

The Concept of Pneuma after Aristotle

Sean Coughlin
David Leith
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(eds.)

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THIS VOLUME EXPLORES the versatility of the concept of pneuma in philosophical and medical theories in the wake of Aristotle's physics. It offers fourteen separate studies of how the concept of pneuma was used in a range of physical, physiological, psychological, cosmological and ethical inquiries. The focus is on individual thinkers or traditions and the specific questions they sought to address, including early Peripatetic sources, the Stoics, the major Hellenistic medical traditions, Galen, as well as Proclus in Late Antiquity and John Zacharias Aktouarios in the early 14th century. Building on new scholarly approaches and on recent advancements in our understanding of Graeco-Roman philosophy and medicine, the volume prompts a profound re-evaluation of this fluid and adaptable, but crucially important, substance, in antiquity and beyond.

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CONTENTS

SEAN COUGHLIN, DAVID LEITH, ORLY LEWIS

Introduction — 7

PAVEL GREGORIC

Soul and Pneuma in *De spiritu* — 17

LUCIANA REPICI

Strato of Lampsacus on Pneuma — 37

MICHIEL MEEUSEN

Aristotle's Second Breath: Pneumatic Processes in the *Natural Problems*
(On Sexual Intercourse) — 63

ORLY LEWIS AND DAVID LEITH

Ideas of Pneuma in Early Hellenistic Medical Writers — 93

DAVID LEITH

The Pneumatic Theories of Erasistratus and Asclepiades — 131

TEUN TIELEMAN

Cleanthes' Pneumatology. Two Testimonies from Tertullian — 157

IAN HENSLEY

The Physics of Pneuma in Early Stoicism — 171

SEAN COUGHLIN AND ORLY LEWIS

Pneuma and the Pneumatist School of Medicine — 203

PETER N. SINGER

Galen on Pneuma: Between Metaphysical Speculation and Anatomical
Theory — 237

JULIUS ROCCA

One Part of a Teleological Whole: Galen's Account of the Lung as an
Instrument of Pneumatic Elaboration — 283

JULIA TROMPETER

How the Soul Affects the Body: Pneumatic Tension, Psychic Tension and
Megalopsychia in Galen — 313

BETTINA BOHLE

Proclus on the Pneumatic Ochema — 343

PETROS BOURAS-VALLIANATOS

Theories on Pneuma in the Work of the Late Byzantine Physician John
Zacharias Aktouarios — 365

Index of Ancient Sources — 401

Index of Names — 427

General Index — 429

Ian Hensley

The Physics of Pneuma in Early Stoicism

Summary

This chapter examines the ancient Stoic theory of the physical composition of pneuma, how its composition relates to pneuma's many causal roles in Stoic philosophy, and to what extent each of the first three leaders of the Stoic school accepted the claim that pneuma pervades the cosmos. I argue that pneuma is a compound of fire and air. Furthermore, many functions of pneuma can be reduced to the functions of these elements. Finally, it is likely that each of the early Stoics posited a pervasive cosmic pneuma. This paper also explores the nature of pneuma's tensile movement and offers an account of fire and air's roles in causing its motion.

Keywords: Stoicism; pneuma; fire; air; tensile movement; blending

Dieser Beitrag behandelt die antike stoische Theorie der physischen Komposition des Pneuma, wie dessen Zusammensetzung sich zu vielen kausalen Rollen in der stoischen Philosophie verhält und in welchem Maß jeder der ersten drei Schulhäupter der Stoa annahm, dass Pneuma den Kosmos durchdringe. Ich argumentiere, dass sich Pneuma aus Feuer und Luft besteht und dass viele Funktionen des Pneumas auf die Funktionen dieser Elemente reduziert werden können. Auch ist es wahrscheinlich, dass jeder frühe Stoiker das allgegenwärtige, kosmische Pneuma postulierte. Dieser Beitrag untersucht außerdem die Natur der Spannungsbewegung beim Pneuma und bietet eine Beschreibung, wie Feuer und Luft Bewegung verursachen.

Keywords: Stoizismus; Pneuma; Feuer; Luft; Spannungsbewegung; Vermischung

I would like to thank Tad Brennan, Charles Brittain, Gail Fine, the editors of this volume, and two anonymous referees for comments on previous versions of this chapter. I presented an early version of this chapter at Syracuse University at the Central New York Humanities Workshop in 2017, and I would like to thank the participants at this event for their helpful comments and criticisms.

1 Introduction

This chapter focuses on the Hellenistic Stoics' theory of *pneuma*. Specifically, it focuses on the pneumatic theory of the first three leaders of the Athenian school or the "early Stoics": Zeno, Cleanthes, and Chrysippus. Physics was one of the main components of Stoic philosophy as it developed under these philosophers. Since the early Stoic theory of *pneuma* developed within Stoic physics more generally, it will be helpful to first describe Stoicism's central physical commitments. This will highlight the importance of *pneuma* within Stoic philosophy and help to clarify several key aspects of its nature.

One central tenet of Stoic physics is corporealism: the claim that only bodies are beings (*onta*).¹ Even though the Stoics posit certain incorporeal entities, these incorporeals are somehow less real than bodies. The details of bodies' and incorporeals' different modes of existence are controversial. However, it is clear that, given their distinctive ontological status, only bodies can be causes and only bodies can be affected by causes within Stoicism.² Therefore, any causal interaction in the world should be analysed in terms of one body affecting another.

Now consider two distinctive claims about causation made by the early Stoics. First, causes (or at least certain types of causes) are always sufficient to bring about their effects.³ Second, there are no uncaused events in the world; for any change or condition in the world, there is a cause responsible for it.⁴ Given corporealism, it follows that a body is the cause of any event or condition in the natural world. A large portion of Stoic physics is thus concerned with identifying the bodies that are sufficient to cause natural phenomena.

Of course, the Stoics deny the traditional claim that immaterial entities – the soul, virtue, the gods, and so on – cause events or states in the natural world. Instead of simply eliminating these entities from their ontology, however, they claim that such entities are bodies. Consider the soul. Clearly, the Stoics think, the soul causes certain physical events in the body. However, if the soul were incorporeal, then this would be impossible. Hence, the Stoics claim that souls were corporeal. It seems that the Stoics' physical and metaphysical commitments lead them toward a project of reduction: they identify many supposedly paradigmatic incorporeal entities as being corporeal, since

1 Alexander of Aphrodisias, *In Aristotelis Topiconum libros octo commentaria* Wallies 301,19–25 (= *SVF* 2.332 = LS 27A); Plutarch, *De communibus notitiis adversus Stoicos* 30, 1073e (= *SVF* 2.525). "SVF" refers to von Arnim 1905 and "LS" refers to Long and Sedley 1987.
2 Aëtius, *Placita philosophorum* 1.11.5 (= *SVF* 2.340); Cicero, *Academica posteriora* 1.39 (= *SVF* 1.90 = LS 45A); Sextus Empiricus, *Adversus mathematicos* 9.211

(= *SVF* 2.341 = LS 55B); Stobaeus, *Eclogae* 1.13.1e (Wachsmuth/Hense 1.138,14–139,4 = *SVF* 1.89, 2.336 = LS 55A).

3 See Zeno's examples of causes described in Stob. *Ecl.* 1.13.1e (Wachsmuth/Hense 1.138,21–22 = *SVF* 1.89 = LS 55A).

4 See, for example, Alexander of Aphrodisias, *De fato* 12 (Bruns 192,8–11 = *SVF* 2.945 = LS 55N).

they believe those entities exist and are causally active.⁵ Targets for this reduction project include the soul, virtue, God, and qualities.

Now, it would be unsatisfying to state that these supposedly incorporeal entities are bodily without also describing the types of bodies that they are. For one would like to know what kinds of bodies are capable of carrying out the activities normally attributed to these entities. Presumably, the Stoics believe that a set of features allow a particular type of body to carry out the functions attributed to the soul, for example. And while the Stoics might have plausibly identified different types of bodies as suitable for carrying out the activities attributed to these various entities, it appears that, at least by the time that Chrysippus takes over, they think that one body is well suited for being the causal basis for the functions of many different traditionally incorporeal entities: *pneuma*.⁶

The Stoics claim that *pneuma* carries out the functions attributed to the soul, virtue, the gods, God or Zeus himself, and qualities. Thus, one type of body is capable of causing many different events and states within their physics. This chapter will examine two central questions about *pneuma* in Stoicism. First, what is its underlying physical makeup? Second, how does *pneuma*'s composition explain its ability to carry out these many causal roles?

I will proceed in the following way. Section 2 presents the standard Stoic theory of *pneuma*, according to which *pneuma* is divided into three main types that are assigned different functions. Next, in Section 3, I examine to what extent the first two leaders of the Stoics, Zeno and Cleanthes, endorsed this theory. This discussion revolves around the following questions. First, did Zeno and Cleanthes claim that certain entities are made of *pneuma*? Second, if so, did they also believe that *pneuma* is present throughout the world, as the standard Stoic theory maintains? After arguing that the available evidence does not conclusively answer these questions, I turn toward Chrysippus in Section 4. While he does endorse the standard theory of *pneuma*, his theory of its underlying nature is not clear. Some sources suggest that he believes *pneuma* is a blend of fire and air; others suggest that he believes that some *pneuma* is made of air alone. By speculating that he might have endorsed a linguistic principle according to which *pneumata* are sometimes identified by their primary causal element, I resolve this interpretive puzzle. My central claim is that Chrysippus believes that *pneuma* is a blend of fire and air in which one of these elements is causally primary, depending on the type of *pneuma* at issue. Given this claim, along with the linguistic principle, our sources do not necessarily conflict with each other. Furthermore, if we understand Chrysippus' theory as a natural development of his predecessors, it is probable that Zeno and Cleanthes endorsed many aspects of the standard Stoic theory of *pneuma* – including the claim that *pneuma*

⁵ See discussion by LS, I.163–164.

are *pneumata*" (Aët. I.11.5, SVF 2.340 = LS 55G).

⁶ See the striking report by Aëtius that "all causes ...

pervades the world. In Section 5, I evaluate to what extent *pneuma*'s components are responsible for its distinctive type of movement. Finally, Section 6 summarizes the results of these discussions.

However, before beginning to examine *pneuma*, we should discuss the state of the evidence for Stoicism. We do not have complete, original treatises written by the first three leaders of the Stoic school. As a result, we must reconstruct these philosophers' views by examining secondhand evidence. These secondhand sources span several centuries, have different philosophical and doxographical projects, and often report or use different original Stoic texts. As a result, many interpretive problems arise, some of which I have already mentioned. I will now describe how this chapter will approach these interpretive problems. (I will not argue that this is the correct interpretive methodology. Rather, my goal in describing it is to clarify certain interpretive choices made in this chapter.)

First, in many cases, our sources are hostile to Stoicism. For example, Plutarch and Alexander of Aphrodisias provide much of our evidence for the Stoic theory of *pneuma* in treatises that explicitly argue against the school. Their anti-Stoic attitudes sometimes affect their reports. For example, Plutarch sometimes quotes the Stoics seemingly out of context to trap them in contradictions, and Alexander sometimes paraphrases the Stoics in Peripatetic language, thereby obscuring the original theory. Other sources are, at the very least, non-Stoic, if not as explicitly hostile as Plutarch and Alexander. If our evidence for the Stoic theory of *pneuma* comes from such sources, should we trust the theory that they attribute to these philosophers?

I approach this issue in the following way. First, all other things being equal, if a non-Stoic or hostile source attributes *p* to the Stoics as a group, then this should raise our credence in the proposition that the first three leaders of the Stoics accepted *p*. For their hostility or non-Stoicness alone cannot be a sufficient reason to reject their report. Second, all other things being equal, if a source attributes *p* to a particular Stoic, then this should raise our credence in the proposition that that Stoic accepted *p* to a higher degree. Furthermore, if a source quotes a particular Stoic or cites a particular work when attributing *p* to that Stoic, then this should raise our credence in the proposition that that Stoic accepted *p* even higher. For a quote from a hostile source is still a quote, and a citation suggests that they were drawing from an original text while discussing the Stoics.

Now, all other things might not be equal. For example, *p* might conflict with other central, well-attested tenets of Stoicism, or *p* might be consistent with later Stoicism but it might conflict with the well-attested views of an early Stoic. Or perhaps the source could be demonstrated to be unreliable in all respects. In such cases, it seems reasonable to disregard the hostile source's report. On the other hand, *p* might agree with other central, well-attested tenets of Stoicism. Such a view might coherently fit into well-

attested Stoicism, it might not conflict with any views attributed to the early Stoics, and it might be confirmed by additional sources. In such cases, this should raise our credence in the proposition that the Stoics accepted p even higher.

Another problem that can arise because of the state of the evidence for Stoicism relates to conflicts between sources. Sometimes, one set of sources will attribute p to the Stoics, and another will attribute a claim that entails *not- p* to them. In some unlucky cases, the other set will explicitly attribute *not- p* itself to the Stoics. When such a conflict arises, and when one set of sources is not clearly more reliable than another, it seems difficult to determine the original Stoic position.

My strategy in relation to this issue is to search for views that the Stoics might have held that cohere with other well-attested Stoic claims, can explain how sources came to attribute apparently conflicting beliefs to the Stoics, and are relatively philosophically plausible. This allows us to accept all sources on a particular issue as reliable, when there is no good reason to reject them, while also charitably interpreting the Stoics. Of course, the resulting interpretation will be speculative, and I will highlight such interpretations when I propose them.

Finally, our sources simply might not offer enough information to answer a particular interpretive question. In such cases, there might be options for indirect interpretation. For example, consider this interpretive question: did Zeno accept x or y ? Suppose our evidence does not clearly provide an answer to this question. Also, suppose our evidence suggests that Chrysippus accepted y . I think the appropriate response is to raise one's credence in the proposition that Zeno accepted y , though of course not as highly as if a source explicitly attributed y to Zeno. While the first three leaders of the Stoics did not agree on everything, the fact that one early Stoic accepted a claim seems to be a defeasible reason to think that another early Stoic accepted that claim. At least, this is true when we do not have independent reasons for thinking that this was an area of Stoic disagreement or a case in which a later Stoic developed and changed the original Stoic theory. In cases of indeterminacy, this is my approach.

2 The roles of pneuma of Stoic physics

A distinctive feature of the Stoic theory of pneuma is its division into three types: state or *hexis*, nature or *physis*, and soul or *psychē*.⁷ Each type is related to a class of natural object. States are paired with inanimate objects, natures with plants, and souls with

⁷ There are two kinds of soul: rational and non-rational. Rational souls have powers that non-rational souls lack. As a result, some sources present

rational souls as a distinct, fourth type of pneuma. For example, see Philo, *Quod deus sit immutabilis* 35–36 (= SVF 2.458 = LS 47Q).

animals. Furthermore, these types of pneuma affect these objects in different ways. This is evident from the following report from Ps.-Galen:

TI There are two kinds of innate pneuma, the natural kind and the psychic kind. Some people (*sc.* the Stoics) also posit a third, the state kind. The pneuma that holds together stones is of the state kind, the one which nurtures animals and plants is natural, and the psychic pneuma is that which, in animate beings, makes animals capable of sensation and of moving in every way.⁸

Ps.-Galen, *Introductio seu Medicus* 12
(Petit 45,13–19 = K. 14.726 = SVF 2.716 = LS 47N).

According to this report, states hold together inanimate objects such as stones, animals and plants are nurtured by natures, and souls cause animals to be able to perceive and move. Inanimate objects, plants, and animals belong to a class that the Stoics call “unified bodies”; which are distinct from bodies whose parts are conjoined or dispersed, such as a ship or army respectively.⁹ The distinguishing feature of unified bodies is that their parts are sympathetic to each other: they act and are affected in a coordinated way. An inanimate whole is unified in so far as it holds together such that its various parts are affected in similar ways – sound vibrations will be transmitted through a stone, for example. A plant is unified in so far as it is nurtured and grows, which is accomplished through its parts acting together to take in nutrients and put them to use. An animal is unified in so far as it perceives and moves in accordance with those perceptions, which, again, is accomplished through a coordination of its parts. These pneumata present within natural objects are identified with those objects’ qualities, since they cause them to possess whatever characteristics distinguish them from other bodies.¹⁰

It is plausible that unified bodies have coordinated and sympathetic parts because of the pneuma present within them. At least, Sextus Empiricus distinguishes unified bodies from other kinds on the basis of two features: unified bodies are governed by single volumes of pneuma and their parts sympathise with each other.¹¹ Thus, for any unified body, there is a volume of pneuma that acts on it such that its parts are coordinated and sympathetic to each other. This is realised in different ways in different types of unified bodies.

8 Unless otherwise noted, when they are available, I will adopt the translations in LS. However, I will use different terms for certain words: I transliterate ‘pneuma,’ translate *hexis* with “state,” and translate *physis* with “nature.” When I use my own translations, I will note this and provide the original text.

9 Sext. Emp. *M.* 9.78.

10 Plutarch, *De Stoicorum repugnantiis* 43, 1054a–b (= SVF 2.449 = LS 47M).

11 Sext. Emp. *M.* 9.78–79 (= SVF 2.1013). See discussion by Annas 1992, 50; Brennan 2015, 47, n. 7; Long 1982, 38; Sambursky 1959, 8–9.

As I have already noted, the Stoics claim that only bodies can act, and only bodies can be affected. Furthermore, any causal interaction between bodies occurs by means of physical contact.¹² There is no action at a distance. Brief, superficial contact facilitates many causal interactions, as in the case where a knife cuts flesh. However, the Stoics also allow for cases of contact and interaction through a type of mixture that they call “blending.” According to Chrysippus, blending is the complete interpenetration of two or more bodies such that they occupy the same place and are present everywhere within the blend.¹³ For example, a volume of water and a volume of wine can blend, and for any portion of the blend, no matter how small, that portion will contain water and wine. However, even in this relationship of total mixture, blended ingredients make contact with each other. This is crucial for the Stoics, since it allows causal interactions to occur between bodies that are completely mixed. The Stoics use their theory of blending to explain many basic kinds of causal interactions, including those between their fundamental principles or *archai*.¹⁴

The Stoics also use this theory of blending to explain pneuma’s role in their physics. Since pneuma governs unified bodies and coordinates their parts, it acts on them. Since pneuma acts on unified bodies, it makes physical contact with them. However, this does not occur by means of superficial contact, nor by mere contact by a juxtaposition, in the way that beans and grains of wheat touch. Rather, according to the Stoics, volumes of pneuma and the unified bodies they govern are totally blended.¹⁵ Consequently, according to the Stoic analysis of blending, unified bodies and their governing pneumata completely interpenetrate each other and form a mixture within which both substances are present everywhere. This is how a unified body’s parts achieve the level of coordination required for sympathy: its governing pneuma is present everywhere within it and thus can act simultaneously in different locations of the body.

The Stoics also classify the cosmos itself as a unified body. Their evidence for this, according to Sextus Empiricus, is that the cosmos’ parts are sympathetic to each other.¹⁶ For example, the phases of the moon are coordinated with the tides and certain biological phases within animals. Since the cosmos is a unified body, it is governed by a single volume of pneuma, which will either be a state, nature, or soul. Correlatively, the cosmos will either be an inanimate object, a plant, or an animal.

12 Plut. *Comm. not.* 40, 1080e–f; Simplicius, *In Aristotelis Categoriae commentarium ad.* c.9, Kalbfleisch 302,29–32 (= *SVF* 2.342).

13 The primary source on Chrysippus’ theory of blending is Alexander of Aphrodisias, *De mixtione*.

14 In Hensley 2018, I argue that the principles, God

and matter, are blended with each other.

15 Alexander of Aphrodisias, *De mixtione* 4 (Bruns 217,32–218,1 = *SVF* 2.473 = LS 48C). See discussion by Long 1982, 38–39.

16 Sext. Emp. *M.* 9.79.

The cosmos is an animal.¹⁷ It is therefore governed by a soul. In fact, its soul is rational, since it somehow encompasses or contains the rational souls of gods and human beings.¹⁸ The various powers assigned to souls are thus assigned to the world's soul, as well – it has sensation, it can think, and it has impulses. Furthermore, it unifies the cosmos by blending with it. For any location within the cosmos, no matter how small, a portion of the world's soul is present. This explains how disparate parts of the world can be sympathetic to each other: because the same *pneuma* is present everywhere within the world, it is able to carry out coordinated actions on geographically separated bodies. Finally, since these coordinated actions are effects of a rational soul, the world is governed rationally, as well. This is why many sources report that one of the basic Stoic principles, God, is made of *pneuma*.¹⁹ For the rational soul of the world, which is made of *pneuma*, seems to be the appropriate vehicle for carrying out God's providential and beneficent plan.²⁰

The following picture of *pneuma*'s place in Stoic physics comes into focus. The world itself is governed by a volume of *pneuma*, which is a rational soul. This *pneuma* blends with the world. It follows that for any location in the world, a portion of the world's soul is present. Furthermore, this is true of any animal, plant, or unified inanimate object. For any location within these bodies, some portion of their governing *pneuma* – either a state, a nature, or a soul – will be present, causing that body to possess certain essential characteristics. Furthermore, many functions of other traditionally incorporeal entities, such as qualities and God, are subsumed under the functions of these types of *pneuma*. For qualities are the causes of bodies being qualified, which are identified with those bodies' governing *pneumata*, and the soul of the world is the vehicle of God's divine activity.

Why did the Stoics choose *pneuma* to be the body that plays such an important and pervasive role in their physics? Scholars have argued that *pneuma*'s status among the Stoics' contemporaries and predecessors as inborn hot breath was the cause.²¹ Seeking to explain the soul's activities on the body, the Stoics needed a corporeal entity. Inborn

17 Calcidius, *In Platonis Timaeum commentarius* 292 (= *SVF* 1.88); Cicero, *De nativa deorum* 2.21–22 (LS 54G); Diogenes Laërtius 7.138 (= *SVF* 2.634); 7.142 (= *SVF* 2.633); Eusebius, *Praeparatio evangelica* 15.15.1 (= *SVF* 2.528); Hermias, *Irrisio gentilium philosophorum* 14 (= *SVF* 1.495); Sext. Emp. *M.* 9.88–91; 9.104.

18 See Cic. *Nat. D.* 2.29–30 (LS 47C) and discussion by Powers 2012.

19 See Aët. 1.7.33 (= *SVF* 2.1027 = LS 46A); Alex. Aphr. *Mixt.* 11 (Bruns 225,3–4); Clement, *Stromateis* 5.14 (= *SVF* 2.1035); Sextus Empiricus, *Pyrrhoniae hypotyposes* 3.218 (= *SVF* 2.1037). The claim that God is

identical to some volume of *pneuma* is controversial. There is also evidence that suggests that God is fire, which would conflict with the claim that God is some type of *pneuma*, if we assume that fire and *pneuma* are distinct. Furthermore, there is evidence that God is somehow more basic than fire and *pneuma*. Defending one of these interpretations over the others is beyond the scope of this chapter.

20 Cf. Furley 1999, 440.

21 See Lapidge 1973, 276; Lapidge 1978, 168; LS, 1.287–288; Sedley 1999, 388–389.

breath was accepted to be corporeal and pervasive within animals' bodies. So the Stoics selected it as the physical basis for the soul. The Stoics also thought that the cosmos was an animal. So, given the ensouled nature of the cosmos, they made an analogy: pneuma must be present throughout the world in the same way it is present throughout an animal's body.

But were there reasons internal to Stoic physics why pneuma played such an important role in their physics? This requires us to examine the Stoics' theory of the physical composition of pneuma. This inquiry will also allow us to evaluate whether and to what extent each of the first three leaders of the school accepted the theory of pneuma described in this section.

3 Zeno and Cleanthes on the composition of pneuma

To what extent did the early Stoics accept the standard Stoic theory of pneuma? Michael Lapidge argues that, while Chrysippus posited an all-pervasive, cosmic pneuma, Zeno did not, and Cleanthes likely did not. He advances two reasons for this – the first textual, the second philosophical. First, no evidence directly reports that Zeno or Cleanthes posited cosmic pneuma. Second, the unifying and psychic functions of cosmic pneuma would be overdetermined by the functions of other basic bodies within Zeno's and Cleanthes' physics. Hence, there would be no work for cosmic pneuma in their physics.²²

However, we do have indirect evidence that Zeno and Cleanthes posited a cosmic pneuma: they posited a world soul.²³ Thus, if the first two leaders of the Stoics also accepted that souls are made of pneuma, it seems likely that they would claim that pneuma is present throughout the world. Such an inference would be obvious.

Did Zeno and Cleanthes believe that souls were made of pneuma? To answer this question, we must first determine what they thought pneuma was made out of. For, at this point, while we know that pneuma is corporeal, we do not yet know the type of body that it is. Answering this question will also allow us to evaluate Lapidge's second claim that cosmic pneuma's functions would overlap with other basic bodies' functions

22 Lapidge 1973, 274–276; Lapidge 1978, 169.

23 On Zeno, see Cic. *Nat. D.* 2.21–22 (= *SVF* 1.111–13); Sext. *Emp. M.* 9.104 (= *SVF* 1.111); 9.107 (= *SVF* 1.110); 9.113 (= *SVF* 1.113). On Cleanthes, see Diog. *Laërt.* 7.139 and Euseb. *Praep. evang.* 15.15.7, who report that Cleanthes claimed the sun was the “leading part of the soul” or *hēgemonikon* of the cosmos. If the cosmos has a leading part of the soul, it

follows that it also has a soul. Furthermore, as Verbeke 1945, 55, notes, Tertullian states that Cleanthes posited a world *spiritus*, which is typically thought to be our Latin sources' term for pneuma (Tert. *Apolo-gia* 21.10 = *SVF* 1.533). So perhaps, *pace* Lapidge, we also have direct evidence that Cleanthes posited a cosmic pneuma.

within Zeno's and Cleanthes' physics. For we can only evaluate this when we know what type of body pneuma is.

Thus, let us consider another important physical theory within Stoicism: their account of the basic "elements" (*stoicheia*). Following in the Empedoclean tradition, the Stoics claim that there are four elemental bodies: fire, air, water, and earth. Like Aristotle, the Stoics seem to think that dividing any portion of one of these bodies will only yield more of that body. Fire, for example, is composed only of smaller portions of fire. Aristotle, of course, analysed these bodies in terms of two primary qualities qualifying an underlying substratum. The Stoics offer a simpler account: each of the elements is associated with only one primary characteristic. Fire is hot, air is cold, water is wet, and earth is dry.²⁴ Furthermore, the elements have particular densities relative to one another. Fire is the least dense element, followed by air, then water, and finally earth is the densest element. It follows from this that elemental change occurs by means of changes of density. For example, when a portion of fire becomes sufficiently dense, it changes into air; and when a portion of water becomes sufficiently rare, it becomes air.²⁵

According to the Stoics, at some level of decomposition, the natural world is composed of the four elements. Since pneuma is present throughout the world, it is natural to inquire into the relationship between pneuma and fire, air, water, and earth. Did they identify pneuma with one, or some combination of, the elements, or is it something distinct?

Our evidence does not clearly tell us how Zeno would answer this question. Consider the following passage from Stobaeus' *Eclogae*, which presents Zeno's distinction between two types of fire:

T2 Zeno says that the sun and the moon and each of the other stars are intelligent and prudent, and have the fieriness of designing fire. For there are two kinds of fire: one is undesigning (*ἄτεχνον*) and converts fuel into itself; the other is designing (*τεχνικόν*), causing growth and preservation, as is the case in plants and animals where it is nature and soul respectively. Such is the fire which constitutes the substance of the stars.

Stob. *Ecl.* 1.25.5 (Wachsmuth/Hense 1.213,15–21 = SVF 1.120 = LS 46D)

According to Zeno, undesigning fire converts fuel into fire. Designing fire has the capacity to preserve. Stobaeus cites natures and souls as examples of designing fire. Now, we noted above that nature and soul were two types of Stoic pneuma – the types that govern

24 Diog. Laërt. 7.137.

25 On the density of the elements, see Galen, *De naturalibus facultatibus* 1.3 (K. 2.8 = SVF 2.406 = LS 47E);

Stob. *Ecl.* 1.10.16c (Wachsmuth/Hense 1.129,18–23 = SVF 2.413 = LS 47A). See discussion by Hahn 1985.

and coordinate plants and animals, respectively. However, according to Stobaeus, Zeno identifies what we originally thought were types of pneuma with designing fire.²⁶

We might react to this report by inferring that Zeno did not posit pneuma at all. According to this interpretation, pneuma would be a later Stoic innovation. However, other sources attribute the standard Stoic position that souls are made of pneuma to him. Diogenes Laërtius groups him with Antipater and Posidonius in describing the soul as hot pneuma.²⁷ Furthermore, according to Tertullian and Calcidius, Zeno claims that souls are corporeal, since they separate from the body at death.²⁸ Specifically, souls are made of *spiritus* – our Latin sources’ term for pneuma. Eusebius, while reporting Zeno’s theory, also claims that souls are made of pneuma.²⁹ On the basis of these sources, we should not conclude that Zeno’s physics was inconsistent with the later Stoic theory of pneuma.³⁰ However, if we assume that pneuma and designing fire are distinct substances, our sources appear to attribute conflicting accounts of souls and natures to Zeno.

We could resolve this apparent inconsistency by arguing that, according to Zeno, pneuma just is a type of fire; it is not composed of any other elements. According to this interpretation, our sources would present the same theory in different language. In support, we could cite Rufus of Ephesus’ report that Zeno identified heat and pneuma.³¹ According to the Stoics, fire is the only hot element. Thus, heat would be a type of fire. It would follow that, according to Rufus, Zeno identifies a type of fire and pneuma.

However, it would be surprising if Zeno so radically revised the common understanding of pneuma as air, wind, or breath that he excluded air from its composition. Thus, we might resist the claim that heat is fire alone. While heat somehow requires fire, perhaps it is a mixture of elements predominated by fire. This would be consistent with the standard interpretation of the nature of Stoic pneuma, in which it is a mixture of elements. In that case, even given Rufus’ report, Zeno would not necessarily identify pneuma and fire. Instead, to resolve our apparently inconsistent sources, one could argue that Zeno claimed that souls are made out of a substance, which he sometimes called “pneuma”, which was predominated by, but not exclusively composed of, fire. “Designing fire” would then refer to this mixture, taking the name of its predominant element, and the apparent inconsistency in our sources would be resolved.

26 Cicero also states that Zeno describes souls as being made of heat or fire. See *Acad. post.* 1.39; *De finibus* 4.12; *Tusculanae disputationes* 1.19 (all reported in *SVF* 1.134).

27 Diog. Laërt. 7.157 (= *SVF* 1.135).

28 Calcidius, *In Tim.* 220 (= *SVF* 1.138); Tertullian, *De Anima* 5 (= *SVF* 1.137).

29 Euseb. *Praep. evang.* 15.20.1 (= *SVF* 1.128).

30 Even though Lapidge argues that Zeno did not

posit cosmic pneuma, he does maintain that Zeno posited psychic pneuma in animals and humans on the basis of these reports. See Lapidge 1973, 274; Lapidge 1978, 168.

31 Rufus, *De corporis humani appellationibus* 228 (Daremborg/Ruelle 166 = *SVF* 1.127). This interpretation is endorsed by Verbeke 1945, 21, seemingly on the basis of this report from Rufus.

However, as we shall soon see, the Stoics did not think that psychic pneuma was predominated by fire, even if fire plays an important role within souls. Furthermore, given the lack of evidence describing Zeno's chemistry or his theory of the underlying composition of pneuma, we lack any confirmation of this theory. Thus, at best, when we limit ourselves to evidence explicitly reporting Zeno's theory of pneuma, we can only speculate on its underlying composition.

Evidence for Cleanthes is similarly difficult. Galen groups Zeno and Cleanthes together with Chrysippus as stating that the substance of the soul consists of pneuma.³² Seneca presents a disagreement between Cleanthes and Chrysippus on the nature of "walking", stating that Cleanthes thought that walking was "spirit (*spiritum*) passing from the leading part all the way to the feet."³³ Again, *spiritus* is pneuma. So, according to Seneca, both Cleanthes and Chrysippus treat the soul as being made of pneuma. On the other hand, while reporting Cleanthes' view, Cicero suggests that the inner causes of life in animals and plants are made of "heat" (*calor*).³⁴ These inner causes of life are soul and nature, respectively. Thus, Cicero suggests that Cleanthes identifies heat with souls and natures. Later in the text, while possibly still reporting Cleanthes' theory, Cicero suggests that the world is held together by a hot, fiery substance.³⁵ If this cosmic heat is totally constituted by fire, which some commentators have argued,³⁶ then the same interpretive problems and potential resolutions that Zeno's account presented face us again.

It seems likely that, when we restrict ourselves to sources presenting Zeno's and Cleanthes' views, our evidence about pneuma and the four elements' relationship is indeterminate. We do not know what pneuma is made out of. As a result, it is not clear whether pneuma's functions in later Stoicism would be overdetermined by the functions of other basic elements in Zeno's and Cleanthes' physics. Thus, we cannot conclusively evaluate Lapidge's argument that Zeno and Cleanthes posited no cosmic pneuma. However, considering evidence for Chrysippus' views might help resolve these difficulties. For, if we can determine Chrysippus' theory of pneuma's composition, we might attribute his theory to his predecessors, or at least consider how Chrysippus' theory could have developed from his predecessors.

32 Galen, *De placitis Hippocratis et Platonis* 2.8.48 (De Lacy 166,12–15 = K. 5.283 = SVF 1.521).

33 Seneca, *Epistulae* 113.23 (= SVF 1.525 = LS 53L).

34 Cic. *Nat. D.* 2.24 (LS 47C).

35 Cic. *Nat. D.* 2.28–32 (LS 47C).

36 Hahn 1977, 158.

4 Chrysippus on the composition of pneuma

First, let us note that, at least on the basis of the available evidence, Chrysippus appears to be the first Stoic to investigate the underlying nature of state – the pneuma that holds together inanimate unified bodies. Consider the following report from Plutarch:

Τ3 ἔτι τὸν ἀέρα φύσει ζοφερὸν εἶναι λέγει, καὶ τούτῳ τεκμηρίῳ χρῆται τοῦ καὶ ψυχρὸν εἶναι πρώτως· ἀντικειῖσθαι γὰρ αὐτοῦ τὸ μὲν ζοφερὸν πρὸς τὴν λαμπρότητα τὸ δὲ ψυχρὸν πρὸς τὴν θερμότητα τοῦ πυρός. ταῦτα κινῶν ἐν τῷ πρώτῳ τῶν Φυσικῶν Ζητημάτων πάλιν ἐν τοῖς περὶ Ἑξέων οὐδὲν ἄλλο τὰς ἕξεις πλὴν ἀέρας εἶναι φησιν· ὑπὸ τούτων γὰρ συνέχεται τὰ σώματα· καὶ τοῦ ποῖον ἕκαστον εἶναι τῶν ἕξει συνεχομένων αἴτιος ὁ συνέχων ἀήρ ἐστίν, ὃν σκληρότητα μὲν ἐν σιδήρῳ πυκνότητα δ' ἐν λίθῳ λευκότητα δ' ἐν ἀργύρῳ καλοῦσι.³⁷

Furthermore, Chrysippus says that air is naturally dark, and he uses this as evidence of the fact that it is also primarily cold. For its darkness is opposed to fire's brilliance, and its coldness to fire's heat. Putting forward these claims in the first book of his *Physical Investigations* and again in his *On States*, he says that states are nothing but volumes of air. "For bodies are held together by these. And the cohesive air is the cause of the fact that each thing is qualified (among things held together by state) – cohesive air which people call hardness in iron, denseness in stone, and whiteness in silver."³⁷

Plut. *Stoic. repug.* 43, 1053e–f, tr. mine

According to the quote that Plutarch provides, Chrysippus claims that cohesive air carries out the function attributed to states: it qualifies inanimate unified bodies or "the things held together by state." As a result of air's activity, particular inanimate bodies have particular features: iron is hard, stone is dense, and silver is white. And the cohesive air is called "hardness", "denseness", and "whiteness" according to the way it qualifies each of these bodies. On the basis of this theory, Plutarch paraphrases Chrysippus as saying that "states are nothing but volumes of air." If this is accurate, then Chrysippus identifies one type of pneuma – state – as being made of air alone.

Is this paraphrase accurate? Since Plutarch is a hostile source, we should determine if his report coheres with well-attested Stoicism or if it is confirmed by others. First,

37 I have followed LS and Cherniss 1976 in placing the quotation marks at these points in the passage. von Arnim 1905 begins the quotation with the para-

phrase "States are nothing but volumes of air" (οὐδὲν ἄλλο τὰς ἕξεις πλὴν ἀέρας εἶναι φησιν).

Plutarch quotes Chrysippus himself. Given this quotation, Plutarch's paraphrase represents Chrysippus fairly. Chrysippus identifies a type of air – cohesive air – with something that performs state's function. Thus, it is fair to say that states are made of air. Furthermore, according to the Stoics, air characteristically affects bodies in such a way that allows it to perform this function. Recall, elemental change occurs by means of a change in density. As a result, according to Galen, fire and air are efficient principles within Stoic physics.³⁸ Since fire is hot, it causes expansion, and since air is cold, it causes condensation and compression. Now, an unformed mixture of earth and water becomes a stone or a piece of iron by solidifying, compressing, and holding together in a particular way. Given air's capabilities, it makes sense that Chrysippus would identify the type of pneuma that literally holds things together with this element. Thus, Plutarch's paraphrase coheres with other well-attested tenets of Stoicism, and we have reason to think that Plutarch's paraphrase of Chrysippus is accurate.³⁹ Thus, one type of pneuma is made of air alone, according to Chrysippus.

On the other hand, other sources represent Chrysippus as claiming that pneuma is a mixture of elements. Consider Galen's account of the nature of pneuma, which is embedded in a criticism of Chrysippus' psychology:

T4 This pneuma possesses two parts, elements, or conditions, which are blended with one another through and through, the cold and the hot, or if one wished to describe them by different names taken from their substances, air and fire;

38 Gal. *Nat. Fac.* 1.3 (K. 2.8) (= *SVF* 2.406 = LS 47E). Plutarch confirms this when he reports that, according to the Stoics, air freezes water by gathering and tightening it, thus suggesting that air compresses objects (Plutarch, *De primo frigido* 11, 949b = *SVF* 2.430 = LS 47T). The underlying physical theory entailed by this account, according to which the elements change into each other by means of a change in density, is confirmed by Stobaeus at *Ecl.* 1.10.16c (Wachsmuth/Hense 1.129,17–23 = *SVF* 2.413 = LS 47A).

39 Lapidge 1978, 174 seems to agree. Salles 2017, 227 argues that Plutarch continues this report of Chrysippus' theory and revises it later in the text at *Stoic. repug.* 43, 1054a–b. See also LS, 1.288–89. In this later passage, Plutarch identifies "qualities" with "pneumata and aeriform tensions." Salles reads this "and" epexegetically and understands Plutarch to mean that aeriform tensions and the cohesive air that Chrysippus discusses at 1053E–F are made of

pneuma, i.e. a mixture of fire and air. However, I disagree with this interpretation for two reasons. First, Plutarch attributes his analysis of states at 1053E–F to Chrysippus alone and quotes him. On the other hand, Plutarch attributes his analysis of qualities at 1054A–B to the Stoics as a group and does not quote or cite any specific Stoic. Thus, I believe that it is unlikely that the later analysis of qualities should be read as clarifying Chrysippus' theory of states. Second, even if we read the "and" epexegetically at 1054A, it is not clear that the meaning we should extract from this passage is that states and aeriform tensions are mixtures of fire and air. For Plutarch does not describe pneuma as being made of fire and air in this passage. So it is not clear what meaning we should take from the clarification of pneumata in terms of aeriform tensions. For these reasons, I do not find the later passage at 1054A–B especially helpful for clarifying the earlier passage quoted above.

and it also acquires some moisture from the bodies in which it dwells.

Gal. *PHP* 5.3.8 (De Lacy 306,24–28 = K. 5.447 = *SVF* 2.841 = LS 47H)

According to this report, pneuma is a blend of air and fire.⁴⁰ According to Chrysippus' chemistry, if two bodies are blended, then each is present in every portion of the mixture. Thus, for any portion of pneuma, air and fire will be present. Alexander of Aphrodisias ascribes the same theory to the Stoics at two points in his *De mixtione*.⁴¹ Although Alexander, like Plutarch, is a critic of the Stoics, he is still a valuable source for Stoic chemistry and physics. His reports in *De mixtione* are often confirmed by other sources. Thus, given the independent confirmation from Galen, we have reason to trust his report on the composition of pneuma.

However, if Galen and Alexander's reports are accurate representations of Chrysippus' theory, they appear to conflict with Plutarch's report. If all pneuma is a blend of fire and air, then state, which is the type of pneuma that holds together inanimate unified bodies, cannot be made of air alone. But this is how Plutarch represents Chrysippus' view on the basis of a quotation from Chrysippus himself. The picture is further complicated by another report from Galen, attributed to the Stoics as a group:

T5 Of the elements themselves, some (the Stoics) call material and some active and dynamic. They maintain that the material elements are held together by those that are dynamic, fire and air being dynamic and active in their view, while earth and water are material. They say that in compounds the dynamic elements pervade the material totally, that is to say, air and fire penetrate water and earth. Air is cold and fire is hot. The natural effect of air is to consolidate and thicken a substance, whereas fire naturally causes expansion, loosening, and widening. The two active elements have fine parts and the other two thick parts. All the substance with fine parts the Stoics call "pneuma," and they think that the function of pneuma is to sustain natural and animal bodies.

Galen, *De causis contentivis* 1 (Kalbfleisch 133,6–16 = LS 55F)

40 This is the most widely-accepted interpretation of the Chrysippean theory of pneuma among contemporary scholars. Most scholars endorse this theory implicitly or explicitly on the basis of this report from Galen and Alexander's testimony, which I discuss below. Those who argue for this interpretation include Hahn 1977, 158; LS, 1.277–278; Salles 2017, 228–232. Ultimately, I will agree with these

commentators, when their view is supplemented by additional claims. Hager 1982 argues that pneuma is more basic than the elements. Sellars 2006, 96–99, seems to agree with Hager. Sorabji 1988, 85–89, argues that pneuma can be either fire or air, somehow disposed.

41 Alex. Aphr. *Mixt.* 10 (Bruns 224,14–22 = *SVF* 2.442 = LS 471); *ibid.* 11 (Bruns 225,6–8, not in *SVF* or LS).

Fire and air hold together the denser elements earth and water. These rarer elements accomplish this in virtue of possessing characteristic functions and then mixing with these denser elements. As we have already seen, air's natural function is to consolidate and thicken, while fire's natural function is to expand and loosen. These functions interact so that objects are held together in a particular way. Galen also says that fire and air have fine parts, and all substance with fine parts is called "pneuma":⁴² Thus, we might infer that the Stoics called air, fire, and mixtures of fire and air "pneuma", since all of these substances possess fine parts. Rather than referring to a particular kind of body, Galen's report suggests that perhaps "pneuma", at some point, became a catch-all term for anything made of air or fire, independently or together.⁴³

If we accept this report from Galen as representing Chrysippus' view, we seem to have at least three options concerning the relationship between pneuma, air, and fire. First, he might think that some types of pneuma – states – are made of air alone, while others might be either made of fire or mixtures of fire and air. Second, he might think that all types of pneuma are blends of fire and air. Third, he might think that pneuma can be made of air alone, fire alone, or mixtures of fire and air, as long as the substance possesses fine parts.

First, let us examine the context of Galen's report that everything with fine parts is called "pneuma". Presumably, he intends this remark to be understood within the context of the passage, in which he describes the relationship between the passive and active elements. When he says that all substance with fine parts is pneuma, Galen likely intends to restrict this claim to complex objects and their immanent causes of cohesion. For it would be strange if the Stoics called pure volumes of fire, which are not present within any other natural object, "pneuma". Such usage would conflict with the standard usage of the term, in which it refers to something airy – usage endorsed by Chrysippus.⁴⁴ Thus, whether the Stoics ever called air individually or only compounds of fire and air "pneuma" will depend on whether air ever exists independently within natural objects, holding them together.⁴⁵

Let us consider the possibility that states are made of air alone, as Plutarch suggests. It would follow that air blends with some combination of earth and water and holds it together in such a way that, for example, a stone is generated. Now, the stone is part

42 The word that I have translated here with "pneuma" is spiritus. This report from Galen is translated into Latin. Again, spiritus is our Latin sources' word for "pneuma." Given this, LS translate this word with "breath," and I use "pneuma" in accordance with my explanation in n. 8.

43 Is Galen accurately representing Chrysippus' view here? His account of how fire and air blend with earth and water and hold them together is standard

Chrysippean chemistry. See, for example, Plutarch, *Comm. not.* 49, 1085c–d (= *SVF* 2.444 = LS 47G).

This gives us a reason to think that the report, as a whole, is accurate.

44 *Stob. Ecl.* 1.17.4 (Wachsmuth/Hense 1.153,24–154,5 = *SVF* 2.471).

45 For a different analysis of this passage from Galen, see Sorabji 1988, 86–89.

of the cosmos. The cosmos, as we have already determined, is an animal with a soul. This soul blends with the entire cosmos, just as an animal's soul blends with the entire animal. Since the stone is a part of the cosmos, it follows that a portion of the cosmos' soul blends with the stone. Assuming that Chrysippus believes that souls are made of fire, either totally or partially, it would follow that a portion of the fire that either totally or partially composes the cosmos' soul is present within the stone, as well.⁴⁶ Furthermore, since a soul governs an animal by coordinating its parts, presumably the cosmos' soul acts on the stone in some way, perhaps indirectly on the air that makes up the stone's state. So the cosmos' soul is somehow indirectly involved in the explanation of the nature of the stone or its place in the world.

For any portion of the stone, both airy states and psychic fire will be present. These elements are thus effectively blended. For there is no portion of the stone's cohesive air that does not participate in fire, and vice versa.⁴⁷ Even granting that states are made of air alone, they still appear to be blended with fire and act in conjunction with fire as causes to inanimate unified bodies. Thus, the stone's pneuma – the internal body that acts on the stone in order to hold it together – is still, effectively, a blend of fire and air, even if we accept Plutarch's paraphrase of Chrysippus as being accurate.

Why, then, would Chrysippus maintain that states are composed of air alone, if this thesis is effectively nullified by the broader physical context? Speculation is required here. Perhaps his rationale is that, while fire partially composes the pneuma present in inanimate unified bodies, the proximate cause of an inanimate unified body's existence is air. This is because air is directly responsible for solidifying an unformed mixture and turning it into a concrete object, as opposed to a mere heap.⁴⁸ Fire's role in the stone's existence is one step removed from this process. Thus, he calls states "air" because air is directly responsible for the characteristic function of stative pneuma.⁴⁹ Chrysippus would thus endorse a linguistic principle according to which a volume of pneuma is sometimes identified according to its primary causal element.

46 Cf. Sedley 1999, 390.

47 On "participation," see *Alex. Aphr. Mixt.* 3 (Bruns 217,9–13 = *SVF* 2.473 = LS 48C) and discussion by Helle 2018.

48 For example, consider this Stoic causal analysis of the existence of a stone. With respect to the predicate "is a stone," "constitutes a stone," or "constitutes an object and not a heap," the cause to the mixture of water and earth is the air. Of course, certain background conditions, such as the presence of fire, might be necessary for this causal interaction to take place. But air is directly responsible for the stone's existence. See the Stoic analysis of causation from *Sext. Emp. M.* 9.211 (= *SVF* 2.341 = LS 55B).

49 Lapidge 1978, 174, endorses a similar claim. Another option is that the pneuma present in inanimate objects is predominated by air, and Chrysippus calls the volume in accordance with its predominant element. Some commentators have argued for an account similar to this view. See, for example, Sedley 1999, 389–390. However, I am skeptical of this interpretation, if "predominate" means something like "takes up more volume in the mixture." For, at least with respect to psychic pneuma, the Stoics deny that one element predominates the mixture to any great extent. See Galen, *Quod animi mores corporis temperamenta sequuntur* 4 (Müller 45 = K. 4.783–784 = *SVF* 2.787), which I discuss below.

Such a linguistic principle is intuitive. When someone adds water to scotch, we still call the resulting mixture “scotch”, since the alcohol is still the primary causal component of the mixture. When a chemist prepares a solution by diluting hydrochloric acid with water, she still calls the resulting mixture “hydrochloric acid”, since the acid is still the primary causal element of the solution.⁵⁰ Similarly, perhaps Chrysippus sometimes describes states as being made of air, since the air in the pneuma is the proximate cause for producing an inanimate whole.

What, then, of psychic and natural pneuma? Is fire or air the proximate cause of the effects of these types of pneuma? First, let us consider psychic pneuma. It unifies animals by providing the capacities for sensation and impulse. It appears that fire is the proximate cause of these effects. Consider the following report from Galen:

T6 Ἐν ταύτῳ δὲ γένηται τῆς οὐσίας καὶ ἡ τῶν Στωϊκῶν περιέχεται δόξα· πνεῦμα μὲν γὰρ τι τὴν ψυχὴν εἶναι βούλονται, καθάπερ καὶ τὴν φύσιν, ἀλλ’ ὑγρότερον μὲν καὶ ψυχρότερον τὸ τῆς φύσεως, ξηρότερον δὲ καὶ θερμότερον τὸ τῆς ψυχῆς. ὥστε καὶ τοῦθ’ ὕλη μὲν τις οἰκεία τῆς ψυχῆς ἐστί τὸ πνεῦμα, τὸ δὲ τῆς ὕλης εἶδος ἡ ποιά κρᾶσις ἐν συμμετρίᾳ γιγνομένη τῆς ἀερώδους τε καὶ πυρῶδους οὐσίας· οὔτε γὰρ ἀέρα μόνον οἶόν τε φάναι τὴν ψυχὴν οὔτε πῦρ, ὅτι μήτε ψυχρὸν ἄκρως ἐγγωρεῖ γίνεσθαι ζῶου σῶμα μήτ’ ἄκρως θερμὸν ἀλλὰ μηδ’ ἐπικρατούμενον ὑπὸ θατέρου κατὰ μεγάλην ὑπεροχὴν, ὅπουγε κἂν βραχεῖ πλεῖον γένηται τοῦ συμμετρου, πυρέττει μὲν τὸ ζῶον ἐν ταῖς τοῦ πυρὸς ἀμέτροις ὑπεροχαῖς, καταψύχεται δὲ καὶ πελιδνοῦται καὶ δυσαίσθητον ἢ παντελῶς ἀναίσθητον γίνεται κατὰ τὰς τοῦ ἀέρος ἐπικρατήσεις· οὗτος γὰρ αὐτός, ὅσον μὲν ἐφ’ ἑαυτῷ, ψυχρός ἐστιν, ἐκ δὲ τῆς πρὸς τὸ πυρῶδες στοιχείον ἐπιμξίας εὐκρατος γίνεται. δῆλον οὖν ἤδη σοι γέγονεν, ὡς ἡ τῆς ψυχῆς οὐσία κατὰ ποιὰν κρᾶσιν ἀέρος τε καὶ πυρὸς γίνεται κατὰ τοὺς Στωϊκοὺς.

The Stoics’ view is that the soul is contained in the same genus of substance. For they want the soul to be some pneuma, just like nature, but natural pneuma is wetter and colder, while psychic pneuma is drier and hotter. Thus, pneuma is the proper matter of soul, and this matter’s form is a blend qualified in proportion, which comes about from aeriform and fiery substance. For one can assert neither that the soul is air alone nor fire alone because an animal’s body will neither admit of being extremely cold nor extremely hot, nor will it be dominated by one or the other by a large excess, in which case, even if the excess is larger than the proportion only by a small amount, the animal becomes feverish in the disproportionate excesses of fire, and, on the other hand, the

⁵⁰ Thanks to Margaret Gustafson for this example.

animal becomes chilled and pales and perceives poorly, or even becomes completely insensitive, because of the domination of air. For this same air, as long as it depends on itself, is cold, and it becomes temperate from its mixture with the fiery element. Therefore, it has become clear to you that, according to the Stoics, the substance of the soul is generated from a qualified blend of air and fire.

Gal. *QAM* 4 (Müller 45,4–24 = K. 4.783–784 = *SVF* 2.787, tr. mine)

According to this report, the Stoics were concerned with the proportion of fire and air within a soul. If the soul becomes too airy, Galen says that the animal will become insensitive. This is because air does not cause animals to be able to perceive. On the other hand, fire is the source of sensation and impulse.⁵¹ Thus, while the pneuma present in an animal is a blend of fire and air, the proximate cause of the animal's sensation and impulse, which distinguish animals from plants, is fire.

If fire is the proximate cause of soul's effects, then why include air in the composition of psychic pneuma? Here, Galen's report is helpful. As the mixture of fire and air present in animals becomes more and more fiery, the animal becomes more and more feverish. This is because the fire present within souls is hot. As such, when its effects are not moderated, fire burns what it comes into contact with.⁵² Consequently, the Stoics needed to explain how the causal basis for perception and impulse could come to be present in animals without also burning them. Air explains this. Since it is cold, air moderates fire's effects. On the physical level, while fire causes things to expand and thus, at some point, become fire, air causes things to contract, and thus counteracts fire's expansive effects. It would follow that psychic fire mixes with air in the right proportion so that it can cause animals to sense and have impulses, without also burning them. Thus, psychic pneuma is a mixture of fire and air in proportions that allow fire to cause animals to be capable of sensation and movement, while air prevents fire from destroying the animal, and it appears that psychic pneuma is not predominated by fire to any great extent.

Let us take stock. I have proposed the following way to reconcile the conflicting evidence on Chrysippus' theory of pneuma. Chrysippus sometimes describes a given volume of pneuma according to its primary causal component. In inanimate unified bodies, that component is air; in animals, that component is fire. In either case, strictly speaking, the pneuma is a blend of the two elements. However, in any volume of pneuma, one of these elements plays a secondary role, and one plays a primary role,

51 This is confirmed by Cic. *Nat. D.* 2.29–31 and 40–41.

52 See, for example, Alexander Lycopolis, 19.2–4 (= LS 461).

depending on the type of object being analysed. Furthermore, since all pneuma is a blend of fire and air, Galen's report that all internal, sustaining causes with fine parts are called "pneuma" agrees with this theory, since fire and air always work in conjunction as the internal causes of natural objects. Although it is speculative, this interpretation explains the origin of the conflicting reports on Chrysippus' theory of pneuma, and it provides him with a plausible philosophical theory that agrees with the Stoics' broader elemental theory.

Now, let us return to Zeno's claim that souls are made of designing fire and Cleanthes' claim that souls are made of heat. According to the interpretation above, Chrysippus claims that the proximate cause of state's effects is air. Similarly, perhaps when Zeno and Cleanthes identify souls as being made of fire or heat, they are identifying fire as the proximate cause of the soul's effects. While the pneuma within animals is a mixture of fire and air in a certain proportion, we have seen that fire is what directly causes animals to be capable of sensation and movement. These are the effects of psychic pneuma. Thus, if we propose that Zeno and Cleanthes also adopt the linguistic principle according to which pneuma is sometimes identified with its primary causal component, they could maintain that pneuma is a mixture of fire and air, while also calling certain types of pneuma "fire".

While this interpretation is speculative, it has interpretive benefits. Without unduly dismissing any reports, it allows us to reconcile the apparently conflicting sources who describe Zeno's and Cleanthes' physical theories of the soul, while also refraining from attributing the *prima facie* implausible claim that pneuma is made out of fire alone to them. Zeno and Cleanthes' psychic pneuma remains partially composed of air, while fire plays the most important causal role.

I have argued that the proximate cause of stative pneuma's effects is air, and that the proximate cause of psychic pneuma's effects is fire. Our evidence for natural pneuma is limited. Given Zeno's claim that natures are made of designing fire and Cleanthes' claim that natures are made of heat, they likely identified the fire within this pneuma as the cause of growth and nutrition as well. But Galen's report above suggests that natural pneuma is colder than psychic pneuma – presumably because it contains more air than psychic pneuma. So our evidence does not clearly indicate whether fire is directly responsible for natural pneuma's effects.

Conceptually, at least, it would be strange if air were responsible for natural pneuma's effects, since air compresses objects. Growth requires expansion of some sort, which is an effect of fire.⁵³ Thus Stobaeus' report that Zeno identified natural pneuma with designing fire, and the evidence that suggests that Cleanthes identified plants' natures with heat, when understood to mean that the proximate cause of natural pneuma's effects is

53 Cf. Arist. *De an.* 2.4, 416a10–13.

fire, is more probable than the claim that air somehow causes these effects. Still, we should keep in mind the lack of clear evidence on the nature of natural pneuma.

Let us return to Lapidge's argument. He maintains that Zeno and Cleanthes had no theory of cosmic pneuma. His first reason was that no evidence explicitly states this. However, since these two Stoics posited a world soul, and since it appears that they believed souls are made of pneuma, we do have indirect evidence for this. His second reason was that the effects of cosmic pneuma would be overdetermined by Zeno's designing fire and Cleanthes' heat. However, given the preceding interpretation, we have reason to doubt this claim. If Zeno's designing fire and Cleanthes' heat are mixtures of fire and air in which fire is the primary causal component, then designing fire and heat would be types of pneuma (as opposed to pneuma being a type of fire, as I considered in the previous section). Thus, the functions of pneuma and the functions of these basic substances would overlap merely because they are the same substance. As such, the effects of cosmic pneuma would not be overdetermined. Given the evidence that these two Stoics claimed that souls are made of pneuma, and that the world has a soul, we have reason to think that they had a theory of cosmic pneuma. Perhaps the world is governed and unified by fire, but this fire is still part of a mixture of fire and air.

Can we retain the common view that Chrysippus' theory of pneuma was somehow innovative? I believe that we can. As I noted, Chrysippus was the first Stoic to focus specifically on the compressive functions of pneuma. Perhaps he innovated by describing the underlying physical rationale for including air in the pneumatic mixture of fire and air. While this might have been taken for granted by Zeno and Cleanthes, since they assumed that a breathy mixture must include something airy, Chrysippus describes how air's coldness and compressive function restrains fire's tendency to burn. Hence, Chrysippus provides a corporealist explanation of the difference between Zeno's designing and undesigning fire. Undesigning fire's tendency to burn things is not explained in virtue of an intrinsic difference between it and designing fire. Rather, designing fire has simply blended with the correct amount of air so that its destructive effects have been counteracted by air's coldness.⁵⁴ Furthermore, Chrysippus describes the essential function that states play in producing the inanimate world. While perhaps his predecessors ignored this function, Plutarch's testimony suggests that Chrysippus considered it vitally important. Describing the essential contributions of air to Stoic physics thus appears to be Chrysippus' innovation.

54 I endorse this theory in Hensley 2017, as well. Long 1985, 21, also seems to identify the fire present within pneuma as designing fire. See also Furley

1999, 440; Mansfeld 1979, 155; Sorabji 1988, 95, n. 68.

5 Tensile movement

Many functions of pneuma can be reduced to the functions of its components. Air causes compression. As a result, stative pneuma causes solidification and unity in inanimate natural objects. Fire causes expansion, and it also makes animals capable of sensation. As a result, natural pneuma takes in nutrients and puts them to use, and psychic pneuma allows animals to perceive. Questions about pneuma's capability to cause various effects in the world can thus be reduced to questions about its components' capabilities.

However, Stoic pneuma behaves in other ways that we should explain. Specifically, it has a distinctive "tensile movement" or *tonikē kinēsis*. Are fire and air also responsible for this aspect of pneuma? What aspects of tensile movement should be attributed to fire and what aspects to air? To answer these questions, we must describe the nature of tensile movement and then evaluate whether the functions that the Stoics attribute to air and fire could result in this movement.

Consider the following question from Alexander of Aphrodisias:

T7 Also, what is the simultaneous movement of pneuma in opposite directions, by which it sustains everything in which it is present, since, in their own words, it is a pneuma which moves simultaneously out of itself and into itself?

Alex. Aphr. *Mixt.* 10 (Bruns 224,23–25 = SVF 2.442 = LS 471)

According to Alexander, Stoic pneuma moves in opposite directions and out of itself and into itself. Other sources describe pneuma as moving simultaneously "forward and backward" and as "turning back on itself".⁵⁵ Thus, the distinguishing feature of pneuma's tensile movement, which is confirmed by multiple sources, is simultaneous motion in opposite directions.

Contrast transitive and counterfactual motion. Transitive motion involves the leaving of one place, and the occupying of another, and counterfactual motion does not. Instead, counterfactual motion involves tension. When two forces pull against one another and are balanced in a particular way, tension is produced. This tension is such that, were one of the forces removed, the tensed body would move in one direction.

Now reconsider pneuma's motion: it moves in opposite directions simultaneously. Since it is impossible that one body can move simultaneously in opposite directions, scholars have explained this by arguing that pneuma's motion is counterfactual. Oppos-

55 In addition to Alexander, see Stob. *Ecl.* 1.17.4 (Wachsmuth/Hense 1.153,24–154,3 = SVF 2.471);

Philo *Immut.* 35–36 (= SVF 2.458 = LS 47Q).

ing forces within pneuma pull against one another, and it is in this sense that pneuma can move in opposite directions.⁵⁶

However, there is a serious problem with this interpretation: it would conflict with Chrysippus' theory of motion. Chrysippus defines motion as "a change in place, either in whole or in part."⁵⁷ According to the counterfactual analysis of pneumatic motion, neither an entire volume of pneuma nor its parts change place. Therefore, it does not actually move, according to Chrysippus. Given this, if we assume that Chrysippus adopts this counterfactual model of *tonikē kinēsis*, it would be surprising if he stated that pneuma moves by means of *tonikē kinēsis*. Since Stobaeus suggests that Chrysippus did attribute movement to pneuma,⁵⁸ we should explore other possibilities before endorsing the counterfactual model of pneuma's motion.

There is another available explanation of pneuma's simultaneous movement in opposite directions. While a volume of pneuma as a whole is stable, its different parts or portions move in opposite directions. Consider a report from Philo:

T8 He (God) bound some bodies by state, others by nature, others by soul, and others by rational soul. In stones, and logs which have been severed from their natural connection, he created state which is the strongest bond. This is pneuma which turns back towards itself. It begins to extend itself from the centre to the extremities, and having made contact with the outer surfaces it bends back again until it returns to the same place from which it first set out.

Philo *Immut.* 35–36 (= *SVF* 2.458 = *LS* 47Q)

Philo describes stative pneuma following a course within a body.⁵⁹ It begins at the centre, moves toward the edge, and then returns to the centre. The volume of pneuma as a whole cannot move in this way. For the volume of pneuma blends with the natural object, and thus it is present everywhere within the region of space that it occupies; there is nowhere for it to move. Rather, different portions of the volume of pneuma move along the course that Philo describes. Select some portion of the mixture of fire and air that makes up an object's pneuma: it begins at the centre of the object, moves toward its periphery, and then returns to the centre. While it follows this course, other portions of the pneuma are following similar routes throughout the object. Some portions are moving inwardly, and others move outwardly.

56 *LS*, 1.288; Scade 2011, 157; Sedley 1999, 389. In support, see Galen, *De motu musculorum* 1.8 (K. 4.402–403 = *SVF* 2.450 = *LS* 47K). Though note that Galen hedges and states that this sort of motion may involve very rapid movement in two directions.

57 *Stob. Ecl.* 1.19.3 (Wachsmuth/Hense 1.165, 15–16 =

SVF 2.492).

58 *Stob. Ecl.* 1.17.4 (Wachsmuth/Hense 1.153, 24–154, 3 = *SVF* 2.471).

59 Hierocles describes a similar account of how psychic pneuma moves in 4.44–49 (= *LS* 53B, not in *SVF*).

We should note that these portions are not atoms; the Stoics claim that bodies are infinitely divisible. For this reason, Samuel Sambursky describes this sort of motion as the propagation of a wave-state through a continuous medium – a description that captures the difficulty of distinguishing different portions of continuous, non-atomic matter.⁶⁰ Still, even if Sambursky's description is accurate, the motion is still transitive – *something* about pneuma changes places.

This model of pneuma's motion explains how pneuma moves simultaneously in opposite directions. Different portions of a single volume of pneuma move in different directions: some toward the periphery of an object, some toward its centre. Although, as a whole, it does not change places, its parts do. Thus, the claim that pneuma moves can be understood literally, according to Chrysippus' definition of motion. For Chrysippus defines motion as a change in place either as a whole or in part, and a volume of pneuma's parts change places. Hence, we are not forced to accept the counterfactual model of pneumatic motion.

What causes pneuma's motion? To answer this question, we should consider the following report from Nemesius, which is cited approvingly by many commentators:

T9 If they should say, as the Stoics do, that there exists in bodies a kind of tensile movement which moves simultaneously inwards and outwards, the outward movement producing quantities and qualities and the inward one unity and substance, we must ask them (since every movement issues from some power), what this power is and in what substance it consists.

Nemesius, *De natura hominis* 2.44–49 (= SVF 2.451 = LS 47J)

Here is how this report is often understood, as evidence for Stoicism. Pneuma itself has two movements: outward and inward. The outward movement causes qualities and quantities. The inward movement causes unity and substance. Furthermore, the outward movement is caused by the fire in pneuma's composition. In turn, the inward movement is caused by the air in pneuma's composition.⁶¹

First, let us examine these latter two claims. It is unlikely that pneuma's outward movement should be attributed to fire and its inward movement should be attributed to air. First, we lack evidence for this claim. No source explicitly or implicitly attributes

60 Sambursky 1959, 21–33.

61 See also Simplicius, *In Cat. ad. c.8* (Kalbfleisch 269,14–16 = SVF 2.452). Simplicius attributes *being* to the inward motion and *being qualified* to the outward motion. Those who attribute the outward

motion to fire and the inward motion to air include Collette-Dučić and Delcomminette 2006, 28; LS, 1.288; Scade 2011, 146; Salles 2017, 227; Sedley 1999, 389.

this claim to the Stoics.⁶² However, perhaps there is some indirect evidence for this interpretation. Some have thought that air's contractive effects and fire's expansive effects entail such a theory. Since air compresses, it causes pneuma to contract and move inward; and since fire expands, it causes pneuma to expand and move outward.

I disagree with this argument, for such an interpretation does not agree with how the Stoics describe the effects of fire and air. We have seen that air compresses things outside of itself. Similarly, fire causes things outside of itself to expand. Although air has contractive effects on external objects, it does not itself contract. And fire, although having expansive effects, does not necessarily expand.⁶³ So it is not clear how air's contractive effects on external objects would entail that it causes pneuma, of which it is a part, to move inwardly. And the same goes for fire's expansive effects. For pneuma is not some external object over and above fire and air; it is, in some sense, merely a sum of fire and air. Therefore, since fire and air do not themselves expand and contract, it is unlikely that fire causes pneuma's outward motion while air causes its inward motion.

Furthermore, air's motion is sometimes described as moving upward and not inward, at least relative to things on the earth.⁶⁴ On the other hand, while fire is sometimes described as moving upward, the Stoics also say that it moves spontaneously in whatever direction it pleases, as the elemental source of all motion.⁶⁵ Thus, it appears that our evidence for the nature of air and fire's motion does not confirm the standard understanding of Nemesius' report. Instead, since fire is described as self-moved and spontaneous, it is more likely that fire causes the motion within any volume of pneuma. Since fire can direct its motion, it moves itself and the air with which it blends in such a way that different portions of pneuma move along different courses within a natural object, from the centre to the extremities. Fire determines the precise point at which pneuma reverses its motion and the relative velocities of each portion's motion.

Theoretically, this agrees with the idea that fire is the proximate cause of souls' effects. The cosmos' soul acts on the world's parts, coordinating them so that they are sympathetic with each other. Fire achieves these effects by directing its own motion and the motion of the air with which it blends. By making contact with air in the mixture of the two, it is able to position the elements correctly to achieve its desired results.

62 As noted by Scade 2011, 146, n. 41, who was apparently prompted by comments from Robert Sharples. Note that Scade nonetheless endorses this interpretation for the reasons I describe in what follows.

63 Furthermore, fire and air do not seem to directly affect each other in pneumatic mixtures. According to Plutarch, the Stoics claim that both of these elements are naturally tense and sustain themselves (*Comm. not.* 49, 1085c–d = *SVF* 2.444 = *LS* 47G). I take this to entail that fire does not, easily at least,

cause air to expand, and air does not compress fire.

64 *Plut. Stoic. repug.* 42, 1053e (= *SVF* 2.434).

65 Cf. Lapidge 1973, 253. On this latter claim, see Philo, *De aeternitate mundi* 89 and discussion by Long 2008, 129–130. On fire being self-moved and spontaneous, see Cic. *Nat. D.* 2.31–32; Origenes, *De principiis* 3.1.2 (= *SVF* 2.988). On this passage from Origenes, see discussion by Hahm 1994, 177, 183–185; Inwood 1985, 21–26.

Furthermore, by moving forward and backward throughout the cosmos, perhaps very rapidly, it acquires and distributes information.

What effects does pneuma's tensile motion cause? Nemesius attributes "quantities and qualities" to the outward motion of pneuma and "unity and substance" to the inward motion. Here, a superficial reading of this report is likely to mislead us. First, when Nemesius claims that the outward motion of pneuma produces qualities, this cannot mean that this motion causes a change in some separate object such that it is now a quality. For we have seen that the Stoics describe qualities as being made of pneuma itself. Second, Nemesius' claim that the inward motion produces "substance" (*ousia*) cannot be understood in accordance with the Stoic meaning of this term. For "substance" is associated with the passive principle. This entity is neither generated nor destroyed, and so it cannot be produced at all, let alone by pneuma's motion. Because of his misuse of Stoic terms and the resulting incompatibility with well-attested Stoicism, we cannot trust Nemesius' report, at least on the surface level. Either we should interpret his report in a revisionary way, or we should reject the report.

Let me propose some revisionary interpretations of Nemesius' report. Regarding pneuma's inward motion, perhaps we should focus on the point at which pneuma reverses its motion and begins to move toward the centre of an object. When pneuma turns inward, it sets the edge or limit of the body in which it is present. In doing so, it determines the point at which the body ends and the external world begins. Using "unity" and "substance" to express this effect seems fair, even if it is inconsistent with Stoic usage. Each unified body becomes a single thing distinct from the world around it in virtue of the inward motion of its pneuma.

What of the outward motion's effects? Since "quantities" does not occur often in our sources for Stoicism, it is not clear what effect this is meant to capture. Perhaps Nemesius' point is simply that, as pneuma moves further and further out, it causes the unified body that it governs to take up more and more space, increasing its size. Regarding this motion's producing qualities, Nemesius likely means that pneuma's outward motion gives some distinctive characteristics to the body with which it blends.

Given the difficulty of translating Nemesius' report into Stoicism, we might also offer a radically revisionary understanding. Perhaps the motions that Nemesius discusses in this passage are not the motions of pneuma, but the motions caused by pneuma. Namely, since both fire and air are present within pneuma, it causes both expansive and contractive effects on the natural objects it blends with. The inward, or contractive, motion causes unity and substance – it holds objects together, prevents fire from burning them, and solidifies them. The outward, or expansive, motion prevents objects from becoming too rigid and uniform – it gives objects their individuating features and allows animals and plants to perceive and grow. If we adopt this radically revisionary understanding, then Nemesius would simply be repeating the theory of pneuma that I

defended in the previous section.⁶⁶

6 Conclusion

The Stoics' corporealist and causal commitments lead them toward a reduction project. They identify many supposedly incorporeal entities as being bodies, since those entities cause events in the world. As we have seen, pneuma takes on many of these functions within Stoic physics. It compresses inanimate objects such that they cohere as unified wholes. It allows plants and animals to grow. It also makes animals capable of sensation and reason. Pneuma also constitutes qualities, and it is described as the vehicle for the Stoic God's activities. Scholars have argued that pneuma's accepted status as corporeal, innate breath made it a strong candidate to take on these various roles for the Stoics. However, given its physical makeup, the Stoics also had internal philosophical reasons for selecting pneuma as the causal basis of these functions.

Pneuma is capable of performing these functions, since it is a compound of other basic elements in Stoic physics. The functions of pneuma simply are functions of these elements. Since it is cold, air causes compression and coherence. Since it is hot and tense, fire causes growth and perception. Thus, the Stoics analyse pneuma as a compound of fire and air. Sometimes, air is the primary cause of a particular effect – a stone's existence, for example; sometimes, the cause is fire – an animal's existence, for example. This gives rise to apparent conflicts in our sources: sources sometimes describe pneuma as a compound of fire and air, and other times they describe particular types of pneuma as being made of fire or air alone. Still, these elements always work in conjunction.

Furthermore, pneuma moves in a particular way. Some sources suggest this motion is partially responsible for pneuma's effects. The standard understanding of fire and air's causal contributions to this motion assigns an equal share to each element, but there are problems with this interpretation. A more likely account, given an understanding of the effects the Stoics assign to fire and air, is that fire is the primary cause of pneuma's distinctive tensile movement.

Stoic physics is a coherent system for explaining natural phenomena. Because pneuma fits into that system, we can use central, well-attested claims about the basic physical elements and their effects on the world to understand pneuma and its physical role within Stoicism. Such a methodology also allows us to sort out the conflicts and indeterminacies present in our evidence for Stoicism.

66 Against this interpretation, Nemesius calls the motion within bodies "tensile movement," which is usually understood to be the motion of pneuma itself and not the motions caused by pneuma. Of

course, this assumes that Nemesius uses Stoic terminology correctly, and we have already dispensed with this assumption. So perhaps this radically revisionary interpretation can be sustained.

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