De mixtione V–VI: common notions and bodies receiving bodies

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CHAPTER 4

De mixtione V–VI: Common Notions and Bodies Receiving Bodies

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Abstract

In this paper I first set out the role of common notions in the structure of Alexander's argument in *Mixt.* V–VI. Furthermore, I argue that a series of topics discussed in *Mixt.* V–VI, *Mant.* XIV and *Quaest.* II.12 concern the initial stages of Stoic as well as Peripatetic blending rather than the resulting blend. The presence of certain types of (filled) pores and changes in density both facilitate mutual division; mutual division and coextension go hand in hand until a degree of juxtaposition of ingredients is reached which easily allows for the specific interaction that creates the final blend: interaction of qualities for the Peripatetics, tensional dynamics for the Stoics. In addition, I show that a list of stock examples used by Alexander also raises serious questions concerning changes in density and volume, which Aristotle, Alexander and the Stoics had to deal with. I suggest that the role of pores found in *Meteorology* IV may have been part of the solution for some of Alexander's contemporaries. Throughout the arguments in the chapters V–VI, indeed throughout the *De mixtione*, Alexander consistently tries to replace a comprehensive materialist metaphysics of interacting bodies by his own equally comprehensive brand of hylomorphism—even if not every argument is equally convincing.

1 Introduction

After his survey of the Stoic theory of mixture in chapters III–IV of *De mixtione*, Alexander proceeds by setting out his criticism of the Stoic theory in chapters V–XII. In chapters V–VI he will focus on the impossibility of one body receiving another in itself, with special emphasis on the irrelevance of pores for rendering that process possible; in chapter VII he will argue that Stoic blending is incompatible with preservation of the ingredients, and in chapter VIII he will show that blending cannot be conceived as mutual division of the ingredients. This criticism is then applied to a range of Stoic examples of blending in chapters IX–XII, culminating in the rejection of the blending of the Stoic first

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principles of divine *pneuma* and matter. Alexander diagnoses the Stoic failure to distinguish form and matter in the Peripatetic sense as the underlying problem.[1] This leads to the conclusion in chapter XIII that this objectionable theory of blending is a fundamental feature of Stoic physics and metaphysics—which has thus been completely refuted, or so Alexander believes.

At the end of chapter VI Alexander recalls and criticizes a number of phenomena that he introduced in chapter IV as playing a role in Stoic arguments concerning blending,[2] but which he himself identifies as e.g. generation and corruption, alteration, or growth, all more properly explained by Peripatetic hylomorphism. The list, which recurs in whole or in part several times in *De mixtione*, comprises (1) the relation between the Stoic active and passive principles in their various guises, e.g. the soul of animal bodies, the nature of plants, and the cohesion of inanimate bodies (8.23–29); (2) how the elements fire and air permeate earth and water; (3) how fire pervades iron; (4) how lethal poisons and odours permeate the things they affect; (5) how light permeates the air (9.1–11).[3]

From the wide range of phenomena discussed in his polemics it is clear that Alexander is fighting opponents who offer a comprehensive theory of action and passion rather than a rival theory of blending in the Peripatetic sense. The Stoic theory of blending is a formidable opponent precisely because of its comprehensive nature. Of course Alexander will try to turn the ubiquity of blending into a weakness (if blending falls, Stoicism falls with it).[4] However, the Stoic theory of blending has the advantage that it unifies the different compartments of Peripatetic physical and psychological theory under a single heading: bodies in contact affect each other in terms of their fundamental three-dimensional extension and resistance, affecting their mutual tension. Such theory can only be met by an equally ambitious Peripatetic theory covering all relevant cases under a single heading: Alexander's hylomorphism. These are the real opponents that meet in the arena of *De mixtione*.

The ambitious scope of the Stoic theory helps explain why such a large portion of *De mixtione* is devoted to the discussion of phenomena and theories that

1 See *Mixt.* XI, 21.8–15, referring to X, 18.16–22 and 19.15–20.

2 *Mixt.* IV, 8.23–9.11. Cf. Mikeš in this volume, commenting on *Mixt.* 7.24–9.13 (p. 74ff.) carefully distinguishes examples *showing the existence* of processes relevant to blending, as well as *analogies* for processes relevant to blending, from straightforward *cases of blending*. See further p. 94–97 below.

3 *Mant.* XIII collects numerous arguments against the corporeality of light (after Aristotle, *DA* 418b14), see also Alex. *DA* 43.11. Most examples also appear in *Mant.* XIV entitled 'That it is impossible for body to extend through body', which echoes parts of *Mixt.* V–VI.

4 *Mixt.* XII, 25.7–17.

have nothing to do with mixture or blending strictly speaking. Here, as in other works, we see Alexander in the process of developing a new and more comprehensive version of hylomorphism that applies to all of the above processes in a more or less straightforward way, and is accompanied by a sophisticated and layered theory of potentiality and actuality. Alexander's own theory of blending strictly speaking (chapter XIII) not only fits into this mould, but by its very limitation to a special phenomenon, with its most obvious application to liquids (*Mixt.* 15.18–22),[5] Alexander seems to emphasize even more how wrong the Stoics were to extend the mechanics of blending to phenomena that are better explained by Alexander's similarly comprehensive hylomorphism. His approach was successful: Simplicius notes that Alexander's critical discussion of the Stoic 'body goes through body' in both a monograph (probably our chapters V–VI of *De mixtione*) and in his commentaries on Aristotle, is to be regarded as authoritative.[6]

2 Common Notions

In chapters V–VI with which we are concerned here, Alexander carefully continues his strategy of checking theories of blending against common notions.[7] In previous chapters he has already argued that Democritus and Anaxagoras, but also Epicurus and Plato, all somehow fail to uphold three common notions concerning blending:

- CN1 blending consists in the unification of the ingredients (4.16–17); and
- CN2 blending implies the preservation of the ingredients (4.20–21; 7.15–16), since
- CN3 the ingredients can be retrieved from the blend (7.5–8).

Alexander has acknowledged that Chrysippus, on the contrary, respects CN1, the unification of the ingredients, as Chrysippus' treatment of *pneuma* pervading all substance shows (6.10–13). Among the three kinds of mixture that Chrysippus derives from common notions rooted in experience (juxtaposition, fusion, and blending) (7.11–18), it is blending that combines CN1 with

5 See further below p. 95.

6 Simplicius *In Phys.* 209a4ff, 530.9–30, with the reference to Alexander at 530.16. For the position of this evidence from Alex. **In Phys.* in Alexander's physics and cosmology see Rashed (2011), fr. 8 with p. 41–45. Cf. Themistius *In Phys.* 104.18–22.

7 See also Betegh p. 54–56.

CN2, the preservation of the ingredients, on account of CN3, the possibility of retrieval. In such blends both the substances and the qualities of the ingredients are preserved, even though the blended bodies have 'gone through' each other completely, with the result that there is no part in them that does not participate in all bodies that make up the mixture (7.1–5, 18–22; 8.14–17, 27–28).

Precisely because the Stoics were seen to respect the common notions concerning blending so far, there is reason for surprise (9.14 θαυμάσαι δ' ἄν τις) that their theory of blending does not respect, indeed goes against, other natural concepts. At this point, blending is described as 'body goes through body as one body is extended along another body as whole along whole' (9.20–21). This goes against a further common notion:

> CN4 Anything that is full can no longer accept anything in itself (9.24).

In chapter V, Alexander focuses on the first part of the definition: 'body goes through body', but he rephrases it in accordance with CN4, which will turn out to be significant for his objections. For something which is already full (τὸ πλῆρες) has "no space (χώρα) within itself to receive something else of the same kind" (9.24–26). The limitation to something *of the same kind* should probably be taken as 'a full body as it itself is' (10.6), because examples of blending usually concern two or more different kinds of natural body.[8] This background involving the notion of space will continue to play a role in Alexander's arguments. It is important to note that the general language of one body *receiving*, *providing place for*, or *making room for* another body within itself unduly minimizes the mutual interaction between the two bodies to *spatial interaction*. Thus, for the moment, Alexander obscures the fact that on all accounts blending requires a stronger interaction in terms of *tonos* (for the Stoics) or qualities (for Aristotle).[9]

Alexander claims that the Stoics sometimes acknowledged CN4; hence if their theory of blending turns out to disregard CN4, they contradict themselves. For it is precisely on account of CN4 that 'some people' have thought it reasonable to claim the existence of place (τόπος) (9.16–10.2). In other words: attempts to define place as something different from body can be interpreted as implicit acceptance of the view that body does *not* receive body in itself as in a place. The Stoic view of place is an example of this insight. Just like Aristotle and Alexander, the Stoics denied the existence of void *within* the universe. They allowed it to exist *outside* the universe to account for the expansion involved

8 Cf. *Mixt.* XIII, 28.9–11, and *Mant.* XIV, 139.34–35.

9 Cf. Todd (1976) 197.

in the total conflagration.[10] In that sense they acknowledged that body needs something different from body to expand into, which implies acceptance of CN4. Alexander spends chapters V–VI to show how the claim that a full body is able to receive another full body in itself completely fails to respect CN4.

The emphasis on common notions in Alexander's argument is to be understood against the background of a general development of the role of common notions in the Stoic, Epicurean, Platonic and Peripatetic schools. From being mere starting points for further inquiry and articulation, common notions gained a stronger epistemological position as criteria of truth and principles of demonstration in the two centuries that preceded Alexander.[11] In his interpretations of Aristotle, Alexander recognizes such strong common notions in e.g. Aristotle's use of the suppositions we have about wisdom in *Metaph.* A.2, 982a6, as well as Aristotle's discussion of place and time in the *Physics*.[12] Alexander also draws on the use of *endoxa* in Aristotle's dialectics, and enhances the role of axioms in demonstrations.[13] Hence Alexander's strategy in our chapters: if the Stoic theory of blending is at variance with common notions, they should abandon it on account of their own (and Alexander's) epistemology.

3 The Argument of Chapters V–VI

In chapter V Alexander generates an exhaustive division of ways to conceive of body A going through body B, with the following structure:

1. 10.6–10: if body A goes through body B by means of *empty pores* existing in B, it will be the pores in B, not the body B as such, that receive the incoming body A; as a result it will not be the bodies A and B that blend.
2. 10.10–11.5: if interpenetration is supposed to occur through *pores filled with another kind of body C* there are two further options:
   a. 10.10–14: if *the body C in the pores yields* to make room for the incoming body A, again it is not body B as such that receives body A (cf. 1);
   b. 10.14–25: if *the body C in the pores remains*,

10 See e.g. LS 49.

11 See De Haas (2021) 82–85 for an overview of this development.—The passage as a whole (9.14–10.2) shows an abundance of terms referring to common notions and preconceptions, which Alexander feels free to substitute one for the other: κοιναὶ ἔννοιαι, φυσικαὶ ἔννοιαι, πρόληψις, φυσικὴ καὶ κοινὴ πρόληψις.

12 See Alex. *In Metaph.* 9.19–29, with reference to Aristotle, *Phys.* IV 1, 208a29–32 (place); IV 10, 217b30–218a30 (time).

13 See De Haas (2021) 86–99 for a reconstruction of the resulting Peripatetic theory of common notions, with Guyomarc'h (2017) for the role of axioms in Alexander.

(i) the original problem repeats itself: how can pores filled with body receive another body in themselves?[14]
(ii) it is clear from perception that the smallest containers of the body cannot receive another body because the pathways to replacement (*metastasis*) are blocked;[15]
(iii) it will be superfluous to speak of pores in the first place, because body B could just as well receive body A directly by yielding;[16]
(iv) in general, entrance of A through pores in B will not result in blending, but in juxtaposition by conjunction (*kata harmēn*) as Chrysippus called it.[17]

3. 10.25–11.5: returning to *empty pores*, Alexander sets up a *reductio ad absurdum*: suppose we retain the talk of pores, and assume that body A blends with body B, but we regard body B as one big pore.[18] This would of course obliterate the notion of pores as void extensions *within* a body that possesses them. Moreover, body B would be entirely void, i.e. entirely non-being, and as a non-being it could not be involved in blending, or possess void pores to begin with.[19]

This argument is remarkable, because at first sight it seems disconnected from Stoic doctrine. It lists the alleged role of *void pores* (1 and 3), and *filled pores* (2) in blending. Alexander knows that the Stoics did not accept intracosmic void, and therefore did not use it in their theory of blending. In *Mantissa* 14 the option that bodies contain voids is immediately set aside 'for those who hold this view [that body goes through body] say there isn't even any void in

14 For this line of argument, supplemented by (iii), compare Aristotle, *GC* I 8, 326b6–10.

15 Cf. Aristotle, *GA* II 4, 738a10–16: nutriment blocks fine blood vessels and leads to a haemorrhage.

16 Alexander rejects the option that body A might yield by means of contraction, see further below.

17 Cf. *Mixt.* 6.14–20. This may reflect a reduction to atomism, cf. Aristotle, *GC* I 8, 325b5–7, with Todd (1972) 301f.

18 Cf. Aristotle, *GC* I 8, 325b7–9, *Phys.* IV 7, 214b3–9: in his discussion of void Aristotle refers to arguments on growth and on water poured on ashes that might entail either that two bodies are in the same place (*quod non*), or that a whole body be a void. For if growth affects the whole body, and growth is to be explained through void, the whole body must be void. Cf. *Mixt.* XVI, 40.7–9. The example of ashes is briefly mentioned at *Mixt.* VI, 13.2 as a case of generation and corruption.

19 The equation of void with non-being recalls Aristotle's report of atomism at *Phys.* 215a11.

actuality within the world'.[20] Groisard has suggested[21] that Alexander wants to use the occasion to rule out *all* other possible conceptions of the process of blending apart from Aristotle's, so that he can safely end up with (a version of) Aristotle's theory in chapter XIII. According to Todd,[22] Alexander is here using a scholastic distinction of two options deriving from the discussion of void in the explanation of growth, which is conjectured to occur either through void, or through the interpenetration of bodies.[23] There can be no doubt that later Aristotelians worked with the following dossier of Aristotelian material: they took (1) Aristotle's rejection of void in *Phys.* IV 6–9, and (2) the rejection of void in the explanation of growth in *GC* I 5, and combined it with (3) Aristotle's argument against Empedocles and the atomists in *GC* I 8,[24] that action and passion cannot be through void pores, as well as Aristotle's argument (4) that light,[25] and (5) the soul,[26] cannot be bodies. Each time a theory seems to entail either that body goes through body, or needs void, or void pores, this division of options tends to be used. Todd concludes that this whole argument has more to do with Peripatetic scholasticism than with the Stoics.[27]

I shall propose below that the argument of chapter V (and VI) may well be more than a scholastic mantra prompted by a context that needs rebuttal of the view that 'body goes through body'. Given that the Stoics and Alexander agree on the rejection of intracosmic void, much of the chapter would simply be superfluous, the more so since it completely ignores the mutual interaction that is part and parcel of both the Peripatetic and the Stoic theory of blending.

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20 *Mant.* XIV, 139.30–33 (tr. Sharples), cf. Simplicius *In Phys.* 530.22. See also *Quaest.* II.12 'That the contracting of bodies into themselves does not show that body passes through body', using Aristotle, *Phys.* IV 9, 217a10–b20, and *GC* I 8, 325b5–12, 326b7–28, against Empedocles.

21 Groisard 72 ad V, 10.20–22.

22 Todd (1976) 73–88.

23 Aristotle, *GC* I 5, 320b34–321a9, with *Phys.* IV 7, 214b5–9; hence Alexander discusses void in his chapter on growth *Mixt.* XVI, 40.7–12 (see pp. 244–245 in this volume), and *Mant.* XIV. Philoponus, *In GC* 90.12–15 uses the argument from the *Physics* in his commentary on *GC* I 5. For an in-depth analysis of the relation between Alexander's views of mixture and growth see Kupreeva (2004).

24 Aristotle, *GC* I 8, 324b24–35, 325b5–9 and 326b6–14: pores or passages play a role in the explanation of vision and hearing. Cf. Philoponus, *In GC* 178.5–20 for a similar division, probably drawing on Alexander's commentary.

25 Aristotle, *DA* 418b13–18, with *Mant.* XIII, 129.25–32, 139.9–17 with Philoponus, *In DA* 344.7–8, 326.20–26; Alex. *Quaest.* II.23, 72.26–27 (= Emped. Fr. 91 DK).

26 Aristotle, *DA* I 5, with *Mant.* 115.35–116.1, Alex. *DA* 20.6–19 with *in Top.* 173.14–16.

27 If Strato may be credited with a theory of void pockets within the universe to explain growth, expansion & contraction, Alexander would be rejecting his fellow-Peripatetic's view by implication.

It seems more likely that the Stoics tried to replace the entire Peripatetic dossier with their own theory of blending, which (or so I shall argue below) may well have involved the use of pores.

In the meantime, it is important to recall that the notion of body Aristotle is defending in his passages that reject void (three-dimensional extension dependent on the existence of substances) is not the notion of a full, place-consuming, and interactive body that the Stoics developed. The thrust of Aristotle's arguments against the existence of three-dimensional extensions in the form of mathematical bodies, place, or void, rests on the assumption of their independent existence, and the superfluous doubling of overlapping extensions this entails. 'Two bodies cannot be in the same place' is a slogan launched against the colocation of mathematical and physical body, or physical body moving into a place or through a void—all of which are irrelevant for the debate with the Stoics.[28]

Let us first continue with chapter VI. With all options involving pores set aside, Alexander proceeds to explore the consequences of solid bodies going one through the other as such. He works with an assumption which he does not clearly formulate until 12.21–23:[29]

> [NL] when a body receives another body in itself, the blend is *not larger* than the receiving body.

Mant. XIV, 140.10–25 suggests that this assumption is itself the result of two lines of thought: a blend is a state in which the ingredients *have gone* one through the other, or *have been extended alongside each other* whole through whole. Furthermore, the blending of ingredients of different volumes (the famous ladle of wine in the ocean, *Mixt.* 13.7–18) suggests that the smaller will be extended to match the size of the larger that receives it. Alexander and his sources infer that it is thus a characteristic of every blend that it is not larger than the receiving body. This prepares the way for the following Alexandrian argument: *given that* in many examples that the Stoics adduce there is no addition of volume, they are not cases of blending but of form/matter or quality/substance combination. On the other hand, all blending that does involve increase of volume, is taken to imply a denial of one body *receiving* another and this contradicts the Stoic view. We can see how the language of 'receiving' serves Alexander's polemical purposes well.

28 Cf Betegh (2016), De Harven (2018).

29 Other instances of this assumption can be found in *Mant.* XIV, 140.10–12.

Chapter VI can be broken down into five objections to (the consequences of) the claim that solid bodies go through solid bodies, all of which testify to the metaphysical differences of opinion between the Stoics and Alexander:

1. First objection (11.8–23): the assumption abolishes the nature of body. For it is a *proprium* of quantities that any two quantities of the same kind put together, such as two lines joined at a point, two surfaces joined at a line, as well as two bodies, are larger together than either of them was before. If body going through body results in a smaller or the same volume, the Stoics deny a *proprium* of quantities. If one denies a *proprium*, one denies that to which the *proprium* belongs. Hence people who speak of bodies going through one another without adding volume, abolish the nature of body.

   Also for the Stoics lines, surfaces, or bodies *joined* one to the other add up to a larger size. The issue is what happens when they *blend*, when one body receives another *in itself* as Alexander repeatedly calls it.[30] It is telling that Alexander does not say that the bodies are joined *at a line or a surface*, which would have been the proper parallel to the cases of line and surface, but would have exposed the flaw in his argument.[31] Still, the mode of interaction between bodies is left out of the story.
2. Second objection (12.1–21): the assumption also implies that either
   (i) the body (A) that is allegedly taken up into the volume of the other (B) leaves a volume of empty space behind of the same size as A. For what will necessarily come in its place? On the tacit assumption that void does not exist in nature, this is an absurdity. Or
   (ii) if the reception of A into B leads to an increase of volume, because A does not have sufficient room in B, then B does not receive A *in itself* in the first place.
   (iii) this is also borne out by the division that takes place: the two bodies push each other apart to make room for themselves, so, again, B does not *receive* A in itself but rather they push each other aside.

   Again the argument is open to objection. As to (ii–iii), it is striking once again how much the argument depends on the literal meaning of the phrase 'one body *receives* another', which would indeed be an inaccurate phrase in the two cases mentioned. Either the receiving body is

30 Rashed (2011) has argued that the Stoics may have considered the superposition of geometric planes and bodies as a viable interpretation of several physical bodies going through bodies.

31 For joining as a property that distinguishes continous quantities from discrete quantities, cf. *Cat.* 5a1–6. At *Cat.* 6a26–35 Aristotle identifies being called 'equal in size' (*ison*) or 'unequal in size' (*anison*) as the proprium (*idion*) of quantities.

too small, or the two bodies push each other away (which testifies to the role of division that Alexander will discuss further down). Again, there is no attempt to do justice to any of the more sophisticated concepts of blending available.

As to (i), in cases of generation of e.g. water from air, the transition will also 'leave empty space' in an Aristotelian universe. But due to the 'force of the void' nature will not allow this to happen, and other material will take its place (*antiperistasis*).[32] There is no compelling reason why the Stoic universe would not be capable of such compensation either, e.g., by rarefication or generation and corruption.

3. Third objection (12.21–13.4): examples of blends equal in volume to one of the ingredients as adduced by the Stoics are not in fact cases of blending of *bodies*. Soul and body are a case of form and matter; heat in iron is an immaterial quality in a body; ashes dispersed in water involves a change of something that comes to be what something else is. Neither form nor quality will ever receive a body in itself.

   This objection clearly hinges on Aristotelian hylomorphism and category distinctions. It is correct in an Aristotelian universe, but it will not convince a Stoic. In other words, Alexander pits his own metaphysics against the metaphysics of (alleged) applications of Stoic blending.

4. Fourth objection (13.4–7): if bodies can receive each other as assumed, there is no need for *antiperistasis* to explain motion, since motion is also needed for one body to go through something else.

   This argument simply rejects a denial of *antiperistasis* which in Aristotle's *Physics* explains motion of projectiles without the need of assuming void.

5. Fifth objection (13.7–18): it is absurd that one very small body becomes equal in size and is extended alongside a very large body, e.g. one ladle of wine becomes equal in size to a large amount [of water]. It is also absurd to try and establish this by the example of burnt incense and similar substances spreading over large areas. This is the result of a change into another rarer type of body. Such events cannot illustrate blending, which according to the Stoics requires the ingredients to remain what they are, so that they can be retrieved from the blend (CN2 and CN3 above).

This line of argument will be continued in the next chapters, in which the evidence adduced by the Stoics will be reviewed from several angles. At this point Alexander merely registers the oddity of a very small amount (a drop of wine) spreading through a much larger volume (an ocean of water), which is the oldest objection against Stoic blending on record: Arcesilaus against Zeno

32 E.g. Aristotle, *Phys.* IV 8, 215a15. For the debate concerning *antiperistasis* in Alexander's time, see Opsomer (1999). I am grateful to Jan Opsomer for providing me with his paper.

as reported by Plutarch.[33] Alexander attacks the example of burnt incense as a case of generation and corruption. He claims that incense is able to spread because the burning changes it into another, rarer, body which takes up a larger volume.

It should be noted that Aristotle's discussion of mixture does not speak clearly of the relation between the volumes of the ingredients and the resulting blend, although everything he does say seems to point in the direction that blending involves adding volumes.[34]

> Viscous liquids, it is true, produce no effect except to increase the bulk. But when one of the constituents is alone susceptible—or superlatively susceptible, the other being susceptible in a very slight degree—the compound resulting from their combination is either no greater in volume or only a little greater. This is what happens when tin is combined with bronze. For some things display a hesitating and ambiguous attitude towards one another—showing a slight tendency to combine and also an inclination to behave as receptive matter and form. The behaviour of these metals is a case in point. For the tin almost vanishes, behaving as if it were an immaterial property of the bronze: having been combined, it disappears, leaving no trace except the colour it has imparted to the bronze. The same phenomenon occurs in other instances too. (Arist. *GC* I 10, 328b5–14, tr. Joachim in Barnes 1984)

Viscous liquids resist blending, so their combination merely increases in bulk without further action and passion characteristic of blending; thus only the increase in bulk remains. When one ingredient is highly susceptible to blending under influence of the other, as in the case of tin and bronze, the blend is (almost) of the same size as the bronze (tin only imparts the immaterial property of colour to the bronze, as if it provides a form in matter). This prepares the way for Alexander's argument that the examples adduced by the Stoics in which there is no addition of volume, are not cases of blending but of form/matter or quality/substance combination.

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33 Cf. LS 48A, B and E. Cf Todd (1976) 73–74. Note that in Diogenes' version at 7.151 this initial spreading of the smaller quantity turns into destruction in the end (συμφθαρήσεται), unnecessarily emended to συγκραθήσεται by L&S vol. 2, p. 87 *ad loc.*; see Lewis (1988) for the correction. Diogenes' report is compatible with the case of one ingredient supporting another to spread over a larger extension than it could on its own, all be it not indefinitely (cf *Mixt.* 8.1–27). The wine in the sea also figures prominently in *Mant.* XIV, 141.10–25.

34 So Alex. *Mant.* XIV, 141.9–10.

4 Pores, Coextension and the Process of Blending

In addition to chapter V, the *De mixtione* provides us with further clues regarding the discussion of void and pores. In chapter X Alexander raises problems concerning Stoic *pneuma*:[35]

> *Pneuma*, being forced by something because of its good disposition (*euphuia*) towards it, assumes some power through its unified motion, because it has no capacity to resist its mover because of its affectibility (*eupatheia*). It is affectible in its own nature: it is moist and easily divisible (*eudiaireton*), so that the division of other things with which it has been mixed becomes especially easy. Hence some have thought that it was something void and of an intangible nature, while others thought that there were many empty spaces in it. (*Mixt.* X, 19.23–20.5)

In this text Alexander informs us that *pneuma* is not an active force itself, but rather by nature highly susceptible to be moved by other things. It is also moist and easily divisible, hence an excellent candidate for mixture. Together, these properties cause it to exert a certain force on everything it mixes with in virtue of its concentrated motion. This is not Stoic *pneuma*: Todd refers to *pneuma* as a powerful thrust of wind such as Aristotle regards as the cause of earthquakes in *Meteor.* II 7–8.[36] The final sentence is interesting for our purposes. It states that because of its extreme affectibility some (unnamed) people thought that *pneuma* was "something void and of an intangible nature, while others thought that there were many empty spaces in it" (20.4–5). This cannot be a Stoic view either, given their denial of intracosmic void. But given the crucial role of *pneuma* as the prime Stoic example of body going through other body, Alexander may have believed that the Stoics owe their critics a clear stance towards such rival views of *pneuma*.

The passage also points us to affectibility and divisibility as the physical conditions of mixture in Aristotle as well as Alexander. In *GC* I 10, 328b1–4 Aristotle states that ingredients of mixture need to be easily divisible into small parts (διαιρετά) and affectible (παθητικά), which means they are easily bounded

35 Cf. the incisive comments by Groisard 86–87: this is not a characterization of Stoic *pneuma* despite its inclusion in collections of Stoic fragments. On *pneuma* see further Baghdassarian in this volume.

36 Todd (1976) 217–218 with Groisard 86–87. See esp. *Meteor.* 365b29–366a5, with Alexander's comments *in Meteor.* 116.21–34 confirming the power of exhalations caused by the heat of the sun. If this parallel is relevant, the terminology of mixture is here used in a loose sense to accommodate this Aristotelian *pneuma* to the current Stoic context.

(εὐόριστα).[37] Hence ingredients of blends have to be (predominantly) moist, which applies to liquids as well as metals and alloys.[38] When discussing his own Peripatetic theory of mixture Alexander insists that moisture is involved in all blends (32.11–15). What is more:

> Contributing to the rapid alteration and blending of moist bodies is their easy divisibility (τὸ εὐδιαίρετον); for they divide one another before being unified, and are juxtaposed in small quantities, thus interacting more easily and more quickly, and they rapidly become one body both in substrate and quality [...] (*Mixt.* XV, 33.4–9)[39]

Here Alexander clearly separates the process of blending from the unification that constitutes the resulting blend. Mutual division first creates a situation in which the ingredients mix in ever smaller portions, and are thus merely juxtaposed. Division facilitates a more rapid interaction between their respective qualities (hot-cold, moist-dry), until they reach the equilibrium between qualities which Alexander considers characteristic of a genuine blend. Pouring (e.g.) red wine into water leads to the wine dividing the water and finding a way downward through the water. The original colours remain as long as the state of blending has not been achieved, but "The change in qualities which unifies them in total similarity stops the preceding change of place—a fact also known by sight". (37.5–8) This suggests that once the interaction of qualities has created the blend, the process of division and one body going through another has stopped.[40]

This passage shows that a proper grasp of the extent of division (not to infinity, but to ever smaller portions until the blend is achieved by qualitative interaction), and of the role of juxtaposition as a stage in the process of

37 This seems to become a requirement of ingredients of blending in the conclusion at 328b14–22. For the significance of this conclusion see the excellent analysis by Krizan (2018).

38 See *Meteor.* IV 10, 389a7–9 listing tin, copper, gold, silver, and lead; cf *Meteor.* IV 6 on the activity of heat melting the metal and turning it into liquid. Krizan (2018) 204n30 rightly notes that Aristotle does not provide many explicit examples of blending: she lists *GC* 328b6–13 tin and bronze (see p. 93 above), *HA* III 20, *Sens.* 3, 440a31–b18. The ubiquitous example of water and wine is just a convenient well-known mixture, but not a proper blend according to Aristotle *GC* I 5, 321a32–b2 with I 10, 382a26–31 (see Krizan *o.c.* 203 with n29); Krizan *o.c.* argues, to my mind convincingly, that the four elements do not blend, only their qualities. For this debate, which ran well into the Renaissance, see also De Haas (1999).

39 For a more detailed discussion of this passage see Bodnár in this volume.

40 Cf. Bodnár in this volume, section 5.

blending, are of paramount importance to distinguish the Peripatetic conception of blending from its rivals. The elaborate discussion of division in chapter VIII alone suggests that the Stoics had a role for division in their theory of blending as well, which can be confirmed from other sources.[41] However, it seems unnecessary to assume with Alexander that the Stoics believed in an actual infinite division. For them, too, division could merely facilitate the process, until the interaction in terms of tension (τόνος) yields the tensional motion (τονικὴ κίνησις) which characterizes the blend.[42] The mutual coextension (ἀντιπαρέκτασις) Alexander and other sources ascribe to the Stoics, occurs as bodies are going through one another (III, 7.18–20), and goes hand in hand with division (VIII, 16.19–20).[43] I suggest mutual coextension is also part of the process leading up to blending proper, not necessarily constitutive of the resulting blend.[44]

To division and mutual coextension we might add the role of pores in the initial stages of blending. As we have seen, in chapter V, 10.24–25 Alexander starts from the assumption that bodies go through one another by means of certain pores (διὰ πόρων τινῶν). He then distinguishes two options (the pores are void, or the pores a full) and refutes both. I suggest this exercise only makes sense if the Stoics indeed invoked pores in their description of the process of blending, as Alexander also suggests in *Mant.* XIV, 140.8–10.[45] Alexander stresses that if bodies pervade *the pores* in another body this will yield mere juxtaposition (παράθεσις), not blending (5, 10.24–25; cf. *Mant.* XIV, 140.9). But it seems entirely possible that pervading pores was meant to facilitate division and mutual coextension, leading to the juxtaposition that Aristotle and Alexander also allow during the process leading up to blending proper.[46]

41 See e.g. Rashed (2009) discussing Diogenes Laërtius 7.150–151. On division see further Pfeiffer in this volume.

42 Note that Alexander calls the active elements fire and air *eutonos*, and the passive water and earth *atonos* at *Mixt.* IV, 9.3–8. We have to wait until *Mixt.* X, 19.21–23 before *tonos* is acknowledged as a relevant factor, and until 21.2–7 before the motion of the active principle comes into play (only to be ridiculed, of course). For the importance of this motion see Helle (2018), with reference to Hierocles *Elements of Ethics* IV.3–10 and IV.38–53.

43 See *Mixt.* VIII, 16.19–20: παρεκτείνεται διαιροῦντα ἄλληλα (both present tense).

44 This would entail that e.g. the fifth objection in chapter VI, which identifies complete mutual coextension with coming to be of the same size, is a polemical misconstrual.

45 As far as I know, pores are not mentioned in the remaining reports of early Stoic doctrine. In De Haas (2021) I have argued with respect to the use of common notions that Stoic contemporaries of Alexander may well have developed new insights building on their own heritage, which are reflected in Alexander's polemics. I take Alexander´s criticism of pores, and of the role of compression in explaining bodies going through bodies, as an indication of relevant contemporary views as well.

46 Compare DL 7, 151.4–5: wine in the sea will (first) coextend to some degree, but then it will be destroyed. Cf. Bodnár in this volume, section 1.

Juxtaposition of smaller portions of the ingredients in the natural pores of one of them renders both interaction and division (fission) more likely, esp. in cases in which the ingredients are not as easily divisible as liquids.[47] The order of Alexander's chapters may even mirror the stages of a process that starts with (chapter V) materials pervading each other's pores (when these are present and of sufficient size),[48] or (chapter VI) somehow creating room for each other, both of which (chapter VII) facilitate division, which in its turn facilitates even more interaction between the ingredients, which finally yields the blend. As part of his polemics Alexander presents the concepts of complete pervasion of each other's pores, complete division, and complete mutual coextension as constitutive of the final blend.[49] It is this polemical choice, it seems to me, which yields the absurdities of ingredients being entirely pores, or being actually infinitely divided, or literally being coextended whole through whole. Of course taking the early stages of the process to be definitive of the result in this way is only possible while suppressing the interaction between ingredients in terms of tension, which unifies the blend as soon as the division and coextension have done their work.[50] Thus conceived, the Stoic process would run dangerously parallel to the Peripatetic process, and only differs in the kind of interaction which in the end creates the blend (Stoic tensional motion replaces Peripatetic qualitative interaction). Hence Alexander's concern with every step along the way.

The Stoics may well have taken their inspiration for taking advantage of pores in this way from Aristotle's use of pores in explaining the interaction between various kinds of homogeneous bodies in *Meteorology* IV. What is more, in his commentary on *Meterology* IV Alexander dutifully follows Aristotle in explaining a range of phenomena by means of pores, channels or otherwise open textures. Aristotle uses pores to explain penetration by moisture (381b1, 3; 385a29, b20–25), penetration of combustible materials by fire

47 See the *Meteorologica* passages discussed below p. 97–98.

48 Note 10.6 διὰ πόρων τινῶν: not just any pores, but certain kind of pores, avoiding the objection 2b(ii) above.

49 In this context it is important to note that in chapter 8 Todd emended several occurrences of the verb *diairein* in the present tense to the perfect tense, suggesting (infinite) division to be a mark of the final blend. Cf Todd (1976) 131 with n. 1. Groisard has retained the manuscript readings, thus allowing for a clearer distinction between the process leading up to a blend, and the blend itself.

50 I take it that the notion of mutual participation Alexander mentions in 7.20–22 (cf. Hier. *Elem.Eth.* IV.7–8) refers to this interaction: ὡς μηδὲν μόριον ἐν αὐτοῖς εἶναι μὴ μετέχον πάντων τῶν ἐν τῷ τοιούτῳ κεκραμένῳ μίγματι. Ἀντιπαρέκτασις δι᾽ ὅλων and even παράθεσις δι᾽ ὅλων (Hier. *Elem.Eth.* IV.10) suggest that the tensional dynamics between the ingredients is more important than the material configuration of particles.

(387a19, 21), as well as compressibility (386b2–9), breakability (386a15) and fissibility (387a2) of a range of materials. For instance, combustible materials fall victim to fire because it affects them more easily as fire takes advantage of their relatively open structure, whereas e.g. crystal is not combustible for the lack of pores. Compression, and indeed all changes in rarity and density which do not involve generation and destruction, are explained by e.g. squeezing out air or water present within bodies through pores. So pores are perfectly acceptable as long as they are not void, and as long as they are large enough to allow e.g. the water or air in them to disperse. Here we may find the necessary background to Alexander's concern in chapter V with *filled* pores through which bodies might interpenetrate, divide and eventually affect each other on the way to a proper blend. All of these processes may be relevant as preliminary stages of blending, facilitating a more thorough mutual division of the materials concerned.

This proposal may receive some corroboration from Alexander's interest in compression being related to the issue of bodies pervading bodies. In *Quaestio* II.12 it is argued that things that contract and withdraw into themselves do not do so by body passing through body—suggesting that his opponent claims as much.[51] For the author of *Mant.* XIV, 140.32ff who is refuting the claim that bodies go through bodies, it is obvious that e.g. the impact of fire on iron, liquefaction, lighting a room, and the drop of wine in the sea all imply changes in density. It is no coincidence that *Mant.* 14 uses nearly the same list of examples Alexander uses throughout *De mixtione*.

Both the use of pores, and of changes in density are interesting as possible means for the Stoics to overcome a genuine difficulty of their theory. Among the examples listed above some exhibit no, or very little, change of volume, whereas others are all about change of volume. The latter applies to growth as well as to the additional extension of e.g. incense mixed with air, or gold mixed with chemicals.[52] Pervading each other's pores, or compression of one ingredient under the influence of another[53] will explain at least some of these differences. Against this background the arguments in *Mant.* XIV gain meaning: how do we know which bodies can blend by going one through the other, the author asks, if some denser substances allow it, whereas some rarer substances do not, and density and rarity do not play the same role in all cases?[54]

51 Cf. Sharples (1992), 110–112.

52 The problem is explicitly signaled at *Mant.* XIV, 140.31–32.

53 *Mant.* XIV, 141.16–19 surprisingly suggests that the opponent may have defended the wine/sea example by positing both expansion of the wine and contraction of the sea.

54 *Mant.* XIV, 140.1–8; 140.25–141.1. Cf. Groisard (2016), 129–141.

Alexander wishes to exclude all reference to degrees of density. The notion of 'fullness' that he uses in chapter V–VI is defined more clearly in *Mant.* XIV: "the rarest body and the densest are equally full if there is no place for empty body".[55] This peculiar definition of "full" is meant to exclude a version of Stoic blending: "For being more or less dense does not contribute anything to this [viz. the explanation of fire in iron, and soul, nature and cohesion], if both alike are full" (140.29–30). Nevertheless, this definition of fullness allows for the pores of the *Meteorology*, and all their applications. Since the Stoics reject void pores as well, they are still free to use pores, either as the first stage of bodies pervading bodies, or to allow for changes in density involved in blending and other interaction of bodies. Chapters V–VI thus gain importance as attacks on the preliminary stages in the process of Stoic blending. If so, these chapters are not merely showcasing traditional Peripatetic scholasticism, but constitute a necessary attempt to address significant borrowings by the Stoics of ideas in Aristotle's *GC* and *Meteorology*.

5 Conclusions

In this paper I have argued that a series of topics discussed in *Mixt.* V–VI, *Mant.* XIV and *Quaest.* II.12 relate to initial stages of Stoic, as well as Peripatetic blending. Both schools relate the process of blending to initial interpenetration of ingredients, facilitated by liquidity and (or so I have suggested) the presence of certain types of (filled) pores. Mutual division and coextension go hand in hand, until a degree of juxtaposition of ingredients is reached which easily allows the specific interaction that creates the final blend: interaction of qualities for the Peripatetics, tensional dynamics for the Stoics. We have seen that a stock list of examples used by Alexander also raises questions concerning changes in density and volume, which Aristotle, Alexander and (I suggest) the Stoics had to deal with. I have suggested that the role of pores found in *Meteorology* IV may have been part of the solution for some of Alexander's contemporaries. Throughout the arguments in the chapters V–VI, indeed throughout the *De mixtione*, Alexander consistently tries to replace a comprehensive materialist metaphysics of interacting bodies by his own equally comprehensive brand of hylomorphism—even if not every argument is equally convincing.

55 *Mant.* XIV, 140.3–4 ἐπίσης γὰρ πλῆρες τὸ λεπτομερέστερον τῷ παχυμερεστάτῳ, εἰ μηδαμοῦ χώρα κενοῦ σώματος. Cf. De Harven (2018) 18-19 on rarity and density.