodies. We may think first of all of the Stoics—who must figure prominently in Sextus' original distinction between the active and the passive principles, as well as in his treatment of god as the active principle—for whom the discussion of body precedes that of the principles (cf. D.L. 7.132). Moreover the forthcoming discussion could cover those thinkers as well who do not distinguish between the active and the passive principles. Remember that Sextus said that only the best of the physicists applied this distinction.[5] The prevalent corporealism of the Hellenistic schools, and of most of the previous philosophers, would then fully justify the importance attached to the attack on the notion of body.

The first sentence of the chapter, moreover, distinguishes between corporealists and incorporealists in a way that seems to confirm our expectation that Sextus now wants to raise the generality of the discussion to the highest level by concentrating on the highest and most primary element (περὶ τῶν ἀνωτάτω καὶ ἀρχικωτάτων στοιχείων), which, in the case of the corporealists, is body. Yet he immediately equates this highest and most primary level with the traditional elements, and then starts his doxographical survey: 'Pherecydes of Syros said that earth is the principle and element of all things, Thales that it is water etc.'[6] Then comes (almost) the same doxography as the one he gives for the *material principle* in *PH* 3.[7]

Identifying the most general level with the element(s) or material principle(s) creates a problem exactly in the cases of those who do make the distinction between active and passive principles. For in the doxographical list we find for example that the elements of Empedocles

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[5] *M* 9.12: ἐπεὶ οὖν τοιαύτη τις ἔστι παρὰ τοῖς ἀρίστοις τῶν φυσικῶν διάταξις [...].
[6] Note that the reference to elements is missing from the parallel in *PH* 3.30.
[7] The introductory sentence in Ps-Galen also marks out the ensuing list as an inventory of views about the passive or material principle.

are earth, water, air and fire, whereas the elements of Anaxagoras are the homoiomeres. However, in the introductory section, when Sextus was arguing that the best of the physicists distinguish between the active and passive principles, he explicitly included Empedocles' Love and Strife and Anaxagoras' Mind as active principles (*M* 9.4-10). So in the case of these philosophers it is simply not true that their respective (material) elements with which they figure in the list would constitute the most fundamental level common to the active and passive principles; in these cases the elements are merely the passive principles—in conformity with the announced topic of *PH* 3.30 but in contrast with Sextus' proclaimed agenda in *M* 9. Turning to these would be an appropriate sequel to the discussion of the active principle, but this is not what Sextus proposed to do in our chapter.[8]

I found one addition which may signal that Sextus acknowledges the difference between the two strategies. The lists in Pseudo-Galen and *PH* 3.30 end with the Pythagoreans (numbers), the mathematicians (limits of bodies) and, finally, Strato (qualities). The list in *M* 9 omits Strato, but more importantly, adds the Platonists with the Forms. Clearly, the Platonic Forms would be inappropriate for the list of material principles in Pseudo-Galen and *PH* 3.30, but are appropriate on the list of highest principles in *M* 9.

Having presented his doxographical survey of both corporealists and incorporealists, Sextus then restates that it will be possible to argue against the members of the two groups in common (ἐνέσται πρὸς πάντας κοινῶς ἀντερεῖν) by going through all the difficulties concerning bodies on the one hand and the incorporeals on the other. By showing that there is no consistent conception of body forthcoming, we can undermine all the corporealist views at once, and we can then proceed in a like manner with the other group and raise puzzles concerning incorporeals. Note that this last promise never gets fulfilled in *M* 9-10. In *PH* 3, the general discussion of body is followed by a general discussion of incorporeals, almost as long as the preceding general discussion of body. In *M* 9-10, by contrast, Sextus never

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[8] The situation is actually even more complicated in the case of the Stoics. The Stoics most probably figured in the original doxographical list with their four elements as we can see from Pseudo-Galen's text. Yet, even though it is true that a general treatment of body can be prior to the treatment of the active and passive principles, it is not the case that a treatment of the four elements could fulfil that role: in the Stoic ordering of metaphysical topics, the four elements come after the two principles. Remarkably, the Stoics figure with their four elements also in the parallel passage in *PH* 3.30, but there Sextus adds a note—apparently absent from his source that he otherwise follows almost verbatim—which indicates that he is aware of the fact that, technically, he should be speaking about matter as such and not about the elements (περὶ γὰρ τῆς τερατολογουμένης ἀποίου παρά τισιν ὕλης, ἣν οὐδὲ αὐτοὶ καταλαμβάνειν διαβεβαιοῦνται, τὶ δεῖ καὶ λέγειν; The priority of unqualified matter is also acknowledged in *M* 10.312.) And in our passage he should of course be speaking neither about the four elements, nor unqualified matter, but simply about body.

actually delivers a general discussion of incorporeals understood as the common principles of the incorporealist group; what we get instead is a one-by-one treatment of incorporeals. Moreover, the discussions of the individual incorporeals do not focus on those specific incorporeals that figure in *M* 9.364 as the first principles of the respective incorporealist philosophers. The topics covered in the first chapters of *M* 10 involve two of the Stoic incorporeals—place and time—but includes motion as well. Number, as the Pythagoreans' first principles, comes only after these discussions, whereas the Platonists' Ideas do not receive a separate treatment, but only some remarks embedded in the discussion of the Pythagoreans' numbers. And, to confuse things even further, the discussion of the limits of bodies, the alleged first principles of the incorporealist mathematicians, is not part of the discussion of the incorporeals, but takes up the better part of the discussion of body, the common principle of the corporealists. These oddities in the arrangement of the material, as well as the discrepancies between announced plans and realizations, are characteristic of *M* 9-10 as compared to *M* 3: Sextus apparently does not succeed in integrating his more abundant source material in a large scale scheme.

3. The corporealists' and the mathematicians' conceptions of body

In accordance with the initial distinction between corporealists and incorporealists, Sextus announces at *M* 9.366 that he will start with the conception (ἐννοία) of body as the ultimate principle of the corporealists. He immediately discards an account, which, he says, some ascribe to Pythagoras and according to which body is 'what is capable of being acted upon or of acting' (τὸ οἷόν τε παθεῖν ἢ διαθεῖναι).[9] He justifies this move by recalling that the previous discussion has already shown the absurdity of the conceptions of cause and effect: if there is no acceptable account of cause and effect, the corporealists cannot give an account of body in causal terms. This move, I think, is entirely justified irrespective of the further

[9] The verb διαθεῖναι is not the most common pair of παθεῖν in this definition, it is more usual in grammatical contexts; in any case Sextus turns to the more common ποιεῖν language a few lines later. The phrase of course goes back to Plato's *Sophist*, in which it is suggested as a definition of being that can be acceptable to both corporealists and incorporealists. The attribution to Pythagoras might come from a Pythagoreanizing interpretation of the Platonic material.

problem whether or not everybody on the list of corporealists would accept this as a valid conception or definition of body.[10]

Sextus' next move is considerably trickier however. For he continues by declaring quite abruptly that 'We must now organize (συνταχτέον) the matter at hand according to the conceptions of the mathematicians.' The formulation is not entirely clear,[11] but the idea apparently is that in so far as the causal conception of body has been discredited, we should launch the common attack on the corporealist branch of physicists by an examination of the conceptions of the incorporealist mathematicians.[12] As we shall see, this will involve, first of all, the geometers' conception of body, according to which body is that which has three dimensions (τὸ τρεῖς ἔχον διαστάσεις) and, then, their conceptions of dimensions, and, at a later stage, that of point, line and surface. Sextus does not motivate this move, but the wording and the subsequent discussion in the chapter strongly suggest that showing the absurdity of the mathematicians' conception is considered here not just as one among many, but the single most suitable strategy for such a joint attack on the corporealists' principle. Sextus never actually proves this point, so he never shows that once we have discarded the causal account of body, the remaining options will be covered by an attack through the geometers' notions. In so far as this manoeuvre governs most of the subsequent discussion, a general appraisal of the success of the chapter largely depends on the question whether and how far Sextus' move to turn to the mathematicians is legitimate. How far will the

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[10] The prime candidates are obviously the Stoics. It has however been debated whether they would accept the capacity to act or be acted upon as providing a definition of body, or, being exclusive to bodies, it can merely function as a criterion of corporeality. Reesor (1954) and more recently Falcon (2005) 52 treat it as the Stoic definition of body. LS argue on the other hand that: 'It is essential to see that the capacity to act or be acted upon, though peculiar to bodies, is not advanced as a defining characteristic of body *per se*. In confining this capacity to bodies, the Stoics were not redefining body but radically rejecting the thesis, accepted by Plato and Aristotle, that incorporeals can have any causal efficacy' (vol. 1 p. 273). The question depends on whether we accept that the Stoics in general, and Chrysippus in particular, agreed with Antipater that we get a definition by specifying a necessary property of the definiendum which is unique to it. On the Stoic definitions of definition, see the Schol. to Dionysius Thrax 1.107.5-7 (= *SVF* 2.226) and D.L. 7.60, with a thorough discussion in Brittain (2005) 186-191. It is equally true on the other hand that the texts most often referred to in this connection, Cicero *Acad*. 1.39 and S.E. *M* 8.263, do not present it as a Stoic definition of body.

[11] There might also be a textual problem. The MSS give συντακτέον, which is accepted by Bekker, whereas Mutschmann, followed by Bury, conjectures συναχτέον. συνάγω is normally used by Sextus in the sense of 'to conclude' as by bringing the premises together. If we accept the emendation, perhaps we should take the verb in a hostile sense, as when warriors engage with each other in battle (cf. LSJ s.v. 3).

[12] This seems to be reinforced also by the fact that the μέν at the beginning of the paragraph dealing with the causal notion of body is picked up by the δέ at the beginning of the section introducing the mathematicians' conception.

corporealists accept an attack on their notion of body through an attack on the mathematical conception of body, and related mathematical notions?

Note first of all that the question is conceptual, and not metaphysical; it is irrelevant—or at least it seems so incipiently—that Sextus' incorporealist mathematicians grant the status of principle to the limits of bodies, and thus hold that bodies are derivative of, and thus ontologically dependent on, limit entities, whereas the corporealists denied this. What is at stake at this point is not the ontological relationship between geometrical objects and physical bodies, but the relationship between the mathematicians' and the corporealist physicists' conceptions of body.

What Nicomachus writes about the place of mathematics in the general system of knowledge in his *Introduction to Arithmetic*—possibly the most popular specimen of this flourishing genre in Sextus' time—is more relevant. Before turning to the definitions of the fundamental notions of arithmetic (number, even, odd etc.), he argues, with frequent references to Plato, for the importance and foundational role of mathematics to science (ἐπιστήμη) and wisdom (σοφία): if we abolish mathematics, we abolish the other sciences as well (*Intr. Arith.* 1.6.). Of course, the view that geometry is indispensable to the description of the physical world finds its most illustrious expression in the *Timaeus*. Yet, one does not need to be a Platonist to accept some role of mathematics, and the use of mathematical notions, in the description of the physical world; one can think also of the way Aristotle specifies the use of mathematics in the scientific understanding of certain physical objects and phenomena (cf. *Phys*. 2.2). So, irrespective of one's position about the ontological status of geometrical objects, or the ontological relationship between geometrical and physical bodies, one may hold the view that fundamental geometrical notions are necessary to think about, and have a conception of, certain aspects of the physical world. What Sextus' strategy seems to assume is exactly this with specific regard to the corporealists' common first principle: once the causal account of body has been eliminated, the corporealists' conception of physical body will, at some level of analysis, necessarily involve fundamental geometrical notions. If those geometrical notions turn out to be incoherent and untenable, the corporealists find themselves without a plausible conception of their own principle. The corporealists' principle can thus be attacked through a rejection of the relevant geometrical conceptions. Sextus appears to accept the view expressed also by

Nicomachus—'if we abolish mathematics, we abolish the other sciences as well'—and turn it against the physicists: let's abolish geometry so that we abolish physics as well.

The validity of this strategy can, however, be contested by repudiating the entire discipline of geometry, or, more specifically, by denying the relevance of the allegedly requisite geometrical notions. First of all, there were schools, such as the Cyrenaics, the Cynics, and of course the Sceptics themselves, who rejected geometry with other branches of mathematics as part of their wholesale dismissal of the sciences. This kind of indiscriminate rejection will however be of little significance for Sextus' present purposes in so far as these schools will be unlikely to develop a dogmatist corporealist physics.[13] Yet there were others, namely the Epicureans, who rejected geometry in a targeted way, and denied any truth to it exactly because of its incompatibility with their physical theory involving theoretical minima.[14] Such a comprehensive dismissal of the discipline involves, in all likelihood, a refusal to accept the validity of the fundamental notions of geometry and hence their relevance in the understanding of physical reality in general, and of body in particular. Moreover, the Epicureans' specific reason for rejecting conventional geometry is precisely that the geometrical conception of spatial magnitudes, including limit entities, are fundamentally misconceived. As Sextus himself states explicitly, the proper object of geometry is continuous spatial magnitude (*M* 4.1), whereas the Epicureans emphatically deny that magnitudes are continuous. If so, they will not be prepared to accept the relevance of the geometrical notions at any level of the analysis of their conception of body. Indeed, there are reasons to think that one major source of Sextus' arguments against the fundamental geometrical notions is the Epicurean polemics against the geometers. Furthermore, even if a corporealist physicist does not reject the entire (traditional) discipline of geometry as misconceived, he may still object that specific geometrical concepts—most importantly those of limit entities—are not applicable in the analysis and description of physical bodies; as we shall see, this might turn out to be the (early) Stoic position. In general, the pivotal point will be whether a given physical theory accepts the geometrical analysis of spatial magnitudes applied to physical spatial magnitudes.

What complicates the picture even further is that some of the arguments in the chapter against fundamental geometrical notions aim to show precisely that certain physical

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[13] On the Cyrenaic rejection of physics, see e.g. Sextus *M* 7.11 and 13.
[14] On the Epicurean approach towards geometry, see Sedley (1976); White (1992) 230-9.

phenomena, such as the juxtaposition of limits of bodies, cannot be coherently described in geometrical terms (414-18; 431-33); and these arguments, once again, are likely to go back to Epicurean and Stoic sources.[15] So Sextus, on the one hand, seems to assume that the corporealists are bound to use geometrical notions in formulating their conceptions of physical body, but, on the other hand, uses arguments coming from the corporealists to show that geometrical notions are inappropriate to describe physical bodies. In view of these considerations, it will be important to check at each major juncture of Sextus' argument how the most important representatives of the corporealists would react to that specific move.

It is worth noting, first of all, that, as other texts evince, Sextus is well aware that 'the mathematicians' conception of body formally differs from the corporealist physicists' conceptions. In *M* 1.21 he provides the following inventory:

> Now they [i.e. bodies] are not perceptible as is clear from the conception of them. For body is either (i) a conjunction by aggregation of magnitude, shape, and resistance (ἀντιτυπία), as Epicurus says, or (ii) that which is extended in three dimensions (i.e. that consisting of length, width, and depth), as the mathematicians say, or (iii) that which is extended in three dimensions and has resistance (ἀντιτυπία), again as Epicurus says so that he can also distinguish it by this from the void, or (iv) a resistant mass (ὄγκος ἀντίτυπος) as others say. (trans. Blank, modified)

In line with what we read in *M* 9, the conception referring exclusively to three-dimensional extension is attributed to the mathematicians—and to the mathematicians only. The causal conception of body ('what is capable of being acted upon or of acting') that has been briefly discarded at the beginning of our section in *M* 9 is not mentioned. On the other hand, three further conceptions are listed, two of which are explicitly ascribed to Epicurus, and all three of which makes reference to resistance (ἀντιτυπία).[16] From this fourfold list Sextus in *M* 9 focuses almost exclusively on the one attributed to the mathematicians.[17]

At this point, it will once again be instructive to compare Sextus' strategy with the way he proceeds in the parallel passage in *PH* 3. The starting point is the same as in *M* 9: the account according to which body is that which can act or be acted upon is summarily

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[15] Cf. Dye and Vitrac (2009) 181-2. One of Dye and Vitrac's principal thesis is that, in *M* 3, Sextus primarily attacks geometry as a means of 'modelling' physical reality.

[16] Blank (1998) excises the last definition and argues in his commentary (p. 96, n. 39) that it must be a later interpolation, because it is not attributable to anyone in particular and does not advance Sextus' argument.

[17] At the end of the chapter, in 437, he briefly considers a version of (i) in relation to the questions whether bodies are perceptible.

discarded with reference to the previous discussion of cause and effect. Yet, Sextus then turns to what he takes to be the general conception of body: body is that which is three-dimensional *and has resistance* (τὸ τριχῇ διαστατὸν μετὰ ἀντιτυπίας *PH* 3.39). In the subsequent discussion in *PH* 3, Sextus discusses and attacks ἀντιτυπία alongside the dimensions.[18] As the presence of ἀντιτυπία indicates, what is treated here as the general conception of body is not that of the mathematicians,[19] but the one that is ascribed to Epicurus in *M* 1 (cf. also *M* 11.226). It is worth noting that the author of the treatise *Are Qualities Incorporeal* transmitted under the name of Galen attributes the exact same definition to the Stoics.[20] Thus, Sextus in *PH* 3.39 turns to the conception of body that he explicitly ascribes to Epicurus, but that might have been accepted also by the Stoics; if so, the conception targeted by Sextus could be common ground between the two most prominent contemporary representatives of the corporealist group. In *M* 9.367, by contrast, he turns to the conception of body that he attributes exclusively to the mathematicians.

Some in the corporealist camp, most prominently Aristotle, should accept the relevance of the mathematicians' conception; indeed he also defines body in similar terms at *DC* 1.1 268a7, *Phys*. 3.5 204b20 and 4.1 209a4-6. Yet, the Epicureans and Stoics might object at this point that three-dimensionality is not sufficient to define body.[21] As Sextus himself states in *M* 1.21 (quoted above), Epicurus needs to include ἀντιτυπία 'so that he can also distinguish it [i.e. body] by this from the void.' In a similar vein, Sextus makes Epicurus say in *M* 10.222 that body can never be conceived without ἀντιτυπία; in that context, ἀντιτυπία is presented as the differentia, while three-dimensionality provides the genus of *per se* existents comprising bodies and the void. And the Stoics should agree that three-dimensionality cannot in itself deliver a defining characteristic of body, because there is also the three-dimensionally extended extra-cosmic void. Indeed, the author of *Are Qualities Incorporeal*

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[18] Incidentally, a successful dismissal of ἀντιτυπία could disqualify also the first conception of body attributed to Epicurus in *M* 1, even if Sextus does not mention that conception in the *PH* 3.

[19] That the two conceptions are different is also emphasized by Annas and Barnes (2000) in their note ad loc p. 153, n. 50.

[20] [Galen], *Qual. inc.* 19.483.13-16 = *SVF* 2.381: … τοῦ σώματος τοῦτον ὅρον εἶναι φασιν τὸ τριχῇ διαστατὸν μετὰ ἀντιτυπίας.... Cf. also Plotinus 6.1.26. Reesor (1954) 57 denies that the definition was accepted by the Stoics and maintains that the author of *Qual. inc.* (whom, following Orth, she takes to be Albinus) and Plotinus apply their own definition of body in their polemics against the Stoics.

[21] We see here the historical origins of the long and exciting debate whether three-dimensional extension is sufficient to defined body; a debate that will be taken up by Philoponus (cf. de Haas (1997) and Sorabji (1988)) to flare up again in the early modern period with Descartes on the one side and people like Newton, Boyle, Locke and Leibniz on the other.

gives the very same reason why the Stoics also insisted that ἀντιτυπία has to be included in the definition of body.[22] That ἀντιτυπία is the distinguishing attribute (ἴδιον) of body is also stated at *M* 10.12 in the thought experiment that functions as an argument for the existence of place: if in thought we abolish everything, three-dimensional extension and hence place will still remain.[23]

Sextus, however, can have ready answers to these worries. He could point out, first of all, that ἀντιτυπία is a property that is primarily, if not exclusively, related to the causal characterization of a body; so we have effectively disposed of it with the destruction of the conceptions of cause and effect. Much more importantly, he could argue that even if the Epicureans and the Stoics do not accept that three-dimensional extension is a uniquely defining characteristic of body, their own conception also includes reference to three-dimensional extension; therefore they, too, must give an account of dimensions in order to make their conception of body intelligible—and this remains so irrespective of their insistence on ἀντιτυπία. At this point it is irrelevant what the corporealists think about the validity of geometry. Indeed, it is of no immediate consequence either whether the mathematicians and the physicists speak about the same thing or the mathematicians' conception is of geometrical solids, whereas the physicists focus on physical bodies, or how clear at all the parties were on this distinction;[24] what matters is that both conceptions involve three-dimensionality, and thus all parties need to be able to explain what they mean by that. As Sextus puts it in *M* 1.25: 'Besides, anyone who conceives the body compounded of these dimensions must first know the dimensions themselves, in order to be able to know the body

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[22] [Galen], *Qual. inc.* 19.483.10-14 = *SVF* 2.502. It may be objected how the inclusion of ἀντιτυπία in the definition of matter could be made compatible with the view that matter is 'unqualified being.' One possibility, I think, is that ἀντιτυπία is not conceived as a tangible quality but rather that feature of body which constitutes its causal efficacy; which, in the case of matter, is that it is capable of being acted upon.

[23] Falcon (2005, 53-54) argues that the Epicureans and the Stoics had both a general and a specific notion of body, such that the first, expressed in terms of three-dimensional extension only, included both geometrical and physical bodies, whereas the addition of ἀντιτυπία in the second served to delimit physical bodies. This might be true in the case of the Stoics (cf. D.L. 7.135 with the definition provided by the Stoic Apollodorus: 'A body is what is extended in three ways, in length, in breadth, and in depth', apparently coming from a work called *Physics*). But it seems to me questionable whether the Epicureans were interested in such a generic concept of body enveloping both geometrical and physical bodies. On the whole, I think that the ancient sources correctly identify the primary motivation for the inclusion of ἀντιτυπία that is true for both schools, i.e. to distinguish body from non-corporeal spatial entities such as the void.

[24] Cf. Mueller (1982, 77) 'I am inclined to think that the Stoics did not distinguish clearly between mathematical and physical body, but I doubt that anyone outside the Platonic tradition did so'.

in addition' (trans. Blank).[25]

To sum up: Sextus never shows that once we get rid of the causal account of body on the basis of the previous discussion of cause and effect, all other conceptions of body will include reference to extension in three dimensions.[26] But if that point is granted, Sextus' strategy turns out to be legitimate; actually, it is more economical than the strategy he uses in *PH* 3. Yet, he should have helped his reader by making his reasons more explicit instead of simply stating that 'We must now organize the matter at hand according to the conceptions of the mathematicians.'

4. Excursus: an oddity in the mathematicians' definition of dimensions

The definition of body Sextus attributes to the mathematicians is completed by an account of the dimensions:

> For they say that body is that which has three dimensions, length, breadth, depth, from which length is that which is from above to below, breadth is that which is from left to right, and the third dimension, that is depth, is that which is from front to back (367).[27]

In fact, Sextus characterizes the dimensions, and length in particular, in two different ways in the outsets of the two main argumentative parts respectively. When he starts the second series of arguments focusing on the different conceptions of line at 376, he characterizes length as 'the greatest dimension of the body' (τὸ μέγιστον ἦν τοῦτο τοῦ σώματος διάστημα), and not as 'that which is from above to below' as he does here. Sextus does not mention that he is using two different conceptions in the two sections; but Stobaeus lists exactly these two in substantiating the claim that 'length is said in many ways' in the context of the definition of

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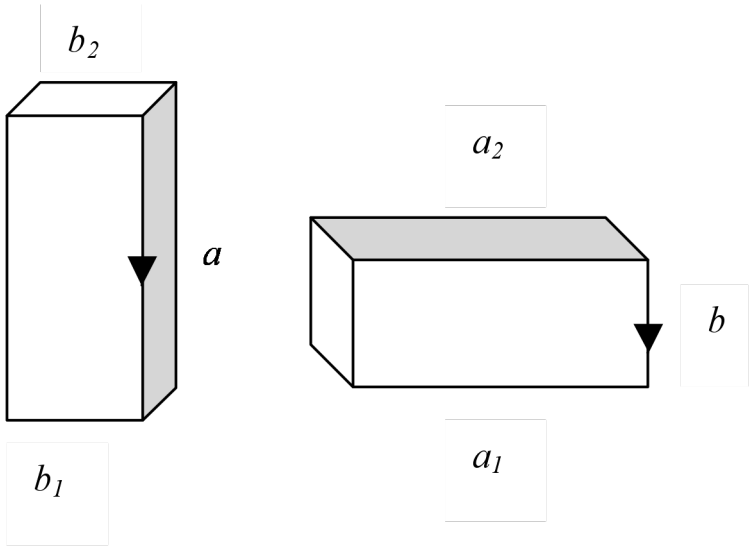
[25] Sextus could even say that Epicurus' alternative conception, listed in *M* 1, also involves magnitude and shape, so it is incumbent on him to say something about dimensions also in view of that account of body.

[26] At this point it becomes significant whether the fourth conception of body, 'a resistant mass', in the *M* 1 list was part of Sextus' text or is a later addition as Blank (1998) argues (see fn. 16 above). To show that it is necessary to give an account of dimensions in view of this conception, too, would certainly need further arguments.

[27] Bury puts into quotation mark only the first part of the sentence; I think it is clear that the second part is also meant to be part of the quotation, verbatim or not.

body as that which has three dimensions.[28] The characterization of dimensions in terms of directions is repeated almost verbatim in the parallel passage in *M* 3.19, with the difference that there, in accordance with what we find in Stobaeus—and as we shall see, in all other parallel texts—breadth is from right to left and not from left to right. Moreover, Sextus specifies in *M* 3.19 that length is the first dimension.[29]

The outcome of this characterization is the seemingly curious idea that the 'length' (μῆκος) of an object will depend on the position of the object and not on its intrinsic geometrical properties. Thus, on the figure below, 'length' will be *a* in the case of the left hand side object, and *b* in the case of the right hand side object. It is worth noting in this respect that in some non-technical contexts μῆκος could also designate the height of an object even when its horizontal dimension was larger.[30]



[28] Stobaeus *Ecl.* 1.143.24 W.: σῶμα ἐστι τὸ τριχῇ διαστατόν, πλάτει, βάθει, μήκει· ταῦτα δὲ πλεοναχῶς λέγεσθαι. ὁτὲ μὲν γὰρ μῆκος [εἶναι] λέγεσθαι τὸ μέγιστον διάστημα τοῦ σώματος, ὁτὲ δὲ μόνον τὸ κάτωθεν ἄνω· καὶ πλάτος ὁτὲ μὲν τὸ δεύτερον διάστημα, ὁτὲ δὲ τὸ ἐκ δεξιᾶς καὶ ἐξ εὐωνυμου· καὶ βάθος ὁτὲ μὲν τὸ εἰς ἑαυτὸ διάστημα, ὁτε δὲ τὸ πρόσω καὶ ὀπίσω. In Stobaeus' text the definition is not assigned to anybody. Diels thought that it comes from Arius Didymus (*Phys.* fr. 19 Diels) and that it is a report of the Stoic view. Hence it is also included in *SVF* (*SVF* 2.357). I found no good reason to think that the definition as a whole, including the two characterization of the dimensions, should be Stoic.

[29] *M* 3.19: … σῶμα μέν ἐστι τὸ τὰς τρεῖς ἔχον διαστάσεις, μῆκος πλάτος βάθος, ὧν πρώτη μὲν διάστασίς ἐστιν ἡ κατὰ μῆκος ἄνωθεν κάτω, δευτέρα δὲ ἡ κατὰ πλάτος ἀπὸ δεξιῶν ἐπ' ἀριστερά, τρίτη δὲ ἡ κατὰ βάθος ἀπὸ τῶν πρόσω εἰς τοὐπίσω. Curiously, Bury here translates ἄνωθεν κάτω by 'up and down'.

[30] Cf. e.g. Aristophanes, *Aves* 1130, listed in LSJ, speaking about the height of a wall.

Even more peculiar, on the definition quoted by Sextus, the dimension (διάστασις) of length is not simply the vertical dimension of the object, but it has a fixed directionality as well—it is from above to below. It differs in this respect from the relevant directions, which, as Sextus specifies in *M* 9.367, can be both from the top down or from the bottom up. Length as a dimension (διάστασις) appears to be identical with one of the two vertical directions (παρατάσεις).

As far as I am aware, it is not at all common in the technical mathematical literature to make an immediate connection between the three dimensions and the six directions.[31] Moreover, the directionality of length (and the other dimensions), not surprisingly, is not a common view in the mathematical literature. It is however closely paralleled in the *Definitions* transmitted under the name of Hero of Alexandria.[32] This is how that text defines line:

> Line is length without breadth and without depth or what first takes existence in magnitude or what has one dimension and is divisible as well; it originates when a point flows from up downwards according to the notion of continuum, and is surrounded and limited by points, itself being the limit of surface.[33] (trans. Cuomo)

And when it comes to define surface, the author says that it is generated as the line flows from right to left along breadth,[34] and that solids come into being when the surface flows

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[31] The term I have translated as 'direction' is παράστασις in N, which has been corrected to παράτασις by Bekker, followed by Mutschman and Hicks. Neither the transmitted, nor the emended term is part of the technical mathematical vocabulary. Neither is included in Mugler (1958). LSJ list only our passage where παράτασις would have the sense 'direction of extension', 'dimension'. The closest we get in both respects is Nicomachus, who however uses the word περίστασις: 'By these [i.e. depth, breadth and length] are defined the six directions (περιστάσεις) which are said to exist in connection with every body and by which motions in space are distinguished; forward, backward, up, down, right and left; for of necessity two directions opposite to each other follow upon each dimension, up and down on one, forward and backward upon the second, and right and left upon the third.' (*Intr. Arith.* 2.6.4, trans. D'Ooge). Note that Nicomachus clearly connects directions to motions. If we want to correct the received παράστασις in Sextus, I wonder if we are not better off making it uniform with Nicomachus' text and read περίστασις.

[32] The parallel is also noted by Freytag (1995) 164 and Dye and Vitrac (2009) 176-7. Heiberg has argued that the work is a Byzantine collection of which 1-132 were derived from Hero. See, approvingly, Mansfeld (1998) 56.

[33] *Definitions* 2: Γραμμὴ δὲ ἐστι μῆκος ἀπλατὲς καὶ ἀβαθὲς ἢ τὸ πρῶτον ἐν μεγέθει τὴν ὑπόστασιν λαμβάνον ἢ τὸ ἐφ' ἓν διαστατόν τε καὶ διαιρετὸν· γίνεται δὲ σημείου ῥυέντος ἄνωθεν κάτω ἐννοίᾳ τῇ κατὰ τὴν συνέχειαν, περιέχεταί τε καὶ περατοῦται σημείοις πέρας ἐπιφανείας αὐτὴ γενομένη.

[34] *Definitions* 8 [Ἐπιφάνειά] γίγνεται δὲ ῥύσει ὑπὸ γραμμῆς κατὰ πλάτος ἀπὸ δεξιῶν ἐπ' ἀριστερὰ ῥυείσης.

from before to behind.[35] The text of the *Definitions* clearly shows that the directionality of the dimensions is based on the genetic view of dimensions. This is reinforced by Sextus in *M* 3.19 where he claims that length is the *first* dimension—just as Hero tells us in the text quoted above that the line is 'what first takes existence in magnitude'. The priority of line in generation is of course current among mathematicians in the Platonist–Pythagorean tradition. Nicomachus, for example, says that 'The first dimension is said to be the line, for the line is that which is one-dimensional' (*Intr. Arithm.* 2.6.4), explaining a little later how the successive dimensions are generated. What the *Definitions* adds to this view is that the line comes into being when the point flows *downwards*.[36] The remaining difference is that both Hero and Nicomachus speak about line whereas Sextus and Stobaeus speak about length. As we shall see, the identification of length and line will be central to Sextus' second set of arguments, and we shall turn back to this issue in that context.[37]

Now, the theory of the successive generation of dimensions, and especially the view that an *n* dimensional entity is generated from the *n*-1 dimensional entity by 'flowing' (a theory that will come into the fore at a later point in Sextus' discussion), can easily lead to the view that the entity thus generated has a directionality. Nonetheless, this idea in itself does not determine the specific direction assigned to the entity in question. The view that the line is the point flowed *from above* may at first blush seem to build too much on the image of 'flowing'—the point behaves as some kind of liquid and so it flows downwards—but of course this will not work in the cases of the other dimensions. It seems much more likely that the specific directionality of the dimensions expresses the view that there is a hierarchy of directions: up, right, and front are prior to down, left and behind. I wish to suggest that the source of this hierarchical systematization of dimensions and directions may be found in Aristotle's startling discussion of the directions in the cosmos in *De Caelo* 2.2 together with a Neo-Pythagorean response to Aristotle's criticism of the Pythagoreans in the same context.[38]

Building on the results of the no less curious treatment of the six directions in *De Incessu Animalium* 2-7, in which he connects the different directions with the functions of living beings, Aristotle says in *De Caelo* 2.2 284b24-5 that: 'Above is the starting point

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[35] *Definitions* 11 περατοῦται δὲ πᾶν στερεὸν ὑπὸ ἐπιφανειῶν καὶ γίνεται ἐπιφανείας ἀπὸ τῶν πρόσω [ἔμπροσθεν] ἐπὶ τὰ ὀπίσω ἐνεχθείσης.
[36] Sextus will speak about the generation of dimensions by 'flowing' at a later point. See pp. xxx below.
[37] See pp. xxx below
[38] The relevance of the *De Caelo* is noted also by Dye and Vitrac (2009) 177.

(ἀρχή) of length, right of breadth, before of depth'. He adds a little later, at 285a19, that length is prior in the sense of generation to breadth, and—although he does not make it explicit here—presumably also to depth. The outcome matches exactly what we have found in the group of texts discussed above both in the order of dimensions and in the respective starting points of the dimensions. Moreover, just as Sextus, Aristotle speaks about length, breadth and depth, and not about line, surface and solid as the *Definitions* (and Nicomachus). Yet, clearly, Aristotle's results come not so much from a theory about the generation of dimensions (which seems to be the immediate background of the view in the *Definitions* and Sextus), but rather from the assumed connection between the directions and the functions of living beings. According to the analysis of *De Incessu Animalium* 4—which is surely connected to the *Timaeus*' discussion of the directions in the organism—growth and the distribution of nutriment is from above to below (with the awkward consequence that the roots are the superior part of plants), locomotion is from the right to left (supported by the 'facts' that all men carry burdens on the left shoulder and that they hop easier on the left leg) and the sense organs, directing movements, are positioned in the front. The outcome is that although all bodies are extended in three dimensions, the six directions properly speaking characterize only animals and that the directions in an animal are relative neither to absolute directions nor to the perspective of the observer, but to the functions of the animal.[39] Aristotle adds however that we can assign directions to inanimate objects analogously and relative to ourselves.

It is remarkable that Aristotle's couches the whole discussion of the directions of the cosmos in a polemic against the Pythagoreans. Ultimately his two points of criticisms are (i) that the Pythagoreans speak only about right and left, omitting above and below which are prior to them in so far as length is prior to breadth and (ii) that they assign right and left to

[39] The question may actually be even more complicated. For Aristotle says that: 'The distinctions are three, namely, above and below, front and its opposite, right and left—all these three oppositions we expect to find in the perfect [or: complete] body [cf. *De Caelo* 1.1]—and each may be called a principle. Above is the principle of length, right of breadth, front in depth. Or again we may connect them with the various movements (Ἔτι δ' ἄλλως κατὰ τὰς κινήσεις), taking principle to mean that part, in a thing capable of movement, from which movement first begins. … Hence we must not look for above and below, right and left, front and back, in every kind of body, but only in those which, being animate, have a principle of movement within themselves.' (trans. Stock). He thus clearly mentions the directions also before introducing the perspective of movements. It is not entirely clear whether the restriction expressed in the last sentence quoted is limited to approaching the directions from the perspective of motions.

inanimate things as well.[40] What seems to justify Aristotle's criticism is that right and left are included in the Table of Opposites, but the other two pairs of directions are not. I would suggest that some later Pythagoreans accepted the force of (i), but rejected (ii). The ensuing view is that in speaking about the derivation sequence of the dimensions, one must also include the priority relations among pairs of opposite directions and say that the derivations are directional. The account of line, surface and body in the *Definitions* and the definitions of the dimensions Sextus attributes to the mathematicians register this development.[41]

5. The relationship between body and dimensions

Having presented the definition of the mathematicians, Sextus next turns to the possible ways to account for the relationship between the dimensions and the body (367-75). At this point the difference between the incorporealist and corporealist standpoints is already of consequence. For the incorporealists, Sextus' problem will amount to the following question: what is the relationship between first principles and derivative entities? For the corporealists, by contrast, the question will concern the relationship between the ontologically basic primary entities and those items that figure in their conceptions. In so far as Sextus' primary targets should remain the incorporealists, the success or failure of this section will depend on whether his arguments will effectively be applicable to the way the corporealists would conceive the issue. In particular, Sextus' argument uses disjunctions as its premises at several levels: 'the relationship between body and dimensions is either A, or B; if A, then it is either Ai or Aii'. Now it is *prima facie* conceivable that different options are available to express the relationship between primary and derivative entities on the one hand, and the relationship between primary entities and entities that are included in their conceptions, on the other. If so, it may well be possible that what is an exclusive and exhaustive disjunction in view of the first question, is not so in view of the second, and thus the argument is valid in the first, but not in the second case. Moreover, as we shall see in a moment, Sextus' main candidate is that

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[40] *DC* 2.2 285a25-7: Διά τε δὴ τὸ παραλείπειν τὰς κυριωτέρας ἀρχὰς δίκαιον αὐτοῖς ἐπιτιμᾶν, καὶ διότι ταύτας ἐν ἅπασιν ὁμοιως ἐνόμιζον ὑπάρχειν.

[41] This suggestion may add further substance to Isnardi Parente's conclusion (Isnardi Parente (1992) 151) that Sextus' source for these chapters of the *Against the Physicists* should be granted the status of an important source of information on Hellenistic Neo-Pythagorean views.

body is, in some way or other, a compound (ἄθροισμα) of the dimensions, and this is how the dimensions 'constitute' the body; in this respect the pivotal question will be what ἄθροισμα means and, furthermore, whether 'constitution' would have the same sense in the two contexts.

According to Sextus' initial dilemma, we can either (A) conceive the body independently of its dimensions, or (B) the body is an aggregate or compound (ἄθροισμα) of the three dimensions (*M* 9.368). We may readily grant to Sextus that (A) is a nonstarter in view of the conception of body we are considering. The remaining discussion considers different alternatives for conceiving body as an aggregate of the dimensions. In the first step, we get a dichotomy in terms of the corporeal–incorporeal distinction: the dimensions are either (Bi) corporeal or (Bii) incorporeal. In the next step Sextus adds two further options for the ἄθροισμα view: either (Biii) the dimensions contained the logos of body in themselves before they formed a body, or (Biv) body supervenes on (or emerges from, ἐπισυνεβή) the complex of three dimensions. The whole discussion is cursory, and the presentation of the alternative views, never assigned to individual authors or schools, is rather crude. Moreover, there is no attempt to show either that the (A)–(B) disjunction is exhaustive, or that the four versions presented cover all the possible variants of (B), the ἄθροισμα view.

All the arguments against the different versions of the ἄθροισμα view turn on the corporeal–incorporeal dichotomy. (Bi), i.e. that the dimensions are corporeal, can quickly be disposed of because it immediately results in an infinite regress: if the dimensions taken individually are bodies, then each of them will have three dimensions as well.[42] (Bii), that the dimensions are incorporeal, may initially appear considerably more plausible—also because it is fair to assume that not only the incorporealists, but also most, if not all, the corporealists would consider the dimensions incorporeal.[43] Yet, Sextus summarily points out that the mere addition of incorporeals will never result in anything bodily. More precisely, he says that the conjunction or 'coming together' (συνέλευσις) of lines, which are incorporeal, and the

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[42] Note, however, that the parallel argument in *PH* 3 does not stop at establishing the regress, but goes one step further: the body will then be composed of infinitely many bodies and must be of infinite size. Sextus applies the infinitely many bodies argument specifically to surface at the very end of the chapter in *M* 9.435. Note that by the application of the doctrine of blending through and through, the Stoic can accept that a body is constituted by entities that are themselves bodies in such a way that the constituent bodies are spatially coextensive with each other and with the body they constitute: more bodies does not mean larger extension.

[43] LS i. 301, followed tentatively by White (1992) ch. 7 develops the interpretation according to which limit entities fall completely outside the corporeal–incorporeal distinction, and are members of the class of pure mental constructs.

compounding of points will never result in a solid and *resistant* body (στερεὸν ... σῶμα καὶ ἀντίτυπον), so also length, depths and breadth, will not produce body (370). The addition of ἀντίτυπον, which makes it unambiguous that Sextus is speaking here about physical bodies, renders the argument problematic towards both camps. The mathematicians may formulate an objection on the basis of the distinction between physical bodies and geometrical solids.[44] The Stoics and the Epicureans may insist, on the other hand, that even if they grant that they need to give an account of the relationship between body and the dimensions in so far as their conception also includes reference to dimensions, they have never agreed that the dimensions are sufficient to provide a resistant physical body; their point was exactly that we need something further, i.e. resistance, to obtain physical body. The real targets of the argument could however be Sextus' 'mathematicians', i.e. those in the Neo-Pythagorean–Platonist tradition who, in the manner of the *Timaeus*, seek to generate also physical bodies from geometrical entities.

(Biii), that the dimensions contained the logos of body in themselves before they formed a body, and (Biv), that body supervenes on (or emerges from, ἐπισυνεβή) the complex of three dimensions, first appear to be more refined alternatives to the rigid corporeal–incorporeal dichotomy of (Bi) and (Bii), yet they soon get collapsed into them. Thus, it never becomes clear in exactly what way (Biii) differs from (Bi). And even though (Biv) sounds promising in so far as the term ἐπισυνεβή is indeed sometimes used to describe the way physical objects are derived from mathematical entities,[45] it also gets reduced to the corporeal–incorporeal dichotomy in a rather mechanical way. In this case, Sextus first assumes—reasonably—that the 'supervenience' view posits incorporeal dimensions, but then asks what 'happens' to the dimensions when they come together to form a body. If they remain incorporeal, we are back to (Bii): incorporeal entities that remain incorporeal cannot deliver a (physical) body. If, on the other hand, one wants to claim that the dimensions *become* corporeal in their conjunction, one needs to accept that they have already been corporeal from the start, because only bodies can undergo qualitative change (μεταβολή), and becoming corporeal is assumed to be such a change. Now, I am not suggesting that those who formulated, or could find attractive, the ἐπισυνεβή view had a full story about

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[44] Cf. n. 24 above, with reference to Mueller (1982, 77).
[45] Cf. e.g. Alex. *in Metaph*. 75.2 commenting on the way numbers, for the Pythagoreans, are supposed to be causes of the physical cosmos.

supervenience or emergence, but it is fairly clear that Sextus does not block all the routes that could be available to these thinkers. Sextus' approach in formulating the dilemma is acceptable in so far as it may legitimately be asked whether anything 'happens' to the lower level constituents when the higher level entity emerges.[46] Yet, he does not seem to allow for instance that the first prong of the ἐπισυνεβή view may differ from (Bii); i.e. that there can be other, more sophisticated, ways to conceive the relationship between the static constituents and the composite entity. He does not even employ puzzles he raises elsewhere about the generation of a composite entity: how can a further, additional thing come to be from a combination of components (cf. e.g. *M* 10.338).

The most problematic part of Sextus' argument is however his initial dichotomy: if body is conceived in terms of dimensions, it will be conceived as an ἄθροισμα, aggregate, of the dimensions. What is common to the different variants of this view is that, in accordance with 'the mathematicians' incorporealism', but in contrast with the fundamental tenet of the corporealists, these conceptions treat the dimensions as ontologically prior to bodies. The underlying assumption seems to be that body is generated from the 'coming together' or conjunction of the independently existing dimensions.

This general assumption will certainly be inadmissible for the corporealists. Epicurus, for one, is at pains to work out an alternative to this picture by explicitly refusing to conceive the relevant relationship in terms of ἄθροισμα. The key text is a difficult passage in the *Letter to Herodotus* in which Epicurus discusses the relationship between bodies and their permanent attributes (*Hdt.* 68-70). However, Epicurus does not refer to dimensions in this context, but mentions shape, colour, size and weight (keeping the list open). Now, the role he assigns to permanent attributes is the same as the role of dimensions in the alternative conception of body under scrutiny in Sextus' text: they are necessary ingredients of the conception of body (ὧν ἄνευ σῶμα οὐ δύνατον νοεῖσθαι) and the body is in a way a complex of these. That Sextus, too, recognizes the parallel is shown by the fact that in describing the relationship Epicurus posits between body and size, shape and resistance in his list of conceptions of body in *M* 1.21, he uses the same language that he uses now for describing the relationship between body and dimensions: he says that according to the first

[46] For a contemporary formulation in which the lower level entities undergo a change, cf. Paul Humphreys' conception of emergence as 'fusion' (Humphreys 1997).

conception of Epicurus, body is a conjunction by aggregation (σύνοδός ... κατὰ ἀθροισμόν) of size, shape and resistance.[47]

Now Epicurus explicitly discards some of the assumptions used in Sextus' argument. He makes it clear, first, that the items listed in the conception of body are not some incorporeals that would exist on their own, independently of the body. He then argues that the nature of the body is a complex (ἀθρόον) of the permanent properties, but not in the way as a larger body is an aggregate (ἄθροισμα) of its bodily constituents, atoms or smaller component parts.[48] We can on the other hand distinguish these constitutive properties by a special way of the mental operation of focusing (ἐπιβολή)—which does not mean that what we can focus on in these ways can be separated from the complex conception of the body.[49] A body can be conceptually analysed into these items, the complex of which provides us with a grasp on the nature of body. Body, however, is not constituted by them in the sense that body is not generated by somehow putting together these items, as they were material parts. The way Epicurus speaks about the relationship between body and permanent attributes is clearly applicable also to the relationship between body and dimensions. Moreover, there are good reasons to think that, all the doctrinal differences about the ontology and nature of limit entities notwithstanding, both Aristotle and the Stoics[50] would follow roughly the same route. They would agree that although body can be analysed into dimensions by a mental operation, it does not mean either that the dimensions arrived at in these ways can be conceived independently of body, or that they would exist independently of body so that the dimensions would be generative of body in the way Sextus' presentation appears to assume. Thus they could actually all agree with Sextus that no version of the ἄθροισμα view will describe the

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[47] At the very end of the chapter on body, Sextus will consider a version of the Epicurean definition in terms of the permanent attributes and there he phrases it in term of ἀθρόος that figures in Epicurus' original text.

[48] The emphasis here is on the fact that the physical constituents also have magnitude—and are hence bodies—but are smaller than the aggregate. There is no such relationship holding between the body and its permanent properties.

[49] οὔθ' ὡς ἕτερ' ἄττα προσυπάρχοντα τούτῳ ἀσωματα· οὔθ' ὡς μόρια τούτων, ἀλλ' ὡς τὸ ὅλον σῶμα καθόλου μὲν <ἐκ> τούτων πάντων τὴν ἑαυτοῦ φύσιν ἔχον ἀίδιον οὐχ οἷόν τε εἶναι, συμπεφερημένων ὥσπερ ὅταν ἐξ αὐτῶν τῶν ὄγκων μεῖζον ἄθροισμα συστῇ ἤτοι τῶν πρώτων ἢ τῶν τοῦ ὅλου μεγεθῶν τοῦδέ τινος ἐλαττόνων, ἀλλὰ μόνον ὡς λέγω ἐκ τούτων ἁπάντων τὴν ἑαυτοῦ φύσιν ἔχον ἀίδιον. καὶ ἐπιβολὰς μὲν ἔχοντα ἰδίας πάντα ταῦτα ἐστι καὶ διαλήψεις, συμπαρακολουθοῦντος δὲ τοῦ ἀθρόου καὶ οὐθαμῇ ἀποσχιζομένου, ἀλλὰ κατὰ τὴν ἀθρόαν ἔννοιαν τοῦ σώματος κατηγορίαν εἰληφότος. The text is exceedingly difficult and I do not claim to understand it in every detail. In the main lines I follow the interpretation and construal suggested in LS 7B (with interpretation in vol 1. p. 36-7 and additional notes in vol. 2, p. 28), possibly with the exception of the last clause quoted.

[50] Cf. Proclus *in Eucl.* 89.15-18 according to which the limit entities exist only κατ' ἐπίνοιαν, contradicted by Posidonius (D.L. 7.135) according to whom they exist also καθ' ὑπόστασιν.

relationship between body and dimensions, yet they will object that this is not the only available way to conceive this relationship. Indeed, Sextus' arguments could well serve the corporealists in their polemics against the incorporealists, and may ultimately go back to such contexts.

I think it is instructive to consider at this point the way Descartes treats the relationship between body and dimensions. He comes back to this question time and again, but a brief passage from Rule Twelve could function as a direct response to Sextus' puzzles:

> If, for example, we consider some body which has extension and shape, we shall indeed admit that, with respect to the thing itself, it is one single and simple entity. For, viewed in that way, it cannot be said to be a composite made up of corporeal nature, extension and shape, since these constituents have never existed in isolation from each other. Yet with respect to our intellect, we call it a composite made up of these three natures, because we understood each of them separately before we were in a position to judge that the three of them are encountered at the same time in one and the same subject. That is why, since we are concerned here with things only in so far as they are perceived by the intellect, we term 'simple' only those things which we know so clearly and distinctly that they cannot be divided by the mind into others which are more distinctly known. Shape, extension and motion, etc. are of this sort; all the rest we conceive to be in a sense composed out of these. (AT 10.418 = CSM 1.44)

Descartes, just as Epicurus, starts by emphasizing the different ways something can be considered a compound. He also stresses that the conceptual analysis by which we decompose body into items that constitute its nature—extensions, shape—does not deliver ontologically more basic and separable entities. The distinction between body and extension is achieved by a mental operation of the intellect which 'alone has the ability to separate out abstract entities of this sort' (AT 10.444 = CSM 1.60). But in the next move, he also has to stress that the items that are the outcome of the conceptual analysis, are 'simple natures' that we cannot analyse further. Decomposition even in this sense has to stop here. As he says also in his letter to Princess Elizabeth (21 May 1643, AT 3.665 = CSM 3.218), extension is a 'primitive notion'. Sextus, however, moves on and seeks to bring the analysis further by asking what length, taken to be the primary extension, is. This move, in itself, is unobjectionable in so far as neither Greek mathematical thinking, nor the relevant philosophical theories block such a step by introducing the conception of primitive notions.

5. The existence of dimensions: length and line

At *M* 9.375 Sextus turns to his second main set of arguments, which extends to 433 and thus takes up the larger part of the chapter. The proclaimed general aim of this long section is to present arguments for the non-existence of body through arguments for the non-existence of dimensions: if we conceive body as that which is constituted by length, breadth and depth, and it turns out that length, breadth and depth do not exist because no conception of them is forthcoming, then body—so conceived—cannot exist either. The argument thus combines conceptual and ontological considerations at more than one level.[51]

The fact that these arguments concentrating on the existence of dimensions are separated from the previous ones that focus on the way dimensions can constitute the body is an advantage of *M* 9 compared to *PH* 3 where these questions are treated together in a somewhat jumbled way. In *M* 3 these two arguments, formulated in the very same terms as in our text, are separated and follow each other in the order we have in *M* 9. It is important to emphasize, however, that in *M* 3 these two arguments come after the discussion of point, line and surface, the joint discussion of line and surface, the discussion of straight line, and so forth. The argument about the existence of dimensions is presented as a brief addition, taking up only 6 lines, before Sextus finally concludes in *M* 3.92 that the *arkhai* of the geometers are unfounded. As we shall see, in *M* 9 all the arguments about the fundamental geometrical notions not only follow the argument which makes the existence of body dependent on the existence of dimensions but are subordinated to it. The reorganization of the material is clearly motivated by the fact that in *M* 9 Sextus approaches the fundamental geometrical notions in the perspective of his general examination of conceptions of body.

Even if the argument about the existence of dimensions is distinguished from the argument that discusses the different ways in which the three dimensions may constitute body, it takes as its tacit premise that there is a part–whole relationship between body and the dimensions. The parallel argument in *PH* 3 (which includes ἀντιτυπία) makes the point explicit: ‘Now without length and breadth and depth and resistance, nothing will be a body; but if a body is these items, then anyone who shows that they are unreal will do away with

[51] Cf. the discussion by Bobzien p. XXX in this volume about the problematic nature of such moves.

bodies too (for wholes are done away together with all their parts)' (*PH* 3.40 trans. Annas and Barnes). Thus, the task now is 'to do away' with the dimensions that constitute body.

Sextus immediately translates the question of the existence of dimensions into the question of the existence of fundamental geometrical objects. The entire later development between 375 and 433 is ultimately dependent on this move. The crucial sentences run as follows:

> … nothing is length, breadth and depths, as we shall establish; therefore body does not exist. For length does not exist, since this is the greatest dimension of the body which is called 'line' by the mathematicians, and the line is a point which has flowed, and the point is a partless and unextended sign (σημεῖον). Hence, if nothing is a partless and unextended sign, there will not be line either, and since there is no line, there is no length either, and since there is no length, body will not subsist (ὑποστήσεται) either. (375-6)

The key step comes in the phrase I have underlined; apparently it is the identification of length and line that provides the basis for the elimination of dimensions through the elimination of limit entities. That the non-existence of length follows from the non-existence of line—which in turn follows from the non-existence of point—is reiterated a little later at 379 as a coda to the short arguments for the inconceivability of point. And when Sextus next turns to the arguments for the inconceivability of line, he says once again that one can argue for the non-existence of length by establishing that line does not exist, because length is line (ἦν γὰρ τὸ μῆκος γραμμή, 380). The same conclusion is repeated at the end of the section dealing with the derivation of line from point (389).

Remarkably, this explicit and emphatic identification of length and line is absent from *M* 3. We may perhaps interpret it as a clear recognition from Sextus that in the entire long subsequent section he is still focusing on the same conception of body, expressed in terms of dimensions, and he must therefore first establish that the dimensions are dependent on, or indeed identical with, the fundamental geometrical entities. This move, on the other hand, may seriously threaten the efficacy of Sextus' strategy. If the dogmatist opponent refuses to accept this identification, the arguments for the inconceivability of point, line and surface will not threaten his conception of body in terms of dimensions. Disagreeing with the Platonists, a corporealist dogmatist may accept that body is to be conceived in terms of three-dimensional extension (with or without resistance) without nonetheless accepting that body is in any way

constituted by points and lines or that the dimensions should be conceived in terms of fundamental geometrical notions.

It is thus highly significant that Sextus immediately translates the dimensions into limit entities as conceived by the mathematicians, and apparently does not allow for possible alternatives formulated by the corporealists. The consequence of this identification is that once Sextus disposes of the various mathematical conceptions of limit entities to his own satisfaction, he considers the job of eliminating body—also as conceived by the corporealists—done. Yet the physicists could, and did, come up with other conceptions of limit entities; for instance the Stoics could claim that limits have depth, albeit infinitesimal depth, whereas the Epicureans taught that limit entities will have a definite three-dimensional magnitude. Thus they can readily agree with Sextus that the mathematical conception of limit entities is flawed, or that limits as conceived by the mathematicians are not applicable to the description of physical reality, without conceding that all this threatens the conception of physical body as three-dimensionally extended (with or without resistance).[52] Indeed, it is highly probable that many of the subsequent arguments against the fundamental geometrical notions originate in Stoic and especially Epicurean texts.[53] At this point the distinction between geometrical and physical bodies also becomes crucial. For it may be much easier to argue that geometrical body stands or falls together with other fundamental geometrical entities, point, line, and surface, so that the conceivability and ontology of these geometrical objects comes in a package, than to accept that physical body is also part of the package.

It is important to note, moreover, that *PH* 3 offers a further possibility, namely that surfaces and lines are 'observed only in connection with so-called bodies' (μόνον περὶ τοῖς λεγομένοις σώμασι θεωρεῖσθαι, *PH* 3.41, trans. Annas and Barnes), which would reverse the priority relationship between line and body. This option, corresponding to the focus on the incorporealist mathematicians, is not entertained here or elsewhere in our chapter; an omission that creates yet another momentous lacuna in the argument of *M* 9.

Let us see then how Sextus justifies the identification of length and line. In a first step, he defines length as the greatest dimension of the body. This, in itself, does not seem to be problematic. If we take a three-dimensional object the actual position of which is not fixed,

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[52] I cannot enter here into the discussion of the ontological status of limits, point, line, and surface according to the different parties concerned. For an instructive treatment of the relevant Aristotelian, Epicurean and Stoics views, see White (1992).

[53] Cf. Dye and Vitrac (2009).

we may designate the longest dimension of it as its length. It is plausible to say that we measure the length of a pencil or a couch always along its largest extension irrespective of the position of the object. This conception is however clearly in contrast with the position-based definition of length ('length is that which is from above to below') that Sextus used in his initial presentation that we considered earlier. We have also seen, on the other hand, that Stobaeus lists exactly these two as alternative conceptions of length.[54] Stobaeus however hastens to point out that that conception of dimensions which defines length as the largest dimension is problematic in the case of bodies such as a sphere: as a body it must have length together with breadth and depth, yet none of these is larger than the other two. Nonetheless, Simplicius in his commentary on Aristotle's *De Caelo* 2.2 emphasizes that 'length is said to be the greatest dimension in *every* body' to supply a premise for his explanation of Aristotle's argument for the claim that the length of the spherical cosmos is the axis joining the two poles.[55]

Yet even if we accept the somewhat counterintuitive claim that in the case of every body one of the dimensions is greater than the others, and that this is the length of the body, (or in the case a sphere, we can designate in a non-arbitrary way one of the diameters as the length of the sphere), how can this motivate the identification of length and line as Sextus' formulation would require it? The background of the identification of length and line, I would suggest, lies elsewhere and is closely connected to the developments I have tried to reconstruct above in discussing the directionality of dimensions. If it is true that length is prior to the other dimensions (as Aristotle also argues in *De Caelo* 2.2 and *IA* 2-7) and, on the other hand, line is the first dimension which is generated from the point, we can say that when the point has flowed, we get the first dimension of the future body, i.e. its length. And in so far as in the next phase of the generation of dimensions we get surface from line, and breadth is the second dimension of the body, surface can be treated as the breadth of the body, or, alternatively, that it is length and breadth. Yet this conception of length is not the same as the one which identifies it with the *greatest* dimension of the body. If you take the generative view of the body, there is nothing, as far as I can see, that could guarantee that what is generated first is also its quantitatively greatest dimension. Moreover, the claim that length is the greatest dimension indicates that we are not dealing with indeterminate

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[54] Cf. p. xxx above.
[55] *CAG* 7.390.2-6. μῆκος γὰρ ἐν πᾶσι τοῖς σώμασι λέγεται τὸ μέγιστον ἐν αὐτοῖς διάστημα.

extensions. Thus, I think, Sextus' move would be much better motivated if he had said that 'For length does not exist, since this is the *first* dimension of the body which is called 'line' by the mathematicians.' There seems to be a confusion here between the two conceptions of dimensions that Stobaeus duly distinguishes.

When formulated in that way, the identification of line and length may moreover reveal a further confusion between 'having length' and 'being length'. Length appears together with line because the line already has length. But this does not mean that line is length or length is line. The identification nonetheless seems to lurk also in the Euclidean definition of line. For the Euclidean definitions states not merely that 'line is that which is extended in one dimension', as Nicomachus will later say (*Intr. Arithm.* 2.6.4), or that 'line is what has length only' but that it is 'breadthless length' (Def. 1.2). Compare the definition of surface: 'A surface is that which *has* length and breadth only' (Def. 1.5). Note also the priority relations among dimensions seems to be presupposed in these definitions as well.[56]

6. Point, line and surface

As we have seen, Sextus in the programmatic sentences of 375-6 makes the existence of body ultimately dependent on the existence of point. If the conditional in the last sentence in the passage quoted above holds ('if nothing is a partless and unextended sign, there will not be line either, and since there is no line, there is no length either, and since there is no length, body will not subsist either'), it should in theory be sufficient to argue merely for the non-existence of point. However, presenting all the arguments included also in *Against the Geometers*, Sextus systematically goes through the available conceptions of point, line and surface. Surely, those conceptions of line that derive it from point ('line is a point which has flowed' and 'line is a row of points') are also relevant in so far as they substantiate the claim that line depends on point. Yet Sextus does not stop there but examines further conceptions of line, and then surface, and examines whether they are consistent with the mathematicians'

[56] Hero *Def.* 2.1 lists both definitions. Note that μῆκος in specific geometrical contexts, moreover, can be used synonymously with εὐθεῖα. See Mugler (1958) 293 s.v. μῆκος. It is also remarkable that Aristotle in some key passages uses the word μῆκος where one would rather expect γραμμή. See e.g. *Met.* M3 1078a8 and *Phys*. 2.2 193b24-6.

'theorems'.[57] Now this overall strategy is clearly relevant in the context of the *Against the Geometers*. The notions in question form the basis of geometry as a *technê*, which builds its whole edifice on these; this is why it is informative to relate these conceptions to further, more complex statements, operations, and notions used by the same *technê*. A *technê* can effectively be destroyed by showing that its fundamental notions, as well as its more complex operations, turn out to be incoherent. In such a context, this kind of overkill can also be a powerful rhetorical tool. Indeed, for destroying geometry as a *technê*, one does not need to show that its assumed fundamental objects do not exist; it is sufficient to show that the a *technê* is incapable of construing a coherent conception of them.

Prima facie, the whole exercise is much less relevant in the context of *Against the Physicists*, where the primary target should still be the first principles of the dogmatic physicists. There are cases, however, where this tactics furnishes considerations that turn out to be relevant in this context as well. Discussing various alternative conceptions of the different limit entities may deliver such formulations which could be accepted also by the dogmatist physicists. So along the two definitions of surface that would surely be rejected by Epicureans and Stoics alike—i.e. that 'surface is the line which has flowed' and 'surface is breadth without depth'—we get a third definition, 'surface is the limit of body', which could be accepted by them. Similarly, the examination of the question what happens to limit entities when two bodies touch (430-6) is relevant in the context of the *Against the Physicists* as well. The impression we get, especially in view of the close correspondence with *Against the Geometers*, is that Sextus keeps concentrating on the geometers, casts his net far and wide, and then some of his catch turns out to be material to his present agenda, without him explicitly discriminating between what is and what is not relevant.

The overall structure of the examination of the basic geometrical objects is as follows. First comes a relatively brief discussion of point conceived as a partless and unextended sign (377-8). In the next step, Sextus turns to line, starting with those conceptions of it that derive line from point (380-8). He wraps up this section by an interim conclusion stating that line cannot be conceived in relation to point, therefore body does not exist (389). Next, he turns to doing away with line directly (προηγουμένως), according to its own conception (390). The direct attack on line concentrates primarily on the definition that we know from Euclid ('Line

[57] The examination of surface (430-6) may actually be taken as independent from the project announced in 375-6 in so far as it primarily concentrates on the question what happens to limits when two bodies touch.

is breadthless length', Eucl. Def. 1.2)[58] but also includes a short section on line conceived as the limit of surface (cf. Eucl. Def. 1.6). At 418 Sextus formally announces the end of the direct examination of limit entities and body, but he appends a longish section in which he discusses the *aporiai* that result when one relates the conceptions of the fundamental geometrical entities to geometrical hypotheses and theorems about more complex, derivative geometrical objects (circle, straight line, parallel lines, square, cylinder etc., 419-30). For once, Sextus makes explicit that this section has no direct bearing on the conception of body under investigation,[59] but claims that it provides further evidence to show the absurdity and inconsistency of the geometers' conceptions. Finally, he completes the programme by a section on surface (430-6). It is formally connected to the previous discussion of line, and starts with the thesis that the surface is generated from line, but it concentrates rather on the puzzles stemming from treating surface, understood as a two-dimensional entity, as the limit of body. Sextus proclaims the end of the examinations concerning the conceptions of basic geometric objects and the related theorems at 437. As practically all the arguments contained in this section are identical with the ones in *Against the Geometers* and hence were discussed by Ian Mueller, and more extensively by Wolfgang Freytag, I shall treat this section briefly, primarily concentrating on those points that reveal the articulation of the arguments and their place in the overall argumentative strategy of the chapter.

Collecting the different conceptions of the fundamental geometrical entities, there appear to be three ways to give an account of them:[60]

i. by derivation: the n+1-dimensional object is the n-dimensional object which has flowed: 'line is the point which has flowed' and 'surface is the line which has flowed'.

ii. as a limit: the n-dimensional object is the limit of the n+1-dimensional object 'point is the limit of line', 'line is the limit of surface' and 'surface is the limit of body'.

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[58] Dye and Vitrac (2009) 174-point out very reasonably that from the presence of definitions identical to those in Euclid one should not infer that Sextus consulted Euclid's *Elements*, or for that matter any other more technical geometrical treatises, or that his primary targets were these works and authors.

[59] For this reason I shall not discuss this section.

[60] For a somewhat different formulation of the three types of definition, see Freytag (1996) 162.

iii. by privation: the *n*-dimensional object is an extension that does not have the extension characteristic of *n*+1 dimensional objects: 'point is a partless and unextended sign', 'line is breadthless length' and 'suface is breadth without depth'.

An important difference between i. and ii. is whether we take the lower or the higher dimensional object as primary: ii. assumes that *n*-dimensional entities belong to *n*+1 dimensional objects, whereas i. takes it that *n*+1 dimensional entities can be generated from *n* dimensional entities; obviously, ii. will be more palatable to the corporealists. Sextus in *M* 3.19 seems to treat the genetic account primary from which the other accounts somehow follow (παρό).[61] We shall also see that Sextus apparently takes the view according to which the *n*+1 dimensional entity is a multitude of *n* dimensional entities as a possible interpretation of the derivation by 'flowing'. However, he does not add to the list a fourth type of account, according to which we define an entity as the origin or beginning of the next entity in the derivation sequence (although as we shall see in a moment, he considers that it is essential to point that it is generative of the line). There is evidence that such definitions were also current in the Pythagorean tradition. Aristotle mentions as an example the definition according to which point is the *arkhê* of line (*Top*. 108b31-2) and it has been plausibly argued that he takes the example from Archytas.[62] Nicomachus also uses this definition (*Intr. Arith*. 2.7).

A. Point

Even though the way Sextus introduces his overall strategy suggests that the examination of point will carry much of the weight of the argument, the point is dealt with very briefly (377-8). The section on point in *Against the Geometers* is considerably longer (*M* 3.22-8). According to Sextus' initial dilemma, the point is either corporeal or incorporeal. As it does not satisfy the criteria of three-dimensionality, the point cannot be a body. Sextus is thus using the conception under investigation as a premise in the argument—this is of course fine in so far as he wants to show the internal inconsistency of the conception. The argument to the effect that the point cannot be incorporeal uses as its premise that the point is generative

[61] The list of definitions considered by Sextus in Mueller (1982) 73-4 is not complete.
[62] Huffman (2005) 499-503.

of the line. Yet, if the point is incorporeal, it cannot function as a source of generation for further entities, because generation presupposes contact (θίξις) and only something corporeal can be in contact.[63]

The whole discussion turns on the expectation that the point is that from which the other dimensions, and ultimately the body will be built up. Sextus thus does not consider whether the notion of the point as a partless and unextended entity is coherent in itself, and does not exploit the numerous puzzles, mentioned also by Aristotle, that may arise from such a conception. Similarly, taking the point to be incorporeal may be coherent in itself—but it will not do for our purposes, because then it will not be able to produce line. A discussion of that conception which takes point to be a limit entity—one which receives a treatment also in *M* 3—is missing too.

B. Line

i. Derivation from point

Sextus next turns to line and the critical examination of the different conceptions of line will take up the larger part of the remainder of the chapter. Remember that line is crucial since this is what Sextus has identified with length, and length is supposed to be essential for the constitution of body being its primary dimension. First come those conceptions that derive line from point. The discussion of the relationship between point and line had had of course a long history by that time, starting at least with Archytas, and becoming an especially important issue among the disciples of Plato. Part of the problem is the old Zenonian one: how can something that has magnitude be constituted by things that have no magnitude. The other part of the problem is the topological relationship between points that are supposed to be constitutive of a continuous magnitude: how can we imagine the relationship between two neighbouring points. It is also important to see, as has often been emphasized, that these

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[63] It is notable that Sextus does not base his case on the Aristotelian argument from *Phys*. 6.1 that what is partless cannot be in contact (ἅπτεται), but states that *incorporeals* cannot be in contact. From the same assumption we can deduce that lines and surfaces, which have parts but are incorporeal, cannot be in contact either. For Stoic parallels, cf. e.g. Nemesius 81.8 = *SVF* 2.790 (part): οὐδὲ γὰρ ἐφάπτεται σώματος ἀσώματον. For the view that all causal interaction presupposes contact, see *M* 9.258. In *M* 10.325 Sextus says more specifically that generation and perishing presupposes contact. See also e.g. Plut. *De comm. not*. 1080E about Chrysippus' insistence on this point. For a more detailed discussion of why incorporeals cannot be in contact, see Freytag (1995) 4.2.2. and 4.2.3. on why contact is needed, according to Sextus, for generation.

questions cannot be adequately treated without a fairly advanced set-theoretical apparatus developed in the second half of the nineteenth century.[64]

Because the problems with the different conceptions of line are so apparent, Sextus can be generous, and employ the customary sceptic strategy: let us ignore that we have already done away with point, and hypothetically grant that it exists—even so the line will not exist because it is impossible to derive it from point. According to the old tag that Sextus constantly ascribes to the mathematicians, we obtain the line when 'the point has flowed' (στιγμὴ ἐρρυηκυῖα, 376); alternatively the line is the 'flux of sign' (ῥύσις σημείου, 380).[65] The ῥύσις doctrine is actually the only mathematical view to which Sextus attaches a name, if not in *M* 9, at least in *M* 3. At *M* 3.28 Sextus reports that Eratosthenes, in order to ward off attacks, used to say that the point does not have a place, neither does it measure the interval of the line, but produces the line by flowing (ῥυὲν δὲ ποιεῖ τὴν γραμμὴν). The attribution to Eratosthenes is confirmed by a parallel report by Theon of Smyrna in a context where he explicitly discusses Eratosthenes' views: 'As to the point, it produces the line neither by multiplication, nor by addition, but by a continuous movement, just as the line produces the surface, and the surface the solid' (*Exp.*, 31, 83.21-24 Hiller).[66]

Somewhat curiously, Sextus seems to consider that all those views that derive the line from the point can be described by the terms of ῥύσις and ἐρρυηκυῖα, so that these terms cover both those views (A) that obtain the line from a single point and those (B) that conceive the line as a set of points in a row. Now (B) is not only an unintuitive interpretation of the labels, but is the group of views in contradistinction to which Eratosthenes apparently put forward the ῥύσις doctrine in the first place. Indeed, other specifics of Eratosthenes' conception, most notably that the point does not have a place, are also ignored in Sextus' arguments which are based on the assumption that 'flowing' can only be conceived in physical terms.

The distinction between (A) and (B) constitutes the first dilemma which then leads to several further levels of dilemmas. Sextus first deals with the less probable option at each level, and then constructs a dilemma from the other horn. (A) is thus first divided into (A1)

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[64] Cf. e.g. White (1992) ch. 1 and 4, esp. 179-85; Freytag (1995) ch. 2 and 4.
[65] On the origins of this conception, see e.g. Isnardi Parente (1992) 195-61. She defends the view according to which the conception may ultimately go back to Archytas.
[66] Cf. Freytag (1995) and Dye and Vitrac (2009) 185.

the point remains at the same place, and (A2) the point moves from one place to another. (A1) is implausible both because it does not deliver a line—a stationary point will remain a point—and because why would we then say that the point flows? But (A2), the *prima facie* more plausible candidate, needs interpretation. When the point moves (A2i), does it occupy a new place by leaving its previous place behind or (A2ii) does it lay hold of the new place without giving up its first place? Again, (A2i) will leave us with a single moving point—Sextus does not even need to indulge in the difficulties that may be raised about the motion of a partless entity[67] and whether something which is not a body and has no extension can have a place.[68]

If one assumes that the point can flow and that it has a place, (A2ii) might be the most intuitive interpretation of the definition; and it is at this point that we can expect the argument to become more interesting. Sextus, however, formulates this option in a rather perplexing way. According to the next level of dilemmas when the point lays hold of a new place it becomes 'coextensive by stretching out' (ἀντιπαρεκτείνομαι).[69] As far as I am aware, this notion is not used in technical mathematical contexts, and evinces once again Sextus' fundamentally physicalist interpretation that treats point as a body. The rare term used here belongs to the Stoic technical vocabulary to designate the way in which two bodies interpenetrate in each other in *krasis*, and thus take up the same extension; in Sextus' presentation the same relationship would hold between point and its place.

According to Sextus' dilemma the point 'stretches out' either (A2iia) to an indivisible place or (A2iib) to a divisible place. Once again, the first option is implausible: what is coextensive with an indivisible place is still a point. Now what about (A2iib)? For, presumably, this is what the derivation is supposed to mean: the indivisible point has become the first divisible magnitude, i.e. the line. Sextus' objection is double. On the one hand, he points out, reasonably enough, that the resulting entity can no longer be a point in so far as it is divisible. The basis of this objection must be that the conception under investigation

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[67] Cf. Aristotle, *Phys*. 6.10 240b8-241a6.

[68] This problem arises from Aristotle's discussion of place in *Phys*. 4.1-5 according to which only a moving *body* can be in a place. Eratosthenes' insistence that the point does not have a place might be a recognition of Aristotle's point. On how the ancient commentators tried to make this claim compatible with the discussion of contact in *Phys*. 5.3 which presupposes that limit entities also have place, see Furley (1982) and White (1992) 24-8.

[69] Cf. *SVF* 2.471, 472 and 473 from Alex., *Mixt*. and Arius Didymus. This otherwise rare word occurs in Sextus 10 times, twice in the chapter on part and whole (*M* 9.262-3), three times in our passage, which is exactly paralleled in *M* 3, and once in the chapter on time (*M* 10.225).

assumes that the resulting line is not a qualitatively different entity, but still a point—a point which has flowed.[70] Besides, the change described by the verb 'to flow' does not seem to refer to a process of generation, but rather to locomotion or growth.

Sextus nonetheless adds another objection according to which, in so far as it is divisible, it must have parts, whereas that which has parts is a body (τὸ δὲ ἔχον μέρη σῶμα ἐστιν, 385)—so the point must be a body, which is unacceptable for those who hold this conception: it is not extended in three dimensions. So Sextus does not merely point out that the conclusion according to which the point has parts is incompatible with the definition according to which the point is partless, but introduces the further premise stating that that which has parts is a body. Perhaps we can derive this premise from the discussion of part and whole: that which has parts is a whole, but only a body is a whole (cf. *M* 9.332 and 334 for the Stoic and Peripatetic acceptance of this statement). We have seen above that the final stage of the discussion about the conception of point depends not on the partlessness of point, but on the corporeal–incorporeal distinction, and can therefore be extended to line and surface: it implies that not only point, but line and surface cannot be in contact either. Although Sextus does not draw this conclusion, in the present case the last premise implies that—in so far as they are not bodies—the line and the surface cannot have parts either. Partlessness ceases to be a distinctive feature of point.

Sextus now turns to (B): line is a multitude of points in a row (πολλὰ στοιχηδὸν κείμενα, 386). The argument turns on the question how the neighbouring points are spatially related. They are either (B1) divided by intervening spaces or (B2) touch one another. Again, (B1) is less plausible, because we have lost the continuity of the line. (B2), in turn, is dealt with by a variant of Aristotle's dilemmas in *Phys*. 6.1 231a-24b6: when points touch, do they touch whole by whole, part by part, or part by whole. As we know from Plutarch (*De comm. not.* 1080E), Chrysippus' chief objection against the advocates of indivisible magnitudes went along similar lines. One difference is that Aristotle simply points out that points, being partless, cannot touch part with part, whereas Sextus dwells on this issue at some length. He not only says that points should, on this conception, have distinguishable parts along the line—one by which they touch the previous point and one by which they touch the next point in the row—but also in the other directions as well. The line is imagined to lie on a surface so

[70] Freytag (1995) 175-76 argues that Sextus' fundamental objection is that one cannot identify the moment when the generation of line form point could take place.

that each point constituting the line touches the underlying surface with a further part; and have something above, so that the point has to have a fourth part by which it can touch the corresponding part of that thing. One may be struck by the literal-mindedness of the visual imagery—the points are supposed to touch the underlying surface as the pearls of a necklace touch the dressing table. Yet this elaboration reveals the refusal that 'naked' lines can exist just on their own in something like abstract space: the line must have some environment, and if we suppose that the line is constituted of points, these points must have some topological relation not only to one another but also to the corresponding parts of the environment. Indeed, the whole section is characterized, once again, by strongly physicalist, corporealist assumptions. Point, line, and surface are systematically treated as bodies, and then it is pointed out that they cannot be bodies, their parts are conceived as physical parts, whereas 'touch', as we have just seen, is portrayed as a physical contact between bodies.

The section is wrapped up by the conclusion that since it has been shown that there is no such thing as line, and we need line to conceive length, and length to conceive body, no such thing as body exists (389).

ii. Line is breadthless length

This is the point where Sextus turns to abolishing the line directly (προηγουμένως) according to its own conception. The expression may simply refer to a distinction between different conceptions: he is now turning to that conception of line which does not relate it either to point or to surface[71]—so neither i. nor ii. but iii. on the list above. We get a slightly stronger interpretation if we take the phrase to mean that Sextus will now attack line directly in the sense that the conception of line to be discussed is independent from the more specific doctrines of the mathematicians about the ontology and derivation sequence of geometrical entities. The conception in question—line is breadthless length—is thus not only a different one, but one that is less theory-laden and could be more widely accepted. The parallel use of προηγουμένως in *M* 10.189 offers some support for this construal.[72] Notably, this is also where Sextus starts to speak about 'geometers'—up until this point he has only spoken about the 'mathematicians'. The text does not make the relationship between the two designations explicit, but I find it tempting to think that, if the distinction is to carry any weight, then the

[71] So Mueller (1982) 72.
[72] Cf. Warren (2003) 314 and Bobzien p. in this volume.

geometers are those who do not need to be committed to the derivation sequence of geometrical objects. Indeed, none of the arguments of the subsequent section—where geometers are mentioned, and the coherence of their definitions and theorems is under attack—assumes the more robust metaphysics of the 'mathematicians'.[73]

The conception at issue is of course the Euclidean definition of line (Def. 1.2). Yet, as Sextus will also remind us, Aristotle had already formulated a defence of it; the definition and the controversies around it therefore must go back to pre-Euclidean times.

Sextus' strategy consists in applying an empiricist epistemology to show that what is defined in this way is inconceivable. It is notable that Sextus concentrates the empiricist artillery on this definition of line and does not apply it to the point (as he does in *M* 3.22-8). Sextus first presents a general typology of different ways in which we conceive (νοεῖται *M* 9.393; ἐπινοεῖται *M* 3.40) a concept (τὸ ἐπινοούμενον *M* 9.393; τὸ νοούμενον *M* 3.40).[74] According to the first division, we form concepts either by direct encounter with things that are manifest, or by transference (μετάβασις) from them; the experience of manifest things is thus a precondition of concept formation. Putting to work his usual method, Sextus contends that line can be grasped in neither way.

One might think that it is not a central issue for the geometer whether or not a length without breadth is directly perceptible. Yet there is some evidence that there were authors also in the mathematical tradition who tried to claim that one-dimensional entities are available to direct perceptual experience by referring to e.g. 'what divides illuminated regions from those in shadow.'[75] The purported direct perceptability of such entities should not only ward off sceptical attacks, like the one we find in Sextus, but could also be directed against those empiricist physicists who, for different reasons, deny that one-dimensional limit entities have any reality in the physical world. Sextus, however, ignores such examples and finds it sufficient to assert that length is never perceived in itself, but always together with some measure of breadth.

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[73] When he turns to the difficulties surrounding surface in *M* 9.430, Sextus refers to the derivation of surface from line by flowing, but does not exploit any of the puzzles that may derive from this conception. Instead, he immediately turns to consider those difficulties which arise when we define surface as that which has two dimension, having length and breadth only, and which takes it to be the limit of body. These latter are of course acceptable also for those who otherwise disagree with the derivation sequence view.

[74] Cf. also *M* 8.59-60. On this epistemological passage, see the fuller analysis in Mueller (1982) 78-81 and Freytag (1995) 1.3. See also Ierodiakonou pp. xxx in this volume.

[75] Proclus, *in Eucl.* 100.14-16. The claim is attributed to Apollonius by Heiberg; cf. also Hero, *Def.* 16.5-11.

Sextus then divides the other option, transference, into three ways of concept formation: according to resemblance (κατὰ ὁμοιότητα), composition (κατὰ ἐπισύνθεσιν) and proportionality (κατὰ ἀναλογίαν), this last one comprising diminution and increase. Once again, Sextus purports that we cannot conceive length without breadth by any of these modes. The ultimate origin of this specific typology is unknown, but it closely corresponds to somewhat different lists attributed to the Epicureans and the Stoics respectively. First, it differs from the theory of concept formation Diogenes Laertius ascribes to Epicurus only in that Epicurus does not subsume the three non-direct forms under μετάβασις.[76] What differentiates the non-direct modes is that in those cases there is some measure of contribution from reasoning. Diogenes attributes a similar, but more extensive, list to the Stoics (7.52-3), where we also find the examples of the Cyclops (increase) and the pygmy (diminution), mentioned by Sextus. The term μετάβασις does figure on that list, but not as a more general concept covering resemblance, composition and proportionality. It is briefly mentioned as the specific way things like *lekta* and place—and so presumably also void and time—are conceived. So if one, like apparently Plutarch (*De comm. not.* 1080E), thinks that limit entities belong in the category of incorporeals, one could speculate that line would be conceived by μετάβασις—but still it would not be identical with any of the modes examined by Sextus.[77]

Sextus' formulates his objections to two of the three forms of μετάβασις analogously. He points out that all three require that there is some entity such that it is directly available to perceptual experience, and itself shows the relevant kind of property that the entity to be conceived by transference also possesses. Thus, we can conceive a giant by increase or a pygmy by diminution, because human beings that are directly perceptible also have size. Yet we always perceive length with some quantity of breadth (as Sextus has already proclaimed in blocking the firs horn of his original dilemma), so by increase or diminution we could conceive lengths with larger or smaller breadths—but not without breadth. Similarly, there is no resemblance in the relevant way between a perceivable length with *some* breadth and a length *without* breadth. The third way, composition, is even easier to dispose of: for what

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[76] D.L. 10.32: καὶ γὰρ καὶ ἐπίνοιαι πᾶσαι ἀπὸ τῶν αἰσθήσεων γεγόνασι κατά τε περίπτωσιν καὶ ἀναλογίαν καὶ ὁμοιότητα καὶ σύνθεσιν,

[77] Mueller (1982) 78 notes that in so far as the Stoic μετάβασις appears to be a 'quasi-scientific inference to an explanatory concept', but the line does not seem to have such a role, μετάβασις may not be applicable to line.

manifest thing should we added to what other manifest thing—as we add horse and man to arrive at the conception of a centaur—to obtain the conception of a breadthless length?

Although Sextus does not mention them in his original classification, he adds and discusses a little later two further possible ways of concept formation: intensification or 'stretching' (κατ' ἐπίτασιν, 403-6) and privation (κατὰ στέρησιν, 407). Such later additions are always worrying. The original typology had the air of an exhaustive list—Sextus even added that 'there being this many ways of conceiving, if a length without breadth is conceived, it should be conceived in one of these ways' (396)—but then the reader has to learn that other options are also available, and may wonder whether even further possibilities, not considered by Sextus at all, would be available, so that they would make Sextus' argument inconclusive.

Now, the formulation in *M* 3 suggests that 'stretching' (ἐπίτασις) was the way (some) geometers actually tried to answer the empiricist challenge against the conception of line as breadthless length. The idea seems to be that we can conceive line as the limit towards which an infinite series of successive reductions of the other dimension of a surface converge. It would be exciting to see how exactly this idea was expressed by the geometers. In any case, Sextus does not accept such a notion of a limit of an infinite series and states, not unlike a Stoic would do, that there will be some breadth remaining after any finite number of steps; the length that has a however small breadth is still not breadthless. Or, there is a least breadth, and once we have removed that, there will be no length left either.

One cannot but agree with Mueller that Sextus' treament of privation (στέρησις) is 'rather unsatisfactory'.[78] Sextus' notion of στέρησις is very narrow and in this sense remains close to what, judging from the example in Diogenes, the Stoics may have meant by that term ('by στέρησις, for instance man without hands' D.L. 7.53). His principal point is that privation cannot operate by negating an essential attribute of the subject. The examples he gives to substantiate this point are particularly noteworthy: flesh cannot be conceived without vulnerability just as *body cannot be conceived without resistance.* This last one may have been entirely appropriate in its original context, but comes quite abruptly after the complete neglect of this question all along the chapter. And of course, Sextus has not yet established

[78] Mueller (1982) 80.

that the possession of breadth is such an attribute without which length cannot be conceived—it is exactly what he is supposed to show now.

Sextus' argument against Aristotle is similarly unrefined. Aristotle, in his defence of this particular conception of line, pointed out that 'when we grasp the length of the wall, we apprehend it without the breadth of it' (*M* 9. 412; fr. 29 Rose). Sextus' response consists in stating that even if we apprehend the wall's length without the actual breadth of the wall, we never do it without any breadth.

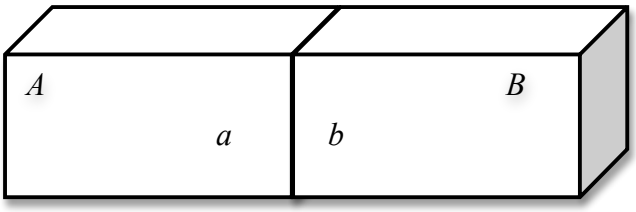
Much more could be said about this epistemological section, but this last point is a good reminder of the larger structural problems that the whole discussion of line as breadthless length raises. Remember that Sextus has undertaken the discussion of point and line because he assumed that the (the concept of) length, and hence (that of) body, is dependent on these. We need line to conceive length: line is primary, so if there is no line, there will be no length either. Yet the treatment of line in this section takes the opposite approach. It takes for granted that we have an object which has at least length and breadth, and argues that from this we cannot arrive at the conception of something which has length only (or is breadthless length). But even if the argument went through, from the inconceivability of line thus defined, it does not follow that we cannot conceive something that has length, breadth and depth. Thus, this long section does not seem to have any real effect on the question whether the conception of body as that which has length, breadth and depth (with or without resistance) is coherent in itself. It is clearly an argument that the empiricist corporealists can use against fundamental geometrical notions; more specifically, this argument can also be used against those geometers, such as Euclid, who do not base their case on the derivation sequence of these entities. We find, once again, an argument which is entirely appropriate in a general attack on the geometers but is at odds with what is supposed to be on Sextus' agenda in this chapter.

C. Touching limits

The remaining part of the section on line (414-18), as well as the better part of the section on surface (431-3), exploit *aporiai* arising from touch: when two entities are juxtaposed, or touch one another, what happens to their corresponding limit entities. Do they get fused into one or do they remain distinct, reiterating thus the contact problem? Sextus in this section does not develop the corresponding separation problem, which appears to require the division

of a point into two, or the cutting of a line along its length, or the reduplication of a surface by slicing. This is a genuine, and much discussed, problem for which ancient mathematical theory does not seem to furnish an entirely satisfactory answer.[79]

It is noteworthy that Sextus, in both sections, formulates the touching problem in such a way that the limit entities in each case belong to bodies. So when he speaks about the problems concerning the touching of two lines, he does not discuss what 'happens' to the points that are the limits of the lines, whether they melt or remain distinct. Instead, he construes the issue thus that the touching lines are themselves the limits of surfaces of bodies (415). The question, formulated in this way, will apparently be the following. Imagine two rectangular objects touching each other with two respective surfaces, so that the surfaces perpendicular to the touching surfaces (surfaces *A* and *B* on the figure below) are in line with one another. Now the lines that are the limits of these surfaces, *a* and *b*, are parallel to each other and are in touch.



The question then is whether these two touching parallel lines become one or remain two; Sextus obviously aims at showing that both options result in absurdities. The first horn of the dilemma, i.e. that the two lines become coincident and get unified, applies the geometrical description that would be acceptable also to Aristotle, and possibly to the Stoics,[80] whereas the counter-arguments combine geometrical and physical considerations. Assuming that two entities (surfaces or bodies) cannot share, or be separated by, one limit, and ignoring the possibility that one of the entities is an open segment (which would be the contemporary solution), Sextus claims that the unification of the two lines would result in the unification (ἕνωσις) of the two surfaces, and hence of the two bodies. The first objection to this scenario

[79] Cf. White (1992) esp. Part One, and the relevant parts of the Cone Problem 293-306 and Mueller (1982) 82-6.
[80] Cf. Plutarch, *De comm. not.* 1080E-1081A. Plutarch objects, however, that on the Stoics' own view limit entities, being incorporeals, cannot undergo such changes, come into being or pass out of being, that would be required by this view.

is that this is not what we observe in the case of physical bodies: liquids might, but stones and other solid bodies do not get unified when juxtaposed. Then, apparently forgetting that he explicitly stated at the outset of this set of arguments that, *ex hypothesi*, we are still considering the line to be breadthless, he objects that by the unification of the two lines, we would thus lose one edge, and therefore the resulting unified object would be smaller than the sum of the two original bodies. The treatment of the other horn of the dilemma—i.e. that the two lines remain distinct—is however supposed to be contradicted by precisely that assumption.

The problem of touching bodies reoccurs in a different, and even less refined, form at the discussion of surfaces (431). In this case, the purported difficulty arises from the distinction between the limit and the limited. If limits are distinct from body they are the limits of, and they cover the body from the outside and contain it as the jar contains the liquid, then we must say, absurdly, that the two bodies are not in touch, only their limits are, or that the bodies somehow reach beyond (ἐκτός) their own limits. What might give force to these arguments is that at least some Stoics apparently claimed that limits are not parts of the body in so far as the parts of bodies must be bodies themselves (Stobaeus 1.167.9-14).

7. The final argument

At the end of the chapter, Sextus presents a further, independent argument for the inconceivability of body (437-9). This is the point where he finally leaves the mathematicians behind, and presents a more general consideration. The argument is closely paralleled in *PH* 3—with some differences that we shall briefly consider below—where it is also the concluding section of the treatment of body. In *PH* 3, however, this argument takes up almost one third of the discussion of body, whereas in our chapter it is dwarfed by the disproportionately long section on the mathematicians' conceptions. Sextus, however, introduces the argument in *M* 9 as the more powerful way to engage with the matter at hand (σθεναρῶς συνάγοντα τὸ προκείμενον). Note, that if one accepts Mutschmann's conjecture in *M* 9.367, then Sextus uses here the same construction as the one by which he

announced that he would next turn to the mathematicians' conceptions (κατὰ δε τὰς τῶν μαθεματικῶν ἐννοίας νῦν συντακτέον τὸ προκείμενον).

According to the opening dichotomy of the argument, body is the object of perception or the object of thought. The first horn seems very promising, especially in view of the fact that the Epicureans argued for the existence of bodies by simply referring to perception: 'That bodies exist is universally witnessed by sensation itself' (σώματα μὲν γὰρ ὡς ἔστιν, αὐτὴ ἡ αἴσθησις ἐπὶ πάντων μαρτυρεῖ, *Hdt*. 39, trans. Sedley; cf. Lucr. 422-3). Acknowledging that he has primarily Epicurus in view, Sextus immediately provides the relevant Epicurean definition of body:

> For it (sc. body) is a complex quality grasped according to composition of shape, size and resistance.[81]

The formulation strongly resembles the one in *Hdt*. 68-70 we considered above, and the closeness to the Epicurean original is further indicated by the use of the word ἀθρόος. We have seen that this is Epicurus' technical term for the complex of permanent attributes.[82] Epicurus may nonetheless object to call body a complex *quality* (ἀθρόα ποιότης)—he speaks about a complex conception of body (ἀθρόα ἐννοία τοῦ σώματος, *Hdt*. 68). Sextus' argument however turns exactly on this point. He declares that such a composite quality is not the object of perception. *PH* 3 is a little more explicit: 'But they say that the senses are simply affected (ἁπλοπαθεῖς)'. According to a full corpus *TLG* search ἁπλοπαθής occurs only in Sextus, and only in *PH*,[83] yet the wording suggests that Sextus is not introducing an external premise, but is referring to an epistemological doctrine advocated, or accepted, by those who hold this view about body. The problem he raises may be construed as a version of the 'wooden horse' problem of the *Theaetetus* (184c-d): the complex is not perceived directly by the senses, and we need something further to bring together the information provided by the senses. Yet Sextus seems to refer directly back to the epistemological interlude in the discussion of line: the complex quality is grasped according to composition (ἐπισύνθεσις),

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[81] ἀθρόα γὰρ ἦν ποιότης κατ' ἐπισύνθεσιν σχήματος καὶ μεγέθους καὶ ἀντιτυπίας λαμβανομένη. The list is different in *PH* 3.47: 'length and breadth and depth and resistance and colour and various other items together with which they are observed'.

[82] Note that *PH* 3.47 speaks about συναθροισμός at this point.

[83] In *PH* 3.108 it is used in an argument to show that change is not perceptible, because we should be able to perceive both from what and into what the object changes.

and composition was there listed as one form of μετάβασις which was in turn contrasted with immediate perceptual encounter with manifest things. The reoccurrence of this term—missing from *PH* 3—is notable because it indicates that the argument present also in *PH* 3 was rephrased in *M* 9 in terms of the preceding epistemological material, which is part of the mathematical section, and hence absent from *PH* 3. We have moreover seen that there is some evidence coming from Diogenes Laertius to indicate that ἐπισύνθεσις was part of Epicurean epistemology; a further signal that Sextus' criticism is internal. Although this line of reasoning is not exploited by Sextus, we may add that from an Epicurean point of view, when we form the conception of something by composition, we do so 'with the help of a measure of reasoning' (D.L. 10.32), and thus the existence of these objects are not directly guaranteed by perception.

The problem raised by Sextus seems to be explicitly discussed by the Epicureans. First, it is crucial that—just as for Aristotle—the proper objects of the different senses do not overlap; the Epicurean argument for this claim is that if this were not so, different senses might provide contrasting evidence on the same thing. *Prima facie*, it would be tempting to think that at least some of the properties, such as shape, are the objects of vision. Yet as a number of texts make clear, the Epicureans follow Aristotle in thinking that colour, and only colour, is the proper object of vision. We can focus on shape on the basis of the stream of images coming from a body, but the shape perceived thus is not the shape of the body, but the shape of the colour.[84] This is emphasized also in a papyrus text which appears crucial in finding an answer to the problem Sextus raises. Its Epicurean author, perhaps Philodemus, stresses that body as such is the proper object of touch.[85] On this view, then, we grasp body not as a complex of properties each of which is the proper object of different senses, but body is presented directly in a single perception by touch.

Assigning body to touch as its proper object is a notable divergence from the Aristotelian view according to which the proper objects of touch are the ranges of qualities defined by the contraries of hot and cold, dry and wet, and, possibly other qualities such as

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[84] *M* 7.207 (reporting the Epicurean view): οὐ γὰρ ὅλον ὁρᾶται τὸ στερέμνιον, ἵνα ἐπὶ τῶν ὁρατῶν ποιώμεθα τὸν λόγον, ἀλλὰ τὸ χρῶμα τοῦ στερεμνίου.

[85] P.Herc. 19/698, col. 17-8: τὴν μὲ[ν] γ[ὰ]ρ [ὄ]ψιν ὁρατὰ κατα[λ]αμβ[ά]νειν ἡγούμεθ[α], τὴν δὲ ἁφὴν ἁπτά, κα[ὶ] τὴν μὲν χρώματο{ι}ς, τὴν δὲ σώματος. ... ὥστε κατ' αὐτὴν ἀναλογίαν κοινὰ κρίματ' εἶναι τῶν αἰσθέσεων τού[των] τὸ σχῆμα καὶ τὸ μέ[γεθ]ος, ὃν λόγον ἔχει τ[ὰ το]ῦ χρώματος π[ρ]ὸς τὸ χρῶμα, τοῦτον ἐχόντων [τ]οῦ σώματος πρὸς τὸ σῶμα, καὶ ὃν λόγον ἔχει τὸ χρῶμ[α] πρὸς τὴν διὰ τῆς ὁράσεως [κατ]άληψιν, τοῦτον το[ῦ σ]ῶματος π[ρ]ὸς τὴν διὰ τῆς ἁφῆς ... See Monet (1996); see also Sedley (1989).

hard and soft (*DA* 2.11 422b27). It is true that Aristotle later specifies that what unites these qualities, and hence guarantees that touch is a single sense modality with a unified proper object, is that these are the distinctive qualities of body *qua* body, in so far as these are the primary qualities that characterize the elements (*DA* 2.11 423b27-31)—this however still does not make body the proper object of touch as the Epicureans apparently held. Indeed, it is tempting to think that what motivates the Epicurean doctrine is precisely that it can ward off the objection that, in so far as it is not the proper object of any of the senses, body is not immediately perceived. On the basis of this modification, the Epicureans could still agree that the senses are ἁπλοπαθής, but would refuse that we need composition, and hence 'some measure of reasoning' to grasp body. Within body we can then distinguish, by the special mental act of focusing, the different items of the ἀθρόον (shape, size and resistance), as Epicurus in *Hdt* 68-70 also claims, just as we can focus on the shape of the colour that we are presented with in vision.

Unfortunately, this may not be the end of the story, for at this juncture it becomes important what properties are included in the ἀθρόον. The list of properties given in our chapter (shape, size and resistance) may be taken care of in the way just suggested. If, however, we take the list given in the parallel text in *PH* 3.47 which includes also colour (and the inclusion of colour may find support in Epicurus' own formulation in *Hdt.* 68), then Sextus' unification problem re-emerges.

The other horn of the initial dilemma, according to which body is the object of thought, appears less interesting. It is based on the strict empiricist principles evidenced also in the epistemological interlude: A can be the object of thought only if there exists some B such that B is the object of perception, and the conception of A can be derived, presumably by the different modes of μετάβασις, from the direct perception of B. If body is not an object of perception, but is an object of thought, we are left with no candidate to take the role of B, for incorporeals are clearly inadequate for the task.

8. Concluding remarks on relative chronology

Can the preceding analysis offer any clues regarding the relationship between *PH* and *Against the Physicist* on the one hand, and *Against the Geometers* and *Against the Physicists* on the other? As to the first question, our analysis may give some slight support to the received view that *Against the Physicist* comes after *PH* 3. Or, to put it in an even more qualified way, there are indications that the chapter on body in *M* 9 as we have it is later than the corresponding part of *PH* 3.

I would tentatively suggest the following scenario. In *PH* 3, Sextus remains closer to the original plan of discussing the material principle after the discussion of god. In a second phase he turns to the discussion of the conception of body in which resistance (ἀντιτυπία) is never lost from sight. Finally, the discussion of Epicurus' alternative conception occupies a proportionately large part of the chapter. True, the series of arguments are not particularly well structured—for example questions concerning the relationship between the constituents and body and the existence of the dimensions are not clearly separated. But on the whole, the chapter is relatively well balanced.

Then comes *Against the Physicists*. The chapter on body confuses the articulation between the discussion of the material principle and body. The separate discussion of the material principle is skipped, Sextus introduces the corporealist-incorporealist distinction instead, and immediately jumps to the discussion of body. I find it easier to think that this is an unhappy modification of the original plan occasioned by the more extensive material than that the awkwardness of this ordering presents the original version, which was then cleared up in *PH*. Consider, for instance, the use of the doxographical material. We have every reason to believe that it was presented in Sextus' source as an inventory of the different views on the material principles—this is confirmed also by the introductory words in Ps.-Galen. Sextus nevertheless presents it in our chapter as part of a different strategy. I find it unlikely that Sextus first used it in *M* 9 removed from its original context and in a confusing way, and then reused it in *PH* restoring it into its proper context, and going back to his original source, adding also the introductory words that he first left out in *M* 9.

Now what about the main structural difference between the relevant section of *PH* 3 and our chapter, i.e. the prominence of the discussion of the mathematicians' conceptions, that creates a considerable imbalance in our text? Roughly, there are two possibilities. We can think that Sextus turned away from the agenda of *PH* 3, perhaps because he though that the discussion of the geometrical notions might pull the rug from under all conceptions of

body, introduced the mathematicians' conception of body, and then got carried away—sometimes quite far away—and included considerations that have no immediate bearing on the primary issue on his agenda. Point, line and surface, to be sure, were already mentioned in the relevant section of *PH* 3. Yet I find it difficult to believe that all the arguments presented in this long section, including the ones about the geometers theorems, etc., were developed or collected in view of the proclaimed objective of our chapter. It is a much more economical hypothesis, I believe, that this series of arguments originally formed part of a systematic attack on the geometers and then were integrated in our chapter with some reshuffling and little shortening, with the result that the discussion of body in *Against the Physicists* became so strikingly imbalanced. This hypothesis implies that, whether or not *Against the Geometers* had by that time received its final form, the main bulk of the material presented in it was already available in a fairly organized form when Sextus was composing this part of *Against the Physicists*.[86]

References

Ackrill, J. (1963) *Aristotle, Categories and De Interpretatione*. Clarendon, Oxford.
Annas, J. and Barnes, J. (2000) (ed.) *Sextus Empiricus, Outlines of Scepticism*. Cambridge University Press, Cambridge.
Blank, D. (ed.) (1998) *Sextus Empiricus, Against the Grammarians*. Clarendon, Oxford.
Brochard, V. (1923) *Les Sceptiques grecs*, 2nd edn. Vrin, Paris.
Brunschwig, J. (2003) 'Stoic Metaphysics', in *The Cambridge Companion to the Stoics*, ed. B. Inwood. Cambridge University Press, Cambridge.
Cuomo, S. (2001) *Ancient Mathematics*. Routledge, London.
Diels, H. (1870) *De Galeni historia philosopha*. Diss. Bonn.

[86] I am of course aware of the fact that the received view holds that *M* 7-11 is earlier than *M* 1-6. Some earlier scholars, e.g. Zeller and Brochard, however argued for the sequence *PH*, *M* 1-6, *M* 7-11 (cf. Zeller (1876-1909) vol. 3.2, p. 51, n. 2; Brochard (1923) 318-19.). Without undertaking a full examination of this issue now, let me merely mention that the principal argument for taking *M* 7-11 earlier than *M* 1-6 is that Sextus in the course of *M* 1-6 seems to refer back to *Against the Physicists* twice (see e.g. Floridi (2002) 10). First in *M* 1.35: 'One must bring over the puzzles from those we have already brought forward in our controversy against the physicists concerning change and going through generation and perishing.' Yet, clearly, this may just as well be a reference to the relevant parts of *PH* 3; indeed the distinction between μεταβολή on the one hand, and generation and perishing on the other seems to point to *PH* 3 rather than to *M* 10. The other cross-reference comes from the concluding sentence of *Against the Geometers* and refers back to the arguments that have established the impossibility of subtraction in ἐν τῷ πρὸς τοὺς γραμματικοὺς καὶ ἐν τῷ πρὸς τοὺς φυσικοὺς ὑπομνήματι: part from whole or from part, equal from equal, less from greater, greater from less. Once again, I find no guarantee that this reference is to *M* 9. 297-307 and not to *PH* 3.85-96.

Diels, H. (1879) *Doxographi Graeci*. Berlin.
Dye, G. & Vitrac, B. (2009) 'Le Contre les Géomètres de Sextus Empiricus: Sources, Cible, Structure', *Phronesis* 54: 155-203.
de Haas, F. A. J. (1996) *John Philoponus' New Definition of Prime Matter*. Leiden, Brill.
Falcon, A. (2005) *Aristotle and the Science of Nature*. Cambridge University Press, Cambridge.
Floridi, L. (1998) 'Mathematical Skepticism: a Sketch with Historian in Foreground', in *The Skeptical Tradition around 1800*, eds. J. van der Zande and R. H. Popkin. Kluwer, Dordrecht: 41-60.
(2004) 'Mathematical Skepticism: the Debate between Hobbes and Wallis', in *Skepticism in Renaissance and Post-Renaissance Thought: New Interpretations*, eds. J. R. M. Neto and R. H. Popkin. Pometheus New York, 2004.
(2002) *Sextus Empiricus. The Transmission and Recovery of Phyrronism*. Oxford University Press, Oxford.
Freytag, W. (1995) *Mathematische Grundbegriffe bei Sextus Empiricus* (Spudasmata). Olms, Hildesheim.
Furley, D. (1982) 'The Greek Commentators' Treatment of Aristotle's Theory of the Continuous', in *Infinity and Continuity in Ancient and Medieval Thought*, ed. N. Kretzmann. Cornell University Press, Ithaca NY, 17-36.
Guthrie, W.K.C. (1965) *A History of Greek Philosophy* vol. 2: *The Presocratic Tradition from Parmenides to Democritus*. Cambridge University Press, Cambridge.
Huffman, C. (2005) *Archytas*. Cambridge University Press, Cambridge.
Humphreys, P. (1997) 'How Properties Emerge', *Philosophy of Science* 64: 1-17.
Isnardi Parente, M. (1992) 'Sesto, Platone, l'Accademia antica e I Pitagorici, *Elenchos* 13: 120-68.
Kidd, I.G. (1988) *Posidonius, II: The Commentary*, 2 vols. Cambridge University Press, Cambridge.
Krämer, H.-J. (1971) *Platonismus und Hellenistische Philosophie*. De Gruyter, Berlin-New York, 1971.
Lear, J. (1982) 'Aristotle's Philosophy of Mathematics', *Philosophical Review* 91: 161-92.
Leibniz, G.W. (1969), *Philosophical Papers*, 2nd ed., Trans. and ed. by L.E. Loemker. Chicago University Press, Chicago.
LS = A.A. Long and D.S. Sedley (ed.), The Hellenistic Philosophers, 2 vols. Cambridge University Press, Cambridge, 1986.
Mansfeld, J. (1998) *Prolegomena Mathematica*. Brill, Leiden.
Monet, A. (1996), '[Philodème, *Sur les sensations*] PHerc. 19/698', *Cronache Ercolanesi* 26: 27-127.
Mueller, I. (1970) 'Aristotle on Geometrical Objects', *Archiv für Geschichte der Philosophie* 52: 154-67.
(1982), 'Geometry and Scepticism', in *Science and Speculation*, eds. J. Barnes, J. Brunschwig, M. Burnyeat and M. Schofield. Cambridge University Press, Cambridge.
Mugler, C. (1958) *Dictionnaire Historique de la Terminologie Géométrique des Grecs*. Klincksieck, Paris.
Pullman, B. (1998), *The Atom in the History of Human Thought*. Oxford.
Reesor, M. (1954) 'The Stoic Concept of Quality', *American Journal of Philology* 75: 40-58.
Sandbach, F. H. (1975) *The Stoics*. London.

Sedley, D (1976) ‘Epicurus and the Mathematicians of Cyzicus’, *Cronache Ercolanesi* 6: 23-54.

(1989), ‘Epicurus on the Common Sensibles’, in *The Criterion of Truth*. Essays in Honour of George Kerfeld, eds. P.M. Huby and G.C. Neal. Liverpool: 123-36.

Sorabji, R. (1988) *Matter, Space and Motion*. Cornell University Press, Ithaca.

Todd, R. B. (1980) ‘Monism and Immanence’ in *Doubt and Dogmatism. Studies in Hellenistic Epistemology*, eds. M. Schofield, M.F. Burnyeat, J. Barnes. Oxford, Clarendon Press: 137-160.

Volkmann, R. (1973) ’Observationes miscellae XXXV-LX’, *Städt. Evang. Gymn. Jauer Progr. Ostern*: 1-20.

Warren, J. (2003) ‘Sextus Empiricus and the Tripartition of Time’, *Phronesis* 48: 313-43.

Watson, G. (1966) *The Stoic Theory of Knowledge*. Belfast.

White, M. J. (1992) *The Continuous and the Discrete*. Clarendon, Oxford.

Williams, B. (1978) *Descartes. The Project of Pure Inquiry*. Pelican, London.

Woolhouse, R. (1993) *Descartes, Spinoza, Leibniz: The Concept of Substance in Seventeenth Century Metaphysics*. Routledge, London.

Zeller, E. (1876-1909) *Die Philosophie der Griechen in ihrer geschichtlichen Entwicklung*, 3 vols. Wellmann, Leipzig.