# The Concept of Pneuma after Aristotle

Sean Coughlin
David Leith
Orly Lewis
(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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# Introduction

## Summary

This volume explores the versatility of the concept of pneuma in philosophical and medical theories in the wake of Aristotle's physics. It offers thirteen 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.

Keywords: pneuma; spirit; soul; body; history of life sciences; philosophy; medicine

Dieser Band erkundet die Vielseitigkeit des Konzepts Pneuma in philosophischen und medizinischen Theorien in der Folge von Aristoteles' Physik. Er bietet dreizehn Beiträge, wie das Konzept Pneuma in körperlichen, physiologischen, psychologischen, kosmologischen und ethischen Untersuchungen betrachtet wurde. Der Fokus liegt auf individuellen Denkern oder Traditionen und deren spezifischen Fragestellungen, unter ihnen die frühen Peripatetiker, die Stoiker, die großen hellenistischen medizinischen Traditionen, Galen, aber auch der spätantike Proclus und Johann Zacharias Aktouarios im frühen 14. Jh. Auf neue Forschungsansätze und Entwicklungen bezüglich des Forschungsgegenstandes griechisch-römische Philosophie und antike Medizin bauend, bietet dieser Sammelband eine profunde Neubewertung dieser fluiden, aber zentralen Substanz, in der Antike und späterer Zeit.

Keywords: Pneuma; Geist; Seele; Körper; Geschichte der Lebenswissenschaften; Philosophie; Medizin

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> And what if all of animated nature
> Be but organic Harps diversly fram'd,
> That tremble into thought, as o'er them sweeps
> Plastic and vast, one intellectual breeze,
> At once the Soul of each, and God of all?
>
> Samuel Taylor Coleridge, "The Eolian Harp"

Air is unmistakably important. Its importance was acknowledged from early on in the Greek philosophical tradition, with Anaximenes of Miletus in the 6th century BCE, who reportedly held that the cosmos developed in some way out of the condensation and rarefaction of air as its original matter. The significance of air was elaborated further in the 5th century BCE by such thinkers as Diogenes of Apollonia, and in the medical tradition by the anonymous authors of the treatises *On Breaths* and *On the Sacred Disease*. With Aristotle, however, the airy substance 'pneuma' took on a new and more sophisticated role in explanations of animal life. His speculations seem likely to have been inspired, at least in part, by questions concerning how the soul interacts with the body. The incorporeality of the soul, as it was conceived by Plato and his disciples, posed problems for explaining the soul's interaction with the corporeal body and its environment. How, for example, might an immaterial soul affect the body so as to cause it to move, or how might sensations impinge physically on the soul so conceived? The relative insubstantiality of a pneumatic substance suggested itself as a plausible medium,[1] and Aristotle himself went so far as to dissociate it from the air which inspired it, conceiving it as something 'connate' (σύμφυτον) and congenital, a material in us "analogous to the elements of the stars."[2]

Around Aristotle's time, then, pneuma gained a novel and crucial significance that it was to retain throughout the rest of antiquity and beyond. It came to feature prominently in all manner of physical, physiological, psychological, cosmological and ethical inquiries. The conceptual framework was still operative for René Descartes in the 17th century in his understanding of the working of the body by means of 'animal spirits' and in the context of his more radical mind-body dualism. And it continued until the 18th century, when focus shifted to entities like Luigi Galvani's electrical force and Antoine Lavoisier's oxygen. The longevity of pneuma as a concept makes it all the more

1 Dillon 2009. And more generally in Lloyd 2007, 140–141, and Bartoš 2006.

2 Arist. *Gen. an.* 2.3, 736b35–737a1: "the pneuma and the nature in the pneuma, enveloped in the semen and the foam-like, being analogous to the element of the stars" (τὸ ἐμπεριλαμβανόμενον ἐν τῷ σπέρματι καὶ ἐν τῷ ἀφρώδει πνεῦμα καὶ ἡ ἐν τῷ πνεύματι φύσις ἀνάλογον οὖσα τῷ τῶν ἄστρων στοιχείῳ). See also Arist. *Gen. an.* 2.3, 736b29–737a1; 3.11, 762a19–b21; Arist. *De motu an.* 10, 703a4–28. For key discussions see: Jaeger 1913; Solmsen 1957; Nussbaum 1978; Verbeke 1978; Freudenthal 1995; Bos 2003; Corcilius and Gregoric 2013; Bos 2018; Bartoš and King 2020.

surprising, however, that there was little consensus concerning what pneuma was, what qualities it had, how many kinds there were, how it came to be present in the body, and what exactly it did there.

The scholarship on these variations and elaborations of the concept of pneuma after Aristotle remains limited. While some of these issues have been addressed piecemeal in earlier scholarship, there are few studies concerned with the concept of pneuma itself.[3] Moreover, recent advancements in such areas as Hellenistic medicine, Galen's medical system and its debts, Stoic physics and medieval medicine and philosophy call for a detailed re-evaluation and revised analysis. There have been important methodological developments in these fields as well. This is true particularly as regards the study of authors for which we only have fragmentary citations and reports, as is the case for most Hellenistic medical and philosophical authors. The change in method is apparent also in scholarship moving away from the eager attempts to identify influence and connections between different ancient authors based on (often incidental) lexical and conceptual similarities. This approach often led to circular arguments, for example, when the ideas of one ancient author were used to fill gaps in the ideas of another author.[4] A bottom-up approach is more fruitful, both for the study of individual authors and for the topic as a whole – an approach which examines each source in its textual and historical contexts as the basis for the reconstruction and discussion of the ideas of each author or historically-attested group of authors.[5]

The conference held at the Excellence Cluster Topoi in Berlin from 2 to 4 July 2015 sought to explore, and to underscore, the diversity and richness of ancient theories that made use of pneuma. It also aimed to provide a more coherent basis for evaluating how connected or disconnected the post-Aristotelian tradition of understanding pneuma may have been. Fourteen papers were read at the conference, on texts and authors spanning the late fourth century BCE to the fourteenth century CE. Of these, ten have been revised for publication here, with the addition of three articles to fill what were felt to be particularly significant gaps (Hensley on Stoic pneuma; Lewis and Leith on early Hellenistic physicians; and Coughlin and Lewis on the Pneumatist medical school).

Our decision to focus on the development of pneumatic theories after Aristotle, and in his wake, was based partly on the desire to avoid unnecessary overlap with a recent conference held at the Academy of Science of the Czech Republic, Prague (20 to

3 On the Stoics: Hager 1982; Tieleman 2014; on Galen: Temkin 1951; Debru 1996; Rocca 2003, 201–238; on Early Hellenistic physicians: Wilson 1959; Lewis 2017, 252–298.

4 See the introduction to the chapter by Coughlin and Lewis in this volume and the references there.

5 By 'historically-attested' we refer here to cases in which the ancient sources themselves explicitly testify a relation between two or more authors (e.g. as master and student or by a similar 'school' labelling).

22 June 2014), entitled 'Aristotle and his Predecessors on Heat, Pneuma and Soul', organised by Hynek Bartoš and Colin Guthrie King.[6] But the decision was also informed by our conviction that Aristotle's ideas were a turning point in the history of the concept of pneuma which shaped, whether directly or indirectly, the views of many of the philosophical and medical theorists who came after him.

This volume does not attempt a comprehensive, linear history of pneuma from Aristotle's pupils to the Byzantine period, or to replace Gérard Verbeke's study *L'évolution de la doctrine du* Pneuma *du stoïcisme à S. Augustine*.[7] Rather, it examines a range of individual authors and texts in their own right, with a view to establishing what their specific interests were, what sorts of questions they were asking, and how they employed pneuma in answering them. Pneuma was never a single substance, homogeneous throughout antiquity. Its extraordinary versatility is evidenced repeatedly in the ways it was used to plug a range of theoretical gaps. In the hands of multiple thinkers from a wide variety of intellectual backgrounds, pneuma was conceived as an innate substance or simply as inspired air, as the substance of the soul or merely as its first instrument or vehicle, as the moist and warm contents of the arteries producing the phenomenon of pulsation, as the mediator of sensation and deliberate motion via the nervous system, as the cause of the cohesion of the cosmos, and much else besides. To do justice to this diversity and versatility, we believed that a more atomised and pluralistic approach was precisely what was needed. In the articles which follow here, individual theories and approaches are allowed to speak for themselves, to illustrate the many different purposes for which pneuma was invoked, and the problems it was intended to solve. Pneuma in our sources is often envisaged more as *explanans* than as *explanandum*. In fact, with the notable exception of the Peripatetic treatise *On Pneuma*, it rarely seems to have been a subject of study in its own right in antiquity. Hence, we believe a series of studies focused on individual thinkers, produced by experts in their respective fields, is the best way to deliver a balanced, rigorous understanding of pneuma and its turbulent history. These independent studies can then be used by other scholars to examine questions of reception, relations and comparisons among authors.

Another key focus of interest here is the fruitful interactions that may be discerned between philosophy and medicine. The philosophical and medical inquiries addressed in this volume were clearly distinct in their overall approach, yet they share many basic assumptions, and influences between philosophers and doctors were evidently working in both directions. We leave for other and future studies the reception of the concept in Jewish, Christian and Muslim theologies ('*ruaḥ ha-qodesh*', 'Holy Spirit', *rūḥ*).[8]

6 See Bartoš and King 2020.

7 Verbeke 1945.

8 Frey and Levison 2014 offers a broad selection of studies on the Judeo-Christian tradition.

The volume adopts a loose chronological structure, and in order to emphasise connections, overlapping interests and continuities, we have not divided it up formally into distinct sections. Nevertheless, general groupings will of course suggest themselves. The volume opens with three papers on pneuma in the early Lyceum, represented by the pseudo-Aristotelian tract *On Pneuma* (Gregoric), Strato of Lampsacus (Repici), and the *Problems* (Meeusen).[9] The fluidity and unevenness of approaches to pneuma and its manifold possible applications are very much apparent in these early Peripatetic investigations. The inquiries opened up here are connected in various ways with key developments in physiology and anatomy that came out of the medical tradition, which are explored in the next two papers, dealing with a series of physicians of the later Classical and Hellenistic periods, namely Diocles of Carystus, Praxagoras of Cos and Herophilus of Chalcedon (Lewis and Leith), and Erasistratus of Ceos and Asclepiades of Bithynia (Leith). The Stoics' conceptions of pneuma are addressed in the two following papers, analysing Cleanthes' distinctive pneumatology on the one hand (Tieleman) and revisiting some basic features of the physics of pneuma in the early Stoa on the other (Hensley). The medical sect known as the Pneumatists, itself agreeing to some degree with Stoicism, is the subject of the next paper (Coughlin and Lewis). Then come three papers on Galen, reflecting both his pivotal position in the elaboration of the physiological role of pneuma, as well as the recent explosion of scholarly interest in Galen's medical and philosophical system generally (Singer, Trompeter, Rocca). Finally, two facets of the later elaboration of these traditions are explored, focusing firstly on Neoplatonist inquiries into the soul's vehicle, Proclus' in particular (Bohle), and secondly on the early 14th century physician John Zacharias Aktouarios, who further articulated Galen's analysis of pneuma in the contemporary context of Byzantine medicine (Bouras-Vallianatos). There are some unfortunate omissions, such as on pneuma in the Epicurean tradition and in the writings of other medieval physicians and philosophers (e.g. Razi, Asaph HaRofeh), and we hope this volume will encourage further study into these and other thinkers.

Finally, we support the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities[10] and have insisted on a fully open-access publication. Edition Topoi enabled us to do so while offering a rigorous multi-tier peer-review system.

9 The volume on Aristotle and his predecessors Bartoš and King 2020 includes a chapter on the treatise *On Pneuma* (namely, on its theory of heat). It is now generally accepted that the treatise was written shortly after Aristotle but that the author engages directly with questions Aristotle left unanswered by making recourse to early Hellenistic medical ideas and debates. Including a paper in both volumes emphasises the continuity in the history of pneuma while reflecting the traditional ambiguity concerning its dating and authorship. On the date and authorship see Lewis and Gregoric 2015 and Gregoric and Lewis 2015, and, for a different view, Bos and Ferwerda 2008; Bos 2018.

10 Max Planck Gesellschaft 2003.

## Note on bibliography and abbreviations

References to ancient sources use Latin titles. Following their first appearance in a chapter, the abbreviated forms are used. Abbreviations follow the list in Simon Hornblower & Anthony Spawforth, *The Oxford Classical Dictionary*, 4th edition, Oxford, 1996, where applicable. For Galenic and Pseudo-Galenic works, we use the abbreviations in Robert James Hankinson, *The Cambridge Companion to Galen*, 391–397. References to Galen cite the volume and page number in the edition by Karl Gottlob Kühn (*Claudii Galeni opera omnia*, 22 volumes, Leipzig, 1821–1833, reprint: Cambridge, 2011, abbreviated as K.) and, when available, the page number in the more recent edition. References to works from the Hippocratic Corpus cite volume and page numbers in the Littré edition (*Oeuvres complètes d'Hippocrate*, ed. Émile Littré, 10 volumes, Paris, 1839–1861, abbreviated as L.) and, when available, the more recent edition. In some cases, authors have included line numbers as well. References to the works of Plato and Aristotle cite the page, section or line numbers in the standard editions of Stephanus and Bekker. References to fragments of Early Greek (Pre-Socratic) philosophers are to their number in Hermann Diels & Walter Kranz, *Die Fragmente der Vorsokratiker*, 6th edition (three volumes, Berlin, 1951–1952, abbreviated as DK). References to the fragments of the Stoics are to Hans von Arnim, *Stoicorum Veterum Fragmenta* (four volumes, Leipzig, 1903–1924, abbreviated as *SVF*). The edition and abbreviation used for each ancient work are listed in the bibliographies of primary sources at the end of each chapter.

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Pavel Gregoric

# Soul and Pneuma in *De spiritu*

## Summary

This paper explores the conception of soul and its relation to pneuma in *De spiritu*, a short and relatively neglected treatise transmitted with the Aristotelian corpus. Following a review of all the relevant passages, it is concluded that the author was familiar with Aristotle's biological works and his conception of soul, but does not subscribe to it. It is shown that various other conceptions of soul make appearance in the treatise. It is proposed that the author aimed to make his physiological and anatomical theory – built on Aristotle's notion of pneuma – compatible with as many different conceptions of soul in circulation as possible, which he viewed as a competitive advantage of his theory.

Keywords: conception of soul; connate pneuma; mixture; artēria; physiology; anatomy; Pseudo-Aristotle

Dieser Beitrag erkundet die Konzeption der Seele und ihre Relation zu pneuma in *De spiritu*, einer kurzen und relativ vernachlässigten Abhandlung, die im aristotelischen Korpus überliefert ist. Nach Sichtung aller relevanten Passagen wird geschlussfolgert, dass der Autor vertraut war mit Aristoteles' biologischen Werken und seiner Konzeption der Seele, ohne sich aber dessen Meinung anzuschließen. Auch wird gezeigt, dass verschiedene andere Konzeptionen der Seele in der Abhandlung vorkommen. Angenommen wird, dass der Autor beabsichtigte, seine physiologische und anatomische Theorie – aufbauend auf Aristotles' Vorstellung des pneuma – mit möglichst vielen verschiedenen Konzeptionen kompatibel zu machen, was er als starken Vorteil seiner Theorie betrachtete.

Keywords: Seelenkonzeption; angeborenes Pneuma; Mischung; Arterie; Physiologie; Anatomie; Pseudo-Aristoteles

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To the memory of two medical doctors –
Dr. Nenad Juranić (1938–2016), the good doctor
Dr. Slobodan Lang (1945–2016), the doctor of goodness

## I

*De spiritu* is a curious and largely neglected short treatise transmitted with the Aristotelian corpus. It contains claims about soul and pneuma which have been cited in support of different views concerning the date and authorship of the treatise. For instance, Abraham Bos and Rein Ferwerda think that the treatise features the same conception of soul and its relation to pneuma that Aristotle championed, which supports Bos' view that the treatise was written by Aristotle himself.[1] Werner Jaeger, by contrast, thinks that *De spiritu* contains evidence of the Aristotelian as well as of a non-Aristotelian conception of soul developed under the influence of the Stoics and Erasistratus (fl. c. 260 BCE).[2] In this paper I would like to explore the conception of soul, its relation to pneuma, and the role soul plays (or fails to play) in this treatise. To do so, I will draw on the previous collaborative studies I have undertaken on *De spiritu*. For the benefit of the reader, I provide a list of assumptions with which I approach this task, asking the reader to consult the published studies for arguments and evidence in support of these assumptions.[3]

First of all, despite a diversity of topics discussed and the author's distressingly associative style, I assume that he operates with a unified picture of human physiology and anatomy. The picture rests on the idea of three distinct but partly overlapping and interacting systems in the body: the system of *artēriai*, by which external air is taken in, turned into pneuma and distributed to different parts of the body. The system of *phlebes*, by which ingested food is turned into blood and by which blood is distributed around the body. And, finally, there is the system of bones and *neura* which supports the body, protects vital organs, and enables locomotion.

Second, concerning pneuma in this treatise, I assume that it is the warm airy substance inside the organism. From the moment external air is inhaled and enters the windpipe – which is part of the system of *artēriai* devoted to the intake of air and distribution of pneuma – it undergoes qualitative changes: the inhaled portion of air is condensed, it receives moisture from the walls of the windpipe and bronchi (Ps.-Aristotle,

1 Bos and Ferwerda 2008, 2, 13, 22–25. The same views, indeed with the same formulations, are found also in Bos and Ferwerda 2007.

2 Jaeger 1913b, 55–74, esp. 68–73.

3 Gregoric, Lewis and Kuhar 2015; Lewis and Gregoric 2015; Gregoric and Lewis 2015.

*De spiritu* 483b6–10, 22–23), and it becomes warmer as well, since there is a lot of heat in the chest. These qualitative changes, achieved simply by means of passing through the *artēriai*, turn air into pneuma. Indeed, the author says that "the external air is mild, whereas once it is enclosed (inside the body) it becomes pneuma, as it gets condensed and distributed somehow" (ἔξω μὲν γὰρ πραῦς (*sc.* ὁ ἀήρ), ἐμπεριληφθεὶς δὲ πνεῦμα, καθάπερ πυκνωθεὶς καὶ διαδοθείς πως, *Spirit.* 483b6–8). It is important to observe that this process is supposed to be quick and simple: the inhaled portion of air acquires certain qualities simply by passing through the windpipe and other *artēriai*. This does not involve transformation of one substance into another, as maintained by some authors who are criticised in *De spiritu*. Nevertheless, because of the various and remarkable effects that it produces, the inhaled air very much deserves an appellation that marks it off from the ordinary atmospheric air, and that appellation is πνεῦμα.

Third, I assume that, in the author's theory, a large portion of inhaled air goes through the windpipe into the lungs where it causes cooling. Another portion of inhaled air goes into the stomach through a "passage along the loin" (πόρος παρὰ τὴν ὀσφύν, *Spirit.* 483a20–21) where it helps digestion of food. From the large portion of pneuma that ends up in the lungs, most of it is evacuated through exhalation, but a smaller quantity gets distributed through the body for the purpose of nourishing the connate pneuma. Here I add, without further elaboration, that pulsation may be linked to the mechanism of distribution of pneuma from the lungs to the rest of the body. In any case, the pneuma which flows through the system of *artēriai* is engaged in three vital activities: respiration, digestion and pulsation (cf. *Spirit.* 482b14–17). It is important to note the threefold role of respiration: it is to draw in air for the purpose of cooling the chest, assisting digestion and supplying nourishment for the connate pneuma.

Fourth, the connate pneuma: I assume that it is the airy substance from which different tissues are composed. In Chapter 9 we learn that parts of the body – such as bones, flesh, air-ducts, blood-ducts and *neura* – are all made of simple bodies (τὰ ἁπλά, *Spirit.* 485b19, 22) mixed in different ratios. The difference in ratio accounts for the difference in qualities, shapes and dimensions of these structures. The only component of mixtures that the author singles out in addition to fire, is pneuma (*Spirit.* 485b10; cf. 484a3–6). I assume that pneuma and heat/fire are singled out because they are taken to be more important than the other simple bodies on account of their intimate connection with the soul (ἐν τούτοις γὰρ ὑπάρχει (*sc.* ἡ ψυχή), *Spirit.* 485b12). In any case, it is clear that all parts of the body contain heat and pneuma. It is my assumption that this pneuma at the level of composition is what the author refers to as the "connate

pneuma" (σύμφυτον πνεῦμα).[4] More to the point, I assume that the connate pneuma in the constitution of *neura* is what the author calls πνεῦμα κινητικόν at 485a7, whereas the connate pneuma in the constitution of *artēriai* is responsible for their sensitivity.

When the author says that "the connate pneuma originates from the lungs and goes through the whole body" (τὸ δὲ σύμφυτον πνεῦμα δι᾽ ὅλου, καὶ ἀρχὴ ἀπὸ τοῦ πνεύμονος, *Spirit.* 482a33–34; cf. 481b19), I take him to mean that a portion of the inhaled air that enters the lungs – possibly a specially fine portion of air of the right temperature – gets distributed through the system of *artēriai* around the body for the purpose of replenishing the airy substance from which all parts of the body are composed in different ratios of mixture with other elements.[5] The connate pneuma in the *artēriai* and *neura*, more than the other elements, seems to account for two 'psychic' activities, sensation and motion respectively. Unfortunately, the text tells us nothing about the way sensation and motion work, and hence it is exceedingly difficult to tell what is the precise role of the connate pneuma in these activities and how it effects this role.

Fifth, I take it that *De spiritu* was not written by Aristotle. Although the exact authorship and date of *De spiritux* are likely to remain unknown, the fact that the author shows no awareness of the epochal discoveries of the Alexandrian doctors suggests that the text was written in the first half of the third century BCE, possibly in the decade between 270 and 260.[6]

So much about the assumptions, let us now turn to soul.

## 2

The word ψυχή and its cognates occur 15 times in the treatise which spans over five Bekker pages.[7] Of the 12 occurrences of the word ψυχή directly relevant for our present task of determining the author's conception of soul, 6 are found in the first part of Chapter 5, which happens to be one of the textually most problematic stretches of the treatise.[8] Any interpretation of this stretch of the text, as well as of the other passages mentioning ψυχή, is bound to be controversial in points of detail, but I hope that my

4 The phrase ἔμφυτον πνεῦμα occurs once in the opening line, at *Spirit.* 481a1, and ὁ φυσικὸς ἀήρ also once, at *Spirit.* 482a6. There is no reason to think that these two phrases refer to anything other than what is elsewhere called σύμφυτον πνεῦμα. Roselli 1992, 69, says that the switch indicates lack of strict technical terminology.

5 I take it that the connate pneuma requires replenishment as the body naturally wears out. Also, sufficient supplies of material for the connate pneuma is required for normal growth of the body; cf. *Spirit.* 481a1–2, 9–10, 14–15, 26–27; 482a22–27.

6 For more arguments in favour of this or even slightly earlier dating, see Lewis and Gregoric 2015.

7 ψυχή (11): 481a17, 18, 482b22, 23, 483a4, 26, 27, 30, 483b11 *bis*, 485b12. ἔμψυχος (3): 481a5, 483a31–32 (εὔψυχον codd.), 485a32. ἄψυχος (1): 485a30.

8 See the critical apparatus in Roselli 1992, 97–101.

discussions, on occasion supported by the outlined assumptions from my previous studies of *De spiritu*, will provide cumulative evidence for the conclusions I draw at the end.

Let us start with the occurrence in the least controversial passage. In Chapter 4, the author discusses three types of motions of pneuma in the body: respiration, pulsation and digestive motion. He establishes that pulsation is independent from respiration in the following way:

> **T1** ἐάν τε γὰρ πυκνὸν ἐάν τε ὀμαλὸν ἐάν τε σφοδρὸν ἢ ἀραιὸν ἀναπνέῃ τις, ὅ γε σφυγμὸς ὅμοιος καὶ ὁ αὐτός, ἀλλ᾽ ἡ ἀνωμαλία γίνεται καὶ ἐπίτασις ἔν τε σωματικοῖς τισι πάθεσι καὶ ἐν τοῖς τῆς ψυχῆς φόβοις ἐλπίσιν ἀγωνίαις.
>
> Whether one breathes rapidly or evenly, heavily or quietly, the pulse remains the same and unchanged, but irregularity and agitation (of the pulse occurs) in some bodily ailments and in fears, anticipations and conflicts of the soul.[9]
>
> Ps.-Arist. *Spirit.* 4, 483a1–5

This passage tells us that soul is the subject of emotions such as fears, anticipations and inner conflicts. Many would find this statement uncontroversial, I suppose, but Aristotle warns us that, strictly speaking, this is not the correct way of speaking about soul: "… to say that it is the soul which is angry is as if we were to say that it is the soul that weaves or builds houses. It is doubtless better to avoid saying that the soul pities or learns or thinks, and rather to say that it is the man who does this with his soul."[10] This should not lead us to conclude hastily that the passage is un-Aristotelian, since Aristotle himself, despite his warning, occasionally uses precisely such locution.[11] However, there is another detail in the close context of this passage that is hard to explain if one assumes that *De spiritu* was written by Aristotle himself.

The passage tells us that pulsation is a type of motion of pneuma that reacts to certain pathological states of the body, but also to certain states of the soul. This seems to be a step towards the author's conclusion that pulsation is prior to the other two types of motion of pneuma and "bears resemblance to some activity, not to the interception of pneuma – unless this contributes to the activity" (ἔοικεν ἐνεργείᾳ τινὶ καὶ οὐκ ἐναπολήψει πνεύματος, εἰ μὴ ἄρα τοῦτο πρὸς τὴν ἐνέργειαν, *Spirit.* 483a17–18). Earlier in Chapter 4, at 482b34–36, the author mentioned the Aristotelian view that pulsation is a mere side-effect of the release of the pneuma intercepted in the nutritive liquid

9 Throughout this paper I print Roselli's text and indicate occasional divergences. Translations are all mine.

10 Arist. *De an.* 1.4, 408b11–15 (revised Oxford translation); see also 408b25–27.

11 E.g. Aristotle, *Physica* 4.11, 218b31; *De sensu* 7, 449a5–7; *De memoria* 1, 450b28.

processed by heat in the heart.[12] In the conclusion of Chapter 4, the author seems to distance himself from that view by saying that pulsation looks more like a purposeful process or activity (ἐνέργεια) – though he is unable to specify what the purpose is. This fact presents a difficulty for those who assume that *De spiritu* was written by Aristotle.[13]

Be that as it may, Chapter 4 seems to show that the author was familiar with Aristotle's theory of pulsation. Let us now look at two passages which bear witness to the author's familiarity with Aristotle's theory of soul. The first passage is brimming with textual problems and allows for different interpretations.

**T2** ἔχει δ' ἀπορίαν καὶ τὰ περὶ τὴν αἴσθησιν. εἰ γὰρ ἡ ἀρτηρία μόνον αἰσθάνεται, πότερα τῷ πνεύματι τῷ δι' αὐτῆς, ἢ τῷ ὄγκῳ [ἢ τῷ σώματι]; ἢ εἴπερ ὁ ἀὴρ πρῶτον ὑπὸ τὴν ψυχήν, τῷ κυριωτέρῳ τε καὶ προτέρῳ; τί οὖν ἡ ψυχή; δύναμίν φασι τὴν αἰτίαν τῆς κινήσεως τῆς τοιαύτης. ἢ δῆλον ὡς οὐκ ὀρθῶς ἐπιτιμήσεις τοῖς τὸ λογιστικὸν καὶ θυμικόν· καὶ γὰρ οὗτοι ὡς δυνάμεις λέγουσιν. ἀλλ' εἰ δὲ ἡ ψυχὴ ἐν τῷ ἀέρι τούτῳ, οὗτός γε κοινός. ἢ πάσχων γέ τι καὶ ἀλλοιούμενος εὐλόγως, ἂν ἔμψυχον ἢ ψυχή,[14] πρὸς τὸ συγγενὲς φέρεται καὶ τῷ ὁμοίῳ τὸ ὅμοιον αὔξεται. ἢ οὔ; τὸ γὰρ ὅλον οὐκ ἀήρ, ἀλλὰ συμβαλλόμενόν τι πρὸς ταύτην τὴν δύναμιν ὁ ἀήρ. ἢ οὐ; <...> τὸ ταύτην ποιοῦν καὶ τὸ ποιῆσαν τοῦτ' ἀρχὴ καὶ ὑπόθεσις.

Things related to sensation also pose a difficulty. If only *artēria* is sensitive, is this due to the pneuma that passes through it or to its bulk [or to its body]? Or, if air is the first under soul, is it due to that which is superior and prior (*sc.* soul)? What, then, is soul? They claim that a capacity is the cause of such motion (that contributes to sensation). Or it is clear that you will incorrectly criticise those who posit the calculative and spirited (parts of soul), for they also speak of capacities. But if soul is present in this air, surely this air is common. Or (shall we say that), being affected or altered by something, if (we have something) ensouled or soul, it moves towards what is akin to it, and like is increased by like? Or not? For the whole is not air, but air is something that contributes to that capacity (*sc.* sensitivity). Or not? <...> that which brings about this (sensitivity?), or once it has brought it about, that is the principle and basis.

Ps.-Arist. *Spirit.* 5, 483a23–35

12 See Aristotle, *De respiratione* 20, 479b26–480a15.

13 Bos and Ferwerda 2008, 112, play down the discrepancy between Aristotle's view of pulsation and the one in the conclusion of Chapter 4 of *De spiritu*.

14 From οὗτός to ἢ ψυχή I follow Jaeger's text and punctuation. Roselli prints οὗτός γε κοινός, ἢ πάσχων γέ τι καὶ ἀλλοιούμενος; εὐλόγως ἂν †εὖψυχον η ψυχή†.

The author's reasoning at the beginning of the passage seems to be as follows. Assuming that only *artēria* is sensitive, the question is whether this is due to the passage of air, to the constitution of *artēria*, or to something "superior and prior" to both, which in all likelihood refers to soul. This prompts the question what soul is, or perhaps what role it plays in rendering the body sensitive (τί οὖν ἡ ψυχή, *Spirit.* 483a27). In response to this question, the author refers to some people who claim that the cause of sensation – or rather the cause of the sort of motion that brings about sensation – is a *dynamis*. This is most probably a reference to Aristotle's view that soul is a set of capacities. Indeed, in Aristotle's theory, the perceptual capacity (ἡ αἰσθητικὴ δύναμις) is one of the three fundamental capacities of the soul, and he dedicates more space to it in *De anima* than to all the other capacities taken together. However, the claim that a capacity is the cause of sensory motion is here attributed to some unnamed people, with the verb in the third person plural (φασί), which suggests that the author does not associate himself with that view.

The following sentence, now with the verb in the second person singular, is no less surprising: "[I]t is clear that you will incorrectly criticise (οὐκ ὀρθῶς ἐπιτιμήσεις) those who posit the calculative and spirited (parts of the soul), for they also speak of capacities." This is clearly a (truncated) reference to the Platonic division of the soul into three parts – the calculative, the spirited and the appetitive. Now the author *objects* to a criticism of this division of the soul, but it is not at all clear what motivates him to raise this objection.[15]

If the words "you will be wrong to criticise those who posit etc." do not address anyone in particular, but aim to make a general point, the author's idea seems to be the following: should one take Aristotle's lead and maintain that a capacity of the soul is responsible for sensory motion, one might be tempted to follow Aristotle also in rejecting the Platonic division of the soul, knowing that Aristotle criticised it extensively in *De anima*; however, the Platonic division of the soul need not be seen as a competing account, because the *logistikon* and the *thymikon* (and the omitted *epithymētikon*) are capacities of the soul also in Plato's theory.[16]

15 Bos and Ferwerda 2008, 20, think that "the underlying question here seems to be: what guarantees the unity of the soul? This is a question which Aristotle often poses as a challenge to Plato". I agree that this is a problem which Aristotle raises to Plato at several places, but I confess that I cannot see anything in T2 pointing to the question of the unity of the soul. Towards the end of my paper, I offer an explanation of the author's motivation for raising this objection. Very briefly, he wants to make his physiological and anatomical theory of pneuma compatible with as many different conceptions of soul in circulation as possible.

16 This is roughly how Roselli 1992, 100, understands the author's train of thought. Needless to say, Aristotle did consider Plato's account of the soul as competing and indeed irreconcilable with his own: Plato took the soul, or at any rate its calculative part, to be an extended entity which moves the body by itself being in motion, which Aristotle discusses critically in *De an.* 1.3–4. Moreover, Plato divided the soul spatially, assigning each part of the soul to a different part of the body, leaving the soul's unity unexplained (Arist. *De an.* 1.5, 411b5–10).

On the other hand, if the words "you will be wrong to criticise those who posit etc." address a particular person, the most probable target is Aristotle and his criticism of the Platonic division of the soul in *De an.* 3.9–10.[17] In that case, however, it seems that the author misunderstood the point of Aristotle's criticism. The point of his criticism is not that the Platonic parts of the soul are not *dynameis*, but rather that they are wrong *dynameis* into which the soul should be divided for the purpose of a systematic account.

Whatever one makes of the author's objection to the criticism of the Platonic division of the soul, the first half of T2 (lines 23–30) seems to count as evidence against the Aristotelian authorship of *De spiritu*: Aristotle would hardly attribute to other people (φασί) the claim that a capacity of the soul is responsible for sensory motion, or be quick to point out that Plato's division of the soul is compatible with that claim and with the underlying account of the soul as a set of capacities. Nevertheless, the first half of T2 counts as a solid piece of evidence that the author was familiar with Aristotle's theory of the soul.

As to the second half of T2 (lines 30–35), they might be interpreted, with some effort, as containing another piece of evidence that the author was familiar with Aristotle's theory of the soul. Here is a tentative reconstruction of the author's reasoning, ignoring some details and textual difficulties. In response to the question what makes *artēria* sensitive, one might argue that this is due to the passage of air or because "soul is in air" (ἡ ψυχὴ ἐν τῷ ἀέρι τούτῳ, *Spirit.* 483a30).[18] Now, is soul in all air, including the external atmospheric (κοινός) air – our author seems to be reasoning – or only in the air which has undergone certain qualitative changes in a living being? It is more reasonable to think that soul is only in the air which has undergone the requisite changes and which contributes to rendering the living being sensitive.[19] Or perhaps it is best to suppose that soul is not even in that air, but is rather the principle and basis (ἀρχὴ καὶ ὑπόθεσις, *Spirit.* 483a35–36) which makes it possible for the inhaled air to undergo the requisite changes as it passes through the system of *artēriai* and thus to render the body sensitive. This would be the author's answer to the initial question whether *artēria* owes its sensitivity to the passage of air, to the constitution of *artēria*, or to soul.

If this charitable reconstruction of the author's train of thought is correct, soul seems to be taken here as the formal cause which explains the structure of the body such that the relevant physiological processes and psychological states can take place. In other words, it is because of soul that *artēria* is constituted in the particular way and that air is able to pass through it having acquired all the right qualities; so it is soul that

17 Apparently, that is what Bos and Ferwerda 2008, 120, also think in their comment on this sentence.

18 I presume this would be a position close to that of Diogenes of Apollonia, who identified soul with air; cf. Arist. *De an.* 1.2, 405a21–25 (= fr. 64A20 DK) and Simplicius, *In Aristotelis Physicorum libros commentarius*, Diels p. 151,28 14 (= frs. 64B3–5 DK).

19 Of course, this air is pneuma.

explains, first and foremost, why *artēria* is sensitive. With this reconstruction, then, the second half of T2 contains an additional piece of evidence that the author was familiar with Aristotle's theory of soul. I admit, however, that the evidence is tenuous, not only because my reconstruction is tentative, but also because in Chapter 9, as I will argue later, the author shows no awareness of the concept of formal causation.

Here is another passage which mentions both soul and capacity of the soul.

> **T3** ἡ μὲν οὖν ἀναπνοὴ δῆλον ὡς ἀπὸ τοῦ ἐντὸς ἔχει τὴν ἀρχήν, εἴτε ψυχῆς δύναμιν εἴτε ψυχὴν δεῖ λέγειν ταύτην, εἴτε καὶ ἄλλην τινὰ σωμάτων μῖξιν, ἣ δι' αὐτῶν ποιεῖ τὴν τοιαύτην ὁλκήν.
>
> It is clear that respiration has its origin from the inside – whether one should define it as a capacity of the soul, soul, or some other mixture of bodies – which, by means of these, produces such intake (*sc.* of external air).
>
> Ps.-Arist. *Spirit.* 4, 482b21–25

The principle of respiration is said to be inside the body, and the first two candidates for this principle are "capacity of the soul" and "soul" (εἴτε ψυχῆς δύναμις εἴτε ψυχή). Aristotle would be the most obvious philosopher who would think that soul, or, more precisely, the nutritive capacity of the soul, is the principle of respiration, contrary to some Hellenistic philosophers and physicians who think that vital activities such as respiration are due to nature (φύσις), not to soul. I take it that the third alternative, "some other mixture of bodies" (ἄλλη τις σωμάτων μίξις), is mentioned precisely to leave room for that possibility, for I am inclined to believe that the author accepts the distinction between nature and soul, such that nature explains vital processes like respiration, pulsation, digestion and reproduction, whereas soul explains processes like sensation and locomotion. I will return to this topic later.

I take T2 and T3 to constitute direct evidence of the author's familiarity with Aristotle's theory of soul. The close affinity of soul with pneuma, affirmed at several places (see T5 and T6 below), can also be regarded as direct evidence to that effect. There is also abundant indirect evidence for the author's familiarity with Aristotle's theory of soul. For instance, *De spiritu* opens with the questions how the connate pneuma is maintained and how it grows.[20] These questions merit attention, we learn, "for we see that it becomes larger and stronger with with change of both age and condition of the body" (*Spirit.* 481a2–3). Of course, we can 'see' this only if we take it for granted that there is such a thing as the connate pneuma, and that it is the source of strength

20 In the opening line, at *Spirit.* 481a1, and only there, the author uses the phrase ἔμφυτον πνεῦμα, which seems to be synonymous with σύμφυτον πνεῦμα; cf. n. 4 above.

in animal bodies.[21] Both of these ideas are found in Aristotle and probably originate with him. Indeed, the very question in the opening sentence of *De spiritu* seems to go back to a parenthetic remark in Aristotle's *De motu animalium* 10: "How the connate pneuma is preserved is stated elsewhere" (703a10–11).[22] The fact that the author knew Aristotle's biological works such as *De motu animalium* and *De respiratione* can be taken as indirect evidence of his familiarity with Aristotle's theory of the soul, since it is unlikely that one could have knowledge of the former without at least some familiarity with the latter. Moreover, the author's use of the term *energeia* with reference to purposeful or vital activity (e.g. *Spirit.* 483a17, 18 and coupled with *dynamis* at 482b6–7), his insistence on teleological explanations (e.g. throughout Chapter 3), his practice of testing the adequacy of an account by appealing to other animals (e.g. in Chapters 2 and 8), the analogy of nature and art (in Chapter 9), and many physiological details borrowed from Aristotle – it is hard to imagine that one could pick all that up without gaining some knowledge of Aristotle's theory of soul.

Given the author's familiarity with Aristotle's theory of soul, however, some passages in *De spiritu* are puzzling. Consider the following passage:

**T4** ἀλλ' αἱ μὲν τέχναι ὡς ὀργάνῳ χρῶνται (*sc.* τῷ πυρί), ἡ δὲ φύσις ἅμα καὶ ὡς ὕλῃ. οὐ δὴ τοῦτο χαλεπόν, ἀλλὰ μᾶλλον τὸ τὴν φύσιν αὐτὴν νοῆσαι τὴν χρωμένην, ἥτις ἅμα τοῖς αἰσθητοῖς πάθεσι καὶ τὸν ῥυθμὸν ἀποδώσει· τοῦτο γὰρ οὐκέτι πυρὸς οὐδὲ πνεύματος. τούτοις δὴ καταμεμείχθαι τοιαύτην δύναμιν θαυμαστόν. ἔτι δὲ τοῦτο θαυμαστὸν [ταὐτὸν] καὶ περὶ ψυχῆς· ἐν τούτοις γὰρ ὑπάρχει. διόπερ οὐ κακῶς[23] εἰς ταὐτόν, ἢ ἁπλῶς ἢ μόριόν τι τὸ δημιουργοῦν, καὶ τὸ τὴν κίνησιν ἀεὶ τὴν ὁμοίαν ὑπάρχειν ἐνεργείᾳ. καὶ γὰρ ἡ φύσις, ἀφ' ἧς καὶ ἡ γένεσις.

But whereas crafts use it (*sc.* fire) as an instrument, nature uses it at the same time also as matter. What is difficult, surely, is not that, but rather that nature herself uses it and assigns not only sensible properties to (bodily parts) but also their proper structure. For this is no longer the scope of fire or pneuma. So, it is remarkable that such a capacity should be combined with these (two bodies,

21 See Arist. *De motu an.* 10, 703a8–10; *De somno et vigilia* 2, 456a15–17; *De generatione animalium* 2.4, 737b32–738a1; 5.7, 787b10–788a16. One might object that ἰσχυρότερον at *Spirit.* 481a2 does not really say that the *body* grows stronger by means of the connate pneuma, but rather it is the connate pneuma that grows stronger (ἰσχυρότερον). This is a different way of expressing the same idea, I take it, and it will be borne out by the role of the connate pneuma in the movement of the limbs.

22 If this remark is a reference to *De spiritu*, I suppose it is a later interpolation by an editor or scribe who knew of the existence of *De spiritu*. Certainly this, and a similar parenthetic promissory remark few lines down, at *De motu an.* 10, 703a16–18, ostensibly interrupt the train of Aristotle's thought in *De motu an.* 10.

23 I follow the manuscript reading κακῶς, preferred by all the editors save Roselli, who reads καλῶς.

> namely fire and pneuma). Moreover, this is remarkable also with regard to soul, for it is found in these (two bodies). For this very reason it is not bad (that they are associated) with the same thing, either unqualifiedly or some particular productive part of it, and that its uniform motion is always present in actuality. For this applies also to the nature from which generation, too, comes about.
>
> Ps.-Arist. *Spirit.* 9, 485b6–15

In this passage the author describes fire both as an instrument and as matter, and he finds nothing particularly problematic with such a description. What he finds problematic, rather, is that nature herself uses fire in such a way as to adorn the bodily parts with just the right qualities, shapes and dimensions.[24] The same problem is then extended to soul (ἔτι δὲ τοῦτο θαυμαστὸν … καὶ περὶ ψυχῆς, *Spirit.* 485b11–12). Now, this indicates two things. First, the author does not seem to follow Aristotle in identifying the nature of a living being with its soul. As is well known, Aristotle defines nature as the internal principle of motion and rest, and in the case of living beings this is their soul. The author of *De spiritu*, by contrast, appears to distinguish a living being's soul from its nature. Nature seems to come first and at a lower level of organic complexity which is common to all living beings, whereas soul comes second and at a higher level of organic complexity manifest in living beings with sensation and locomotion. Whether this was written under the influence of the Stoic *physis-psychē* distinction, as Jaeger and Roselli argue,[25] or perhaps as a forerunner of that theory, one has to admit that this detail does not look very Aristotelian.

Second, the author's wonder at the works of nature and its demiurgic agency in Chapter 9 indicates that he does not subscribe to Aristotle's conception of soul as formal cause. As every Aristotelian knows, soul is what explains the shape and organization of the living body. That is to say, the simple bodies are mixed in the right way and bodily parts adorned with just the right qualities, shapes and dimensions *because* they constitute the appropriate matter for the form they were meant to realize – and the form in question is the soul. Only a person who does not accept formal causation sees a difficulty with nature achieving the right ratios of mixture at all the right places.

It is reasonable to ask why the author does not accept Aristotle's conception of soul as formal cause. If the author is someone with solid knowledge of Aristotle's biological

24 Dobson, Hett, Gohlke, Tricot and Roselli take φύσιν to be the subject of νοῆσαι, whereas Bos and Ferwerda 2008, 45, take φύσιν to be the object of νοῆσαι. They opt for this reading in order to avoid saddling the author of *De spiritu* with the distinctly un-Aristotelian claim that nature thinks. The other argument they give in favour of their reading is more convincing: the alternative would grammatically require νοεῖν instead of νοῆσαι. I accept Bos and Ferwerda's reading, though nothing in my argument depends on it.

25 Jaeger 1913b, 70–73; Roselli 1992, 126.

works, surely he must be familiar with formal causation and hypothetical necessity. Indeed, we have seen that T2 may contain evidence of the author's understanding of soul precisely in the role of the formal cause. So why does he not make use of it in Chapter 9?[26] One possible explanation is that he operates with a different conception of soul. But which conception is that?

The talk of mixture of the simple bodies in different ratios to achieve tissues of different qualities, shapes and dimensions, with the result that there is an ensouled being, may suggest that the author endorses a version of the "Pythagorean" *harmonia*-conception of soul familiar from Plato's *Phaedo* and later championed by the early Peripatetic philosophers Aristoxenus of Tarentum and Dicaearchus of Messene.[27] According to this theory, soul is an epiphenomenon of the right balance of elements in the body, much like the attunement of the lyre is an epiphenomenon of the right tension of the strings.

I do not think that the author of *De spiritu* subscribes to this conception of soul, either. True, he does think that the simple bodies must be mixed in the right ratios at all the right places, and he marvels at nature for achieving that, but for him this does not seem to be a sufficient condition for the presence of soul. What is crucially required – in addition to the right mixtures in all the right places that constitute an organism with different tissues and systems – is pneuma with its various motions and mixtures described in this treatise. For our author, pneuma (and fire) stand in a more intimate relation to soul than the other simple bodies or mixtures of simple bodies – as visible from T4 where soul was said to be "present in pneuma and fire" (ἐν τούτοις γὰρ ὑπάρχει (*sc.* ἡ ψυχή), at *Spirit.* 485b12, referring back to πυρὸς καὶ πνεύματος in line 10).

There are two further passages suggesting that the author took soul to be intimately connected with pneuma.

> **T5** καθαρώτερον γὰρ ὃ τῇ ψυχῇ συμφυές (*sc.* τὸ σύμφυτον πνεῦμα), εἰ μὴ καὶ τὴν ψυχὴν ὕστερον λέγοι γίνεσθαι, διακρινομένων τῶν σπερμάτων καὶ εἰς φύσιν ἰόντων.
>
> For that which is connate to the soul (*sc.* the connate pneuma) is purer – unless one were to say that soul too is generated later, following the separation of seeds and their advancement to their respective nature.
>
> Ps.-Arist. *Spirit.* 1, 481a17–19

26 This problem can be explained away by adopting the thesis of Neustadt 1909 and Jaeger 1913b, 73; Jaeger 1913a, xix, that Chapter 9 does not belong with the rest of the treatise. Against that thesis, see Lewis 2020.

27 See Aristoxenus frs. 120a–d Wehrli (= Cicero, *Tusculanae disputationes* 1.10.19; 1.18.4; Lactantius, *De opificio dei* 16) and Dicaearchus fr. 11 Wehrli (= Nemesius, *De natura hominis* 2); cf. Caston 1997.

**T6** οὐκ ἄρα λεπτότατος (*sc.* ὁ ἐμπεριληφθεὶς ἀήρ), εἴπερ μέμεικται. καὶ μὴν εὔλογόν γε τὸ πρῶτον δεκτικὸν ψυχῆς, εἰ μὴ ἄρα καὶ ἡ ψυχὴ τοιοῦτον, καὶ οὐ καθαρόν τι καὶ ἀμιγές.

So, if (the enclosed air) is mixed, it is not supremely fine. Yet it is very reasonable that the primary receptacle of the soul is such – unless the soul too is of this character (*sc.* mixed), i.e. not something pure and unmixed.

Ps.-Arist. *Spirit.* 5, 483b9–12

In T5, the connate pneuma is said to be something connate to the soul, i.e. something with which the soul is naturally bound together. I take it that much the same idea is expressed in T6 with the idea that pneuma is "the primary receptacle of soul" (τὸ πρῶτον δεκτικὸν ψυχῆς, *Spirit.* 483b10–11). This privileged position of pneuma in relation to soul, I think, rules out the possibility that the author endorses any sort of *harmonia*-conception of soul.

On the other hand, he does not identify soul with air or pneuma, as some Presocratics and the Stoics did.[28] For our author, soul seems to be a *dynamis* (or perhaps a set of *dynameis*) which a living being has owing to pneuma and its various motions and roles in the body. Pneuma is connate (συμφυές) to the soul, it is the primary vehicle of the soul, but it is not the soul itself. As we have seen, the author rejects the view that soul is reducible to air – whether to all air indiscriminately, or even to the inhaled air that has undergone suitable alterations by passing through the body (i.e. pneuma). Our author seems to think that there must be a certain "principle and basis" (ἀρχὴ καὶ ὑπόθεσις, *Spirit.* 483a35–36) which makes it possible for air to undergo these alterations and to produce its various effects in the body. Although he does not explicitly equate this principle with soul in T2, I have suggested that this is what he had in mind.

So, which conception of soul does the author endorse? Could it be Aristotle's non-reductivist conception of soul, after all? Bos is convinced that this is exactly what we find in *De spiritu*. He believes that the intimate connection between soul and pneuma found in this treatise is asserted also by Aristotle in *De anima*.[29] Namely, Bos takes Aristotle's canonical definition of soul as the form of the natural organic body (σώματος φυσικοῦ ὀργανικοῦ, Arist. *De an.* 2.1, 412b5–6) to establish a direct hylomorphic relationship between soul and pneuma: soul is not the form of the whole body made of tissues

**28** E.g. Anaximenes (Aëtius 1.3.4 = fr. 13B2 DK), Xenophanes (Diog. Laërt. 9.19 = fr. 21A1 DK), Diogenes of Apollonia (Theophr. *Sens.* 39–45; Aristotle, *De anima* 1.2, 405a21–25; Simplicius, *In Arist. Phys.* Diels 151,28 = frs. 64A19, 64A20, 64B4, 64B5 DK). For the Stoic view, see Diog. Laërt. 7.1; Ps.-Galen, *De historia philosopha* 24, Diels 613; Tertullian, *De anima* 5; Iamblichus, *De anima* apud Stobaeum, *Eclogae* 1.49.33 (Wachsmuth 367,17 ); Aëtius 4.21; Calc. *In Tim.* 220 (= *SVF* 1.135, 136, 137; 2.826, 836, 879); cf. Long 1982; Annas 1992, 37–70.

**29** Bos 2003; Bos and Ferwerda 2008.

and organs, but only of pneuma in the body. It is true that Aristotle establishes a tight connection between the connate pneuma and soul at several places (e.g. Arist. *De motu an.* 10: *De an.* 3.10; *Gen. an.* 2.3), but this connection should not be understood in terms of the direct hylomorphic relationship. Very briefly, pneuma is not an ancient counterpart to the Cartesian pineal gland that physically reacts to mental states in some mysterious way; rather, it is a material thing which reacts physically to subtle thermic alterations in the heart that accompany perceptions of pleasant and unpleasant things. When heated or chilled, pneuma in the heart expands and contracts, thereby acting mechanically on the tiny *neura* in the heart and this leads to the motion of the limbs.[30] And if the connection between the connate pneuma and soul is not understood in terms of the direct hylomorphic relationship, there is no reason whatsoever to understand Aristotle's notion of the natural organic body in his canonical definition of soul in *De anima* with reference to pneuma only, as Bos insists.[31]

Earlier in this paper I listed some reasons to think that the author of *De spiritu* does not subscribe to Aristotle's non-reductivist conception of soul as the form of the living body; notably, T4 could not have been written by someone who accepts Aristotle's view. What speaks even more decisively against the view that the author of *De spiritu* subscribes to Aristotle's conception of soul are passages in which the author intimates that soul might be something "mixed" with the simple bodies from which living beings are composed. In T3 the author of *De spiritu* speaks of a "capacity of the soul, soul or some other mixture of bodies" (εἴτε ψυχῆς δύναμιν εἴτε ψυχὴν δεῖ λέγειν ταύτην, εἴτε καὶ ἄλλην τινὰ σωμάτων μῖξιν, *Spirit.* 482b22–24) as being responsible for respiration, which may imply that soul is also a mixture of bodies. In T4, nature or soul is explicitly said to be something "mixed" with pneuma and fire (καταμεμείχθαι, *Spirit.* 485b10). In T6 he entertains the idea that soul is "not something pure and unmixed" (οὔ καθαρόν τι καὶ ἀμιγές, *Spirit.* 483b12). I suspect Aristotle would never venture such claims, since they imply corporeality of the soul.[32]

We have made a full circle trying to determine which conception of soul the author endorses, without a positive result.[33] The conclusion we ought to draw at this stage, I

30 For more details, see Corcilius and Gregoric 2013; Gregoric and Kuhar 2014; Gregoric 2020, 427–438.

31 Further difficulties for Bos' position are specific claims about pneuma in *De spiritu* which contradict Aristotle. For example, the source of pneuma for Aristotle is the heart, whereas in *De spiritu* it is the lungs (482a33–34); there is nothing in Aristotle to suggest that pneuma flows only through *artēria* (*Spirit.* 483b12–13, 18–19), or that only *artēria* is sensitive. For other difficulties, see Gregoric and Lewis 2015.

32 According to Aristotle, only entities of the same type can mix; cf. Arist. *Gen. Corr.* 1.10 and *Sens.* 7, 447a30–b3.

33 Jaeger 1913b, 73, writes: "In the other account, fire-pneuma is the organ of the soul, the πρῶτον ὑπὸ τὴν ψυχήν, which is entirely Peripatetic (483a26). There the soul is ἀμιγής (*sc.* 'unmixed') and καθαρά (*sc.* 'pure') (483b12), here (viz. in Chapter 9) it is corporeally mixed with fire-pneuma, which marks the whole distance between Anaxagoras and Zeno of Citium!"

propose, is that the author is not committed to any particular conception of soul. If we look carefully at T3, T5 and T6, we can see that he consistently hedges his statements about soul, as if trying to leave room for different conceptions of it.

In T3 the author observes that the principle of respiration must be inside the body, but he leaves it open whether it is a capacity of the soul, soul itself or "some other mixture of bodies" (ἄλλη τις σωμάτων μίξις, *Spirit.* 482b23–24). As I have suggested, the expression "some other mixture of bodies" may indicate that the principle of respiration is neither soul, nor any particular capacity of the soul, but nature. If that is correct, this again looks like a concession to the conception of soul favoured by the Alexandrian doctors and the Stoics, but also a possibility compatible with the *harmonia*-conception.

In T5 he leaves room for the possibility that soul appears at some later stage of development of an individual, notably once it has started to take part in the process of digestion of food (the working premise here is that the connate pneuma is nourished from the process of digestion of food). Perhaps this is not in line with Aristotle who thinks that soul in its nutritive capacity appears with the formation of the heart, but it is compatible with the *harmonia*-conception and even evocative of the Stoic theory and the theory of Alexandrian physicians, where the development of the embryo is governed by nature, whereas soul appears at birth.

T6 considers the possibility that the air enclosed in the system of *artēria* becomes pneuma by actually mixing with moisture and coarse bits in there. In that case, the author concludes, pneuma would not be the finest substance (λεπτότατος, *Spirit.* 483b10). However, it is reasonable to suppose that the first receptacle of soul is the finest substance, adding a caveat: "unless soul itself is also like that, i.e. not something pure and unmixed". This may very well be intended as a concession to a reductive materialist conception of soul, notably the Stoic one.[34]

It is reasonable to ask why the author of *De spiritu* is not committed to any particular conception of soul. It might be because he was agnostic, but it might also be something programmatic. What I want to suggest is that he regarded it as a recommendation of his physiological and anatomical theory of pneuma that it is compatible with a variety of different conceptions of soul, or at any rate not decisively bound to any one of them. I have argued that the conceptions of soul in play, in addition to Aristotle's non-reductive one, are the epiphenomenalist *harmonia*-conception which enjoyed some popularity among the early Peripatics, and the reductive materialist conception championed by the Stoics. Another conception of soul that the author wanted to keep on the table was the Platonic one. That is why in T2 the author raised the objection to anyone who might think that subscribing to the Aristotelian view that a capacity of the soul is responsible for

34 So Jaeger 1913b, 71–73, and Roselli 1992, 74: "ψυχή too is a body …, which brings us close to the Stoic definitions of the soul."

sensory motion automatically rules out Plato's division of the soul into the calculative, the spirited and the appetitive part. Our author urges that these three parts can also be understood as capacities, so that even adherents of the Platonic conception of soul can be sympathetic to our author's theory.

If the author aimed to develop a physiological and anatomical theory around the Aristotelian notion of pneuma and to demonstrate its superiority over the rival physiological and anatomical theories, reminding the reader every now and then of his theory's compatibility with different conceptions of soul looks like a reasonable strategy, especially if the competing physiological and anatomical theories typically came in conjunction with certain conceptions of soul. Of course, one who chooses this strategy cannot attach great explanatory value to soul, but perhaps one does not need to – if one aims to present a physiological and anatomical theory of a limited scope, as seems to be the case with the author of *De spiritu*.

## 3

Even though soul does not loom large in *De spiritu*, there are certain things that we can say with a modicum of certainty about soul and pneuma in *De spiritu*. First of all, our author thinks that soul, however one conceives of it, stands in a privileged relationship with one type of stuff, and that is pneuma. This is in line with Aristotle's theory but also with the theories of the Stoics and the Alexandrian doctors.

Second, the privileged relationship between soul and pneuma is based on pneuma's purity and fineness. This is in line with the ancient tradition, noted by Aristotle, to identify or associate soul with supremely fine and the least corporeal stuff.[35] This tradition persists in Hellenistic times and was advocated also by Galen.[36]

Third, pneuma's purity and fineness has something to do with the fact that pneuma originates from external air which is considered by many philosophers and physicians, at least from Diogenes of Apollonia onwards, to be the finest type of stuff.

Fourth, soul is relegated to a supporting role in this treatise. Typically, *De spiritu* introduces soul in support of the claim about pneuma's purity and fineness, as in T5 and T6, or with reference to the principle of an activity under discussion, such as respiration in passage T3 or sensitivity in passage T2.

Fifth, the author seems to separate soul from nature in T3 and T4, and he does so in a way which is reminiscent of the *physis-psychē* distinction advocated by the Stoics. Nature

35 Arist. *De an.* 1.2, 405a4–7, 21–25; 1.5, 409b19–21.

36 See, e.g., Ep. *Hdt.* 63; Asclepiades (in Calc. *In Tim.* 215 = Waszink ed. alt. 1975, 229,18–230,7); Galen, *Ut. Resp.* 5.5 (Furley/Wilkie 128 = K. 4.507); Galen, *PHP* 7.3.23–29 (De Lacy 444,12–446,10 = K. 5.606–609). See also the chapter by Leith in this volume.

accounts for the vital activities of respiration, digestion and pulsation, whereas soul goes with the characteristically animal activities of sensation and locomotion. I have argued elsewhere that the crucial role in both sets of activities is played by pneuma, though not in the same way. It is pneuma flowing through the system of *artēriai* that plays the role in vital activities, and pneuma mixed in the right ratios with other simple bodies in the constitution of *artēriai* and *neura* that plays the role in the "psychic" activities of sensation and locomotion, respectively. Pneuma in the latter role, I have argued, is what the author calls "connate pneuma".

Sixth, if one goes along with my assumption that the author makes the distinction between the pneuma flowing through the system of *artēriai* and the connate pneuma as a building block of different tissues, *De spiritu* comes close to the Hellenistic *physis-psychē* distinction in yet another way. Namely, if my assumption is correct, *De spiritu* foreshadows the differentiation of pneuma into two different types, one in charge of vital activities (respiration, digestion, pulsation) and the other in charge of "psychic" activities (sensation, locomotion). This would constitute a clear anticipation of the historically momentous distinction between vital and psychic pneuma, introduced by the Alexandrian doctors and later worked out by Galen.

Finally, I think that the cumulative evidence I have provided in this paper speaks quite strongly against Aristotle's authorship of *De spiritu*. The author's knowledge of Aristotle's biological works and his familiarity with the Aristotelian theory of soul indicate that he affiliated himself with the Peripatetic school. However, his commitment to Aristotle's conception of soul was so weak that he did not see a problem in allowing non-Aristotelian conceptions of soul to appear on equal footing across the treatise. I have suggested that this is the result of the fact that the author had no particular need for a robust concept of soul in developing his physiological and anatomical theory of pneuma and questioning rival ones, but also because he wanted to make his theory acceptable to doctors and philosophers who may have held different views concerning soul.

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Luciana Repici

# Strato of Lampsacus on Pneuma

## Summary

From the fragmentary evidence we can infer only that Strato was interested in the application of Pneuma in different areas of research, from biology to physiology, and to psychology. But we are hardly informed about the context of his views and the general lines of his arguments. The paper analyses the single accounts in their problematic features and is mainly focused on comparing Strato's views on Pneuma with Aristotle's, that is the natural background for the views of a Peripatetic philosopher and an heir of the Aristotelian tradition like Strato, whatever his contacts with Hellenistic doctors, scientists or philosophers. Although unsystematic, Aristotle's remarks appear to be decisive for both clarifying single points and rescuing Strato's position from the habitual charge of reductionism and materialism.

Keywords: philosophy of biology; medicine; Aristotle; Peripatos; Aristotelian tradition

Aus den Fragmenten können wir nur schließen, dass Strato Interesse hatte an der Anwendung von Pneuma in verschiedenen Forschungsbereichen, von der Biologie über Physiologie zur Psychologie. Aber wir wissen nur wenig über den Kontext seiner Ansichten und seine Argumentation. Der Beitrag analysiert die einzelnen Darstellungen hinsichtlich ihrer Schwierigkeiten, wobei vor allem Stratos Ansichten zu Pneuma mit Aristoteles' verglichen werden, also den Hintergrund für die Ansichten eines peripatetischen Philosophen und Erben der aristotelischen Tradition, was für Kontakte Strato zu hellenistischen Ärzten, Wissenschaftlern oder Philosophen hatte. Wenn Aristoteles' Äußerungen auch unsystematisch sind, so scheinen sie entscheidend, um einzelne Argumente zu erklären und Stratos Position vor dem Vorwurf des Reduktionismus und Materialismus zu bewahren.

Keywords: Philosophie der Biologie; Medizin; Aristoteles; Peripatos; Aristotelische Tradition

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## 1 Introduction

Our sources tell us that Strato used pneuma in explanations of several different natural phenomena: from reproduction (the nature of semen and monstrous births) and physiology (sleep) to psychology (sense perception and psychic activities). The evidence is scanty and disappointing.[1] Nine times out of ten we are faced with doxographical accounts which, more often than not, diverge from each other; nine times out of ten his views are coupled with other views with no attempt to distinguish between them; nine times out of ten textual difficulties render the interpretation quite problematic.[2] Finally, nine times out of ten the name of Strato appears with no further qualification such as *the Peripatetic* or *the naturalist* (φυσικός), thus rendering an identification with Strato *of Lampsacus* uncertain. This is a particularly perplexing circumstance when the question arises whether or not Strato of Lampsacus is to be identified with a Strato who was a doctor and a pupil of Erasistratus. Yet, caution is needed in this case, mainly because, apart from the chronological difficulties, the accounts related to the pupil of Erasistratus are of a highly technical nature and pertain to therapeutic rather than to theoretical issues.[3] In addition, hardly any of these accounts on Strato the doctor hints at applications of the concept of pneuma, while this is precisely what is required if one would like to identify the physician as Strato *the naturalist*.[4]

1 Quotations, translations and the numbering of the discussed texts are drawn from the collection of Sharples 2011. Only few pieces of biographical information on Strato are recorded. According to Diogenes Laërtius, *Vitae philosophorum* 5.58–64 (= fr. 1 Sharples), he (a) was from Lampsacus and chiefly concerned with the study of nature; (b) taught Ptolemy Philadelphus; (c) began to be scholarch of the Peripatos in 288–284 BCE, after Theophrastus' death and (d) was head of the school for eighteen years, i.e., until 274–270. Particularly uncertain for chronological reasons is his staying in Alexandria of Egypt as a tutor of Ptolemy Philadelphus. Possibly, he could have been there before 288–284 BCE.

2 Illuminating studies on the constitution of doxographical accounts in antiquity can be found in Mansfeld and Runia 2010.

3 See Sharples 2011, 14–17, who therefore in his collection groups the reports assigned to Strato the doctor by ancient medical sources in an Appendix of dubious texts (1–13). According to Berryman 1996, 98–105, the technical nature of these reports is so high that, even if he was the same person as Strato of Lampsacus, there would be hardly any difference whether or not they are included in an attempt to assess the latter's position.

4 An exception might seem a text from Galen, *De differentiis pulsuum* 4.17 (= K. 8.759.3–15) (see App. 3 Sharples, with his commentary) on the definition

In what follows I shall analyse the relevant *testimonia* individually and try to interpret them with reference to Aristotle. The surviving evidence hardly allows us to gain a satisfactory overview of a hypothetical *Pneumalehre* of Strato and my analysis will show that his application of the concept of pneuma to explanations of animal generation, physiology and psychology may have found support in Aristotle's views, although no systematic version of the theory can be found, to my knowledge, in Aristotle's writings either.[5]

## 2 Strato on pneuma in animal generation

To begin with, two texts are focused on biology and the theory of reproduction, viz., respectively the δύναμις of the generative semen (σπέρμα) and the generation of monsters (τέρατα). The first, transmitted in a doxographical section consisting of three lemmas, runs:

> **T1** Εἰ σῶμα τὸ σπέρμα. Λεύκιππος καὶ Ζήνων σῶμα· ψυχῆς γὰρ εἶναι ἀπόσπασμα. Πυθαγόρας Πλάτων Ἀριστοτέλης ἀσώματον μὲν εἶναι τὴν δύναμιν τοῦ σπέρματος ὥσπερ νοῦν τὸν κινοῦντα, σωματικὴν δὲ τὴν ὕλην τὴν προχεομένην. Στράτων καὶ Δημόκριτος καὶ τὴν δύναμιν σῶμα· πνευματικὴ γάρ.
>
> Whether seed is a body. Leucippus and Zeno (the Stoic) (say that it is) a body; for it is a (portion) drawn off from the soul. Pythagoras, Plato (and) Aristotle (say) that the power of the seed is incorporeal, like the intellect that causes movement, but the matter that is emitted is corporeal. Strato and Democritus (say that) the power too is a body; for it is (of the nature) of pneuma.
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> Ps.-Plutarch, *Placita philosophorum* 5.4, 905b (Mau 135,6–13 = fr. 70 Sharples)

As can be seen, the name of Strato, mentioned without any qualification, occurs in the third lemma, where he is listed together with Democritus as holding the thesis that even

of pulse. Galen reports that on this topic, the members of each individual medical sect disagreed with one another as much as they did with members of other sects, and there were also cases in which some people formulated even three definitions, as in the case of Apollonius "the follower (pupil?) of Strato" (ὁ ἀπὸ Στράτωνος). In fact, in one of his definitions Apollonius had recourse to pneuma, for he assumed that "pulse is the dilatation (διάστασις) from the filling of the artery with the pneuma sent out from the heart." But (a) this was only one of his definitions and it remains uncertain whether Apollonius preferred it to the others; (b) it is uncertain, too, whether Strato can be credited with the same definition; (c) the background of the definition suggests, in accordance with Erasistratus, that the pulse originated from the heart.

5 On this interpretation of Strato's position, see Repici 1988, 85–90. On his surmised *Pneumalehre* as expression of a mechanistic and non-Aristotelian point of view, see Diels 1893; Jaeger 1913.

the power (δύναμις) of the semen is a body (σῶμα), because it is of the nature of pneuma (πνευματική).[6] But this coupling of their names, rather than pointing out a doctrinal convergence between them, could be the result of a doxographical conflation. This seems to be the case also both with the coupling of Leucippus the Atomist and Zeno the Stoic in the first lemma,[7] and with the coupling of Pythagoras, Plato and Aristotle in the second lemma.[8] Strato and Democritus could likewise have been listed together not for reasons of doctrinal convergence, whether methodological or in regard to content. Besides, Democritus is nowhere credited with an interest in defining the incorporeal δύναμις of the semen and, even if he was interested in referring the incorporeal δύναμις of semen to the nature of pneuma, the question could have been sufficiently settled in terms of atomic compounds and movements.[9] Strato and Democritus should therefore be separated and the doctrinal point on the incorporeal δύναμις of the semen in the doxographical report should possibly be ascribed to Strato only.[10] Consequently, granted

6 Notice that the text is uncertain precisely in the point where pneuma is introduced. The whole sentence of the final lines, "the power too (καὶ τὴν δύναμιν) … (of the nature) of pneuma (πνευματικὴ γάρ)" results from various emendations and is assembled following a parallel account by Ps.-Galen, *De historia philosopha* 108 (DG 640,16–20 = K. 19.322). Here, however, Strato is listed together with Democritus and the corporeal nature of seeds' δύναμις is confirmed, but no mention is made of its consisting of pneuma. See on that Sharples' critical apparatus *ad loc*.

7 Aëtius, *Placita philosophorum* 4.3.7 (DG 388,11–12 = Stobaeus, *Eclogae* 1.49.1b), reports that to Leucippus soul was made of (ἐκ) fire. Aristotle, *De anima* 1.2, 403b31–404a9, records that to Democritus and similarly to Leucippus soul was "a sort of fire or hot substance," viz., of those atomic "forms" which are spherical and the most adapted to permeate everywhere. On Zeno's viewpoint, see Diog. Laërt. 7.58 and other reports included in Zeno Citiensis, *SVF* 1.128.

8 Cf. Plato, *Timaeus* 73b1–e1 and Aristotle, *De generatione animalium* 2.3, 737a7–9, on which see below. In my opinion, the report fits much more Plato's account. For here the semen is said to derive from the spinal marrow, in a part of which the Demiurge implanted the "divine semen," viz., the rational soul, while reserving the other parts of it to the constitution of the bodily parts situated along the spine and in all the bones of the body, being they too a seat of soul, though in a less degree. As we shall see, Aristotle neither gives to the δύναμις of the semen the value of an intelligent cause of movement, nor thinks of the rational soul as coming from an external demiurgical power.

9 Instructive information on Democritus' view of pneuma can be inferred from the reports on his explanation of respiration transmitted by Aristotle, *De respiratione* 4, 471b30–472a26 and *De an.* 1.2, 403b31–404a16. As to Democritus' attitude towards the incorporeal, cf. Philoponus, *In Aristotelis libros De anima commentaria* Hayduck 83,27. Aristotle (*De an.* 1.2, 405a6–7) ascribed to Democritus the qualification of fire as "the nearest to incorporeality" of the elements (μάλιστα τῶν στοιχείων ἀσώματον, tr. Smith), by which Democritus justified his identification of the soul with the nature of fire. Philoponus specifies that the above qualification of the fire had to be intended "not in the proper sense" (κυρίως) of the word, given that no Atomist admitted something incorporeal; simply, fire was incorporeal owing to the smallness of its component parts.

10 The connection between Strato's and Democritus' explanatory patterns in physics is controversial, to say the least. According to Cicero, *Academica posteriora (Lucullus)* 2.121 (Plasberg 87,21–88,14 = fr. 18 Sharples), Strato refused to reduce the nature of things to atomic components interspersed with void, taking these to be "the dreams of Democritus." The contextual attribution to Strato of a microvoid theory in other reports, and a conception of πόροι or passageways throughout matter, is far from certain, as Sanders 2011, 263–276, and Berryman 2011, 277–29, have recently argued. But Strato's

that this is the case, we are left with the problem of interpreting Strato's view. As I see it, his remark may have derived from some of Aristotle's claims and may be explained with reference to them.

Briefly, in a well-known though not uncontroversial passage, Aristotle first (a) argues that in its matter the semen is a compound of pneuma and water, defining pneuma as no more than *hot air* (θερμὸς ἀήρ).[11] He then (b) individuates in this component the vehicle of the *psychic faculties* (δυνάμεις), claiming that in its nature the semen contains a special sort of productive heat analogous (though not identical) to the aether, presumably in the sense that, like the element of the heavenly bodies, it is a special matter different from the other elements and an invariable one.[12] Finally (c), Aristotle commits the transmission of *reason* (νοῦς), which belongs to those animals whose soul incorporates *something divine* (τι θεῖον), to the *part of the body* (σῶμα) of the semen that is *separated from the body* (χωριστὸν σώματος) and differs from its *non separated part* (ἀχώριστον) in so far as the latter only melts and changes into a gas (πνευματοῦσθαι), being a humid and watery substance.[13] From (a) we can infer what the material constituents of the pneuma in the semen were, i.e., air and heat. From (b) we can deduce that the pneuma in the semen embodies a special heat, which renders it generative and, like the element of the stars, does not undergo any process of coming-to-be and passing-away. From (c) we can conclude that the material of the semen has in itself a special capacity. For only a part of it turns into an evaporation and disappears; another part still maintains a persistent potentiality, thus accounting for its ability to transmit potentially the principle of the soul. An exception is the rational soul, which is separated from the body and has no

theory of elementary qualities, from what we are told by the sources, is no less uncertain, unfortunately, and Keyser 2011, 293–312, concludes that only a probable account can be given. Traditionally, however, the real problem is the mechanistic viewpoint which Strato could have adopted criticising Aristotle in the relevant aspects of his physics such as weight and time. Despite the controversial nature of the surviving evidence, several recent studies are based on this reading: Pellegrin 2011, 239–261; Lefebvre 2011, 313–352, and Jaulin 2011, 353–365.

**11** Arist. *Gen. an.* 2.2, 735b37–736a1.

**12** *Ibid*. 2.3, 736b29–737a1: "Now it is true that the faculty (δύναμις) of all kinds of soul seems to have a connexion with a matter different from and more divine than the so-called elements; but as one soul differs from another in honour and dishonour, so differs also the nature of the corresponding matter. All have in their semen that which causes it to be productive; I mean what is called vital heat. This is not fire nor any such force (δύναμις), but it is the spiritus (πνεῦμα) included in the semen and the foam-like, and the natural principle in the spiritus, being analogous to the element of the stars" (tr. Platt).

**13** Arist. *Gen. an.* 2.3, 737a7–12: "Let us return to the material (σῶμα) of the semen, in and with which comes away from the male the spiritus conveying the principle of the soul (ψυχικὴ ἀρχή). Of this principle there are two kinds; the one is not connected with matter, and belongs to those animals in which is included something divine (ἐμπεριλαμβάνεταί τι θεῖον) (to wit, what is called the reason) (τοιοῦτος δ' ἐστὶν ὁ καλούμενος νοῦς), while the other is inseparable from matter. This material of the semen dissolves and evaporates because it has a liquid and watery nature" (tr. Platt).

community with the parts of the body, because it needs no bodily organs to actualise.[14] Strato may have based his view on these Aristotelian premises.

Accordingly, despite the elliptical report of the doxographer, his reasoning may have developed as follows. (a) The body of the semen contains a material, i.e., the nature of pneuma, which enables it to be productive; it cannot be excluded that Strato too, like Aristotle, qualified the pneuma as hot air. (b) As a sort of elementary constituent of the semen, the nature of pneuma is the necessary 'force' (δύναμις) (the Aristotelian material necessity, in fact) without which the semen could not fulfil its productive function. (c) The special capacity (δύναμις) of the semen in reproductive processes, by which it transmits somatic and psychic characteristics with the exception of the rational faculty, needs to belong to a body to be actualised. But in the semen it is the nature of the pneuma that enables it to be productive. Hence, from this point of view it is not impossible to say that the above capacity has the nature of the pneuma. As far as we know, Strato may have aimed at developing Aristotle's lines of reasoning and at giving an exhaustive study of the effects of pneuma in reproductive processes, rather than materialising the δύναμις of the semen. And if the latter was not his aim, we can exclude, too, that Strato went on to materialise the soul which the semen carries on, by reducing soul to the same nature of pneuma which the δύναμις of the semen consists of. It seems, therefore, that Strato's position can be safely differentiated from that of Zeno the Stoic recorded in the first lemma of the above doxographical scheme. For, Zeno is in fact credited with the view that the semen is a part of the psychic pneuma, therefore reducing the δύναμις of the semen to the movement of the same material out of which soul itself is composed.[15] But no such conception is attributed to Strato in the surviving evidence.

Finally, mention should be made of a possible connection between Strato and Erasistratus. A brief survey of Erasistratus' theory seems to exclude this possibility. For his *Pneumalehre* is based on distinctions nowhere attributed to Strato; to be precise, that

14 This is the reason why at *Gen. an.* 2.3, 736b26–29, Aristotle claims that the reason alone enters "from the outside" (θύραθεν) and alone is "divine," "for no bodily activity has any connexion (κοινωνεῖ) with the activity of reason" (tr. Platt). But the separation of the rational soul should not be exaggerated in a dualistic (Platonic) fashion. Reason too belongs to mortal human beings, as Aristotle argues in *De an.* 1.4, 408b13–15: "It is doubtless better to avoid saying that the soul pities or learns or thinks, and rather to say that it is the man who does this with his soul" (tr. Smith). Besides, in his view the activity of thinking depends on images (φαντάσματα) and "images are like sensuous contents except in that they contain no matter" (Arist. *De an.* 3.8, 432a4–14, tr. Smith).

15 Althoff 1999, 163, doubts the correctness of the testimony in coupling Strato's and Democritus' names, but does not exclude a closeness between Strato and the Stoic theory of pneuma as "a god-like" substance which pervades the entire cosmos' and "material basis" of the different psychic functions in human beings. The problem is, however, that to my knowledge there is no hint of a cosmic divine pneuma (in the Stoic fashion) in the surviving evidence to be attributed to "Strato the naturalist." On Stoic doctrine of the psychic pneuma, cf. Galen, *In Hippocratis Epidemiarum librum VI commentaria*, 5.5 (Wenkebach 272,15–273,2 = K. 17B.250), and other reports included in *SVF* 2.714–718 particularly.

between a "vital" (φυσικόν; *natural*) pneuma and a psychic pneuma with the function of putting into action the psychic activities of sensation and voluntary action; that between veins and arteries, and that between sensory and motory nerves. As to Erasistratus' *Samenlehre* on the other hand, to my knowledge he only viewed the semen as originating from blood and endowed it with the intrinsic capacity to realise its own end in reproductive processes, without assigning to it any special δύναμις connected or depending on the pneuma.[16] Yet, passing over the important lacunae in the surviving evidence on Strato, modern scholarship usually maintains that a connection might be established because both of them adopted a mechanistic pattern of explanation, according to which Erasistratus and Strato before him would have abandoned Aristotelian teleology.[17]

The other text to be considered with reference to Strato's use of pneuma in animal generation is about the monstrous births (τέρατα). Here again we are faced with a doxographical report:

> **T2** Πῶς τέρατα γίνεται. Ἐμπεδοκλῆς τέρατα γίνεσθαι παρὰ πλεονασμὸν σπέρματος ἢ παρ' ἔλλειψιν ἢ παρὰ τὴν τῆς κινήσεως ταραχὴν ἢ παρὰ τὴν εἰς πλείω διαίρεσιν ἢ παρὰ τὸ ἀπονεύειν· οὕτω προειληφὼς φαίνεται σχεδόν τι πάσας τὰς αἰτιολογίας. Στράτων παρὰ πρόσθεσιν ἢ ἀφαίρεσιν ἢ μετάθεσιν ἢ πνευμάτωσιν. Τῶν ἰατρῶν τινες παρὰ τὸ διαστρέφεσθαι τότε τὴν μήτραν ἐμπνευματουμένην.
>
> How do monstrous births occur? Empedocles (says) that monstrous births result from an excess of semen or (its) lack or an upsetting of (its) movement or (its) division in more numerous (parts) or (its) deviation. So he seems to have anticipated almost all the aetiologies. Strato (says that they result from) addition or removal or transposition (of certain parts) or inflation by pneuma. Some physicians (say that they result) from a distortion of the womb which sometimes is inflated by pneuma.[18]
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> Ps.-Plut. *Plac.* 5.8, 905f–906a (Mau 137,13 et 19–20 = fr. 74 Sharples)

16 See Ps.-Galen, *Introductio seu medicus* 9 (Petit 18,21–21,9 = K. 14.695–698). On the specific remarks on the nature of the semen, cf. Vindicianus, *De semine* 1 (Wellmann 201 = fr. 55 Garofalo), Galen, *De naturalibus facultatibus* 2.3 (Helmreich *SM* 3.162,4 = 2.84 K. = fr. 56 Garofalo) and Galen, *De usu partium* 7.8 (Helmreich *SM* 1.392,25 = K. 3.540 = fr. 104 Garofalo).

17 Cf. chiefly Diels 1893; Jaeger 1913; cf. also Harris 1973, 222–225. Erasistratus' formula is also usually discredited, according to which "nature does nothing rough or unrefined" (Plutarch, *De amore prolis* 2, 495c = fr. 83 Garofalo), not so unlike similar formulae of Aristotle's teleology. For a more cautious interpretation of Strato's viewpoint on the subject, mainly because of the deficient and prejudiced textual evidence, cf. Repici 1988, 85–90. For an analogous approach to the case of Erasistratus, cf. Cambiano 2006, 233–243, and on the question see also von Staden 1997.

18 In Sharples 2011, however, only the lemma on Strato is recorded.

A comparison between such different positions can be useful. In the first lemma we read that Empedocles identified the cause of biological monstrosities in various *défaillances* of the semen, such as an excess (πλεονασμός) or a lack (ἔλλειψις) in its quantity or even an upsetting (ταραχή) or a deviation (ἀπονεύειν) of its movement. Empedocles therefore is taken to support a *spermatic aetiology* of the phenomenon. The anonymous "physicians" held that the cause was the pathological distortion (διαστρέφεσθαι) of the female womb when it is inflated by pneuma (ἐμπνευματουμένη). They therefore are quoted as supporters of a *uterine aetiology* of the phenomenon, introducing the pneuma to explain the pathological affection of the womb. As for Strato, the account says literally that in his view monstrous births take place by *addition* (πρόσθεσις) or *removal* (ἀφαίρεσις) or *transposition* (μετάθεσις) or *pneumatōsis* (πνευμάτωσις; *inflation by pneuma*), without further details or specifications.

If we compare his position to that of Empedocles, we might infer that, unlike Empedocles, Strato did not adopt a spermatic aetiology of the phenomenon, nor limited his explanation only to mechanical fluctuations, such as those by which the semen may be affected according to Empedocles. He also introduced the process of *pneumatōsis*, presumably meaning an inflation by a progressive expansion of pneuma under certain conditions, viz., the same process which the anonymous doctors recognised as a pathological condition of the womb. But from their explanation Strato differs in two relevant respects. First, according to the doctors, pneuma is an indirect cause of the phenomenon; it fills the womb so as to inflate it, but the direct cause of the deformation is the womb's distortion which is produced by such inflation. Quite differently, in Strato's account, pneuma is the direct cause of the phenomenon and what happens affects the bodily parts in general, not only the womb. Second, according to the doctors the single bodily part affected by the process of pneumatisation (i.e., the womb) is seemingly acted upon by the pneuma, as is suggested by the middle-passive participle ἐμπνευματουμένην. In contrast, the view of Strato gives an active sense and alludes to the continuous nature of the process, as is suggested by the *-sis* ending of *pneumatōsis*. Framing Strato's own view however is difficult because the report does not specify what the nouns addition, removal, transposition, and *pneumatōsis* refer to. What is that which is added or removed or transposed or subject to inflation? Presumably the parts of the body are meant (maybe both the inner and the external ones). And if this is so, chances are that Strato's explanation of biological monstrosities was focused on the external characteristics of the monstrous body itself as the plausible result of an unnatural reproductive process. A τέρας can be easily identified as the deformed body in which there are parts added or removed or transposed or inflated in anomalous ways. From what we can infer, Strato might have been interested, like Aristotle,[19] in the phenomenology of τέρατα.[20]

**19** See Arist. *Gen. an.* 4.3, 768b1–36.

**20** In my opinion (cf. Repici 1988, 97–116), this view

Strato might have derived the concept of *pneumatōsis* from Aristotle, who applies it to anomalous states of affairs. If this is correct, we might suppose, too, that Strato conceived of pneuma as an air-like substance, which can thus cause inflation. For Aristotle assimilates the beating (σφύξις) of the heart to the throbbing of an abscess, which however is accompanied by pain (μετ' ἀλγηδόνος), because the change produced in the blood is unnatural (παρὰ φύσιν), and it goes on until the matter formed by concoction is discharged. In his view, there is also a similarity between this phenomenon and that of boiling; for boiling is due to the volatilisation of fluid (πνευματούμενον τὸ ὑγρόν) by heat and to the expansion (αἴρεσθαι) consequent on increase of bulk. The difference is that in an abscess, if there is no evaporation through the walls, the process terminates in suppuration due to the thickening of the liquid, while in boiling it ends in the escape of the fluid out of the containing vessel.[21] Clearly Aristotle draws parallels between a natural (vital) movement of the heart, i.e., pulsation (σφυγμός), an unnatural one (the throbbing of an abscess) and a mechanical one (the boiling of a liquid). And the relevant point is that, although the throbbing of an abscess and the boiling of a liquid last only for a definite length of time, while pulsation goes on continuously, pulsation too is said to be the "vaporisation (πνευμάτωσις) of the heated fluid."[22] No wonder therefore, I think, that following Aristotle, Strato could safely find in anomalous or unnatural inflations of bodily parts one of the modes that produces a monstrous body.[23] In turn, still another Aristotelian issue could be at work in Strato's position, i.e., the power of pneuma to differentiate the parts of the body from one another. Aristotle excludes, unlike the Hippocratic doctors, that the pneuma in question can be the breath (πνοή) of the mother or of the embryo.[24] Yet, he writes, "pneuma there must be, because of (the presence of) humid and hot, one of which as the agent, the other as the patient."[25] This

of Strato on monstrous bodies can hardly be interpreted in terms of a mechanistic explanation, according to which bodies are but combinations of parts in the fashion of atomic aggregates. Democritus gave a spermatic aetiology for the generation of monsters in reproductive processes (see Arist. *Gen. an.* 4.4, 769b30–34). Lucretius on his side (a) excludes that atoms can connect by nature in whatever sort of aggregates, otherwise *portenta* could commonly be seen like "half beast" human beings or high branches sprouting from living bodies (*De rerum natura* 2, 700–729); (b) locates the generation of *monstra ac portenta* in the primeval productions of the earth, soon becoming extinct due to the impossibility of nourishing and reproducing themselves (*ibid*. 5, 837–854). Althoff 1999, 164–165, argues that Strato's viewpoint on the question was mechanistic and materialistic. In his opinion, however, this testimony should be taken as above all a confirmation of the closeness between Strato and the Stoic theory of pneuma; for, the usage of *pneumatōsis* would imply that the *Pneumagehalt* of the semen is held responsible for other effects and phenomena at a biological no less than at a psychic level.

21 Arist. *Resp*. 20, 479b27–480a2, tr. Ross (paraphrased).

22 Arist. *Resp.* 21, 480a14–15.

23 Respiration too, which is a movement of the heart no less vital (natural) and continuous than pulsation, originates from the same process as pulsation, viz., by the heat expanding the fluid, of which food furnishes a constant supply. See *Resp.* 21, 480a16–b1.

24 Arist. *Gen. an.* 2.6, 741b37–742a16. On the Hippocratic view, cf. *De natura pueri* 17 (Potter 42,14–43,9 = L. 7.496–498).

25 Arist. *Gen. an.* 2.6, 742a14–16.

statement suggests that for Aristotle pneuma can be generated in places in which heat acts upon a liquid. If this is true, then it could explain how Aristotle's theory accounts for inflations arising from material constituents; and how the inflations, in turn, contributed to the articulation of parts of different size and quality. Such an idea could have stood at the basis of Strato's notion of unnatural inflations yielding monstrous embryos.

As a final question we may wonder whether any connection exists between Strato's *pneumatōsis* and Erasistratus' theory of pulse (σφυγμός); for to Erasistratus the cause of pulse was the flow of pneuma into the arteries. In another sense, however, he called "pulse" (σφυγμός) also the throbbing in cases of fevers and inflammation.[26] But a general difficulty for any possible connection is the circumstance, already noted, that Erasistratus' view of pulse is based on his distinction between veins and arteries, nowhere attributed to Strato. More specifically, Erasistratus explained the pulse of the arteries as the natural (κατὰ φύσιν) movement directly depending on the beating of the heart and alternately involving expansion and contraction.[27] Strato's *pneumatōsis*, on the contrary, seems to be only a process of expansion from which monstrous effects are produced. As to Erasistratus' pulse in the sense of the throbbing in fevers and inflammation, it refers to cases of disease, not of monstrous deformity. Moreover, Strato's *pneumatōsis* seems to imply, as noticed, an active process of pneumatisation, in which inflation by expansion of pneuma does not seem to take place by constraint or pressure. In Erasistratus' view, on the contrary, arteries expand because pneuma, propelled by the heart in its movement of contraction, is forced into them by pressure. Finally, Strato's *pneumatōsis* seems to be a process of vaporisation, i.e., the rising of a vapour (= pneuma) from a liquid, like in Aristotle, and to account for the *generation* of this airy material. Perhaps Greek etymology could be of assistance for interpreting Erasistratus' view on the inflation of the arteries by pneuma for the purpose of filling them with their own pneuma also as a process of "pneumatisation" (*pneumatōsis*). Nonetheless, important differences remain. For, "pneumatisation" in the latter case would mean a flow of a stream of vapour/airy material through a vessel and a blow of pneuma/wind passing through.

## 3 Strato on pneuma in sleep

Two other reports lead us into the physiological realm, that is, the explanation of how sleep occurs. But in the first of them the crucial problem is that the name of Strato is inserted into the text by modern scholars instead of Plato's name which is transmitted by

26 Cf. Galen, *De placitis Hippocratis et Platonis* 6.7.7 (De Lacy 406,20–24 = K. 5.667.18–668.1); *Diff. Puls.* 4.17 (= K. 8.761). Cf. Erasistratus fr. 111 Garofalo (= Gal. *Diff. Puls.* 3.2, K. 8.645–646); frs. 194–226 Garofalo.

27 Galen, *De usu pulsuum* 4 (Furley/Wilkie 212–214 = K. 5.167–169).

the manuscripts.[28] Hence, the attribution of the thesis to Strato is dubious, and a further problem is that in the report the thesis is attributed jointly to Plato and the Stoics. The doxographical account is as follows:

> **T3** Πῶς ὕπνος γίνεται καὶ θάνατος .... <Στράτων>[29] οἱ Στωικοὶ τὸν μὲν ὕπνον γίνεσθαι ἀνέσει τοῦ αἰσθητικοῦ πνεύματος οὐ κατ' ἀναχαλασμόν, καθάπερ ἐπὶ τῆς γη<ράνσεω>ς, φερομένου δ' ὡς ἐπὶ τὸ ἡγεμονικὸν μεσόφρυον· ὅταν δὲ παντελὴς γένηται ἡ ἄνεσις τοῦ αἰσθητικοῦ πνεύματος, τότε γεγενῆσθαι θάνατον.[30]
>
> How sleep and death come about (…). Strato (and) the Stoics (say) that sleep comes about through a relaxation of the sensory pneuma, not through a slackening as in growing old, but when it is carried towards the ruling (principle in) the space between the eyebrows. When the relaxation of the sensory pneuma is total, death occurs.
>
> Ps.-Plut. *Plac.* 5.24, 909e–f (Mau 148,21–149,2 = fr. 66 Sharples)

Taking the section as a whole and setting apart the textual difficulties, the theory related in the lemma explains sleep and death jointly. Sleep is the effect of a relaxation (ἄνεσις) of the *sensory pneuma* (αἰσθητικὸν πνεῦμα), not of its slackening (ἀναχαλασμός), in consequence of its being carried towards the "ruling part" (ἡγεμονικόν) between the eyebrows; death comes when the relaxation of the sensory pneuma is complete. But whose theory is this? I suspect that it is basically the Stoics', with Platonic insertions reinterpreted in Stoic terms. The mention of both sensory pneuma and the ἡγεμονικόν clearly points, I believe, at Stoic psychology. Plato, on the other hand, when explaining sleep in the *Timaeus*, makes no mention of the sensory pneuma. Yet, in his view sleep results from an obstruction of the visual ray which interrupts the functioning of the sense of sight, whose sensory organ is located in the same region as the eyebrows. What is more, in his search for a centre of command or a prime guide in animal body and life (the Stoic ἡγεμονικόν, with the due differences) Plato notoriously adopts a model in

**28** For a similar confusion, see 40 above.

**29** See n. 32 below.

**30** In his commentary Sharples reminds us that the emendation from the manuscripts' reading of Plato (Πλάτων) to Strato is due to Corsinus and is accepted by Diels because of the reference to the space between the eyebrows, which is attributed to Strato by other doxographical reports, as we shall see. Also Ps.-Gal. *Hist. Phil.* 128 (DG 646,15–17 = K. 19.339) has "Plato." The report of Ps.-Plutarch is textually uncertain, too. An emendation is needed, as Sharples points out, for the expression "as in growing old," whose translation is based on Mau's conjecture for a meaningless expression of the MSS. On the reliability of this testimony, see Repici 1988, 49–57, and Mansfeld 1990, 3092–3108.

which the head and the brain remain in control.[31] Therefore, it is perhaps no wonder that the doxographer could have coupled both their names and theories. But Strato?

If he could be credited with the above theory, he should be credited, too, with the Stoic conception of the psychic pneuma and its τόνος, namely, its being vigorous or, on the contrary, relaxed or slackened.[32] In addition, some Stoics localised the psychic pneuma in the head.[33] Yet hardly any surviving evidence on Strato would justify such a connection. It is true that according to two other reports he himself is explicitly said to localise the ἡγεμονικόν in the space between the eyebrows, and a quite similar viewpoint is also attributed to Erasistratus. But both these reports are quite problematic. In one report Erasistratus, unlike Strato, is said to localise the ἡγεμονικόν "in the membrane [surrounding] the brain, which he calls *epikranis*," rather than in the space between the eyebrows.[34] The other account, in turn, mentions two Stratos: in one case, his name is not accompanied by any qualification and he is quoted together with Erasistratus as supporting the view that the ἡγεμονικόν is localised in the membranes around the brain; in the other case, the belief that the ἡγεμονικόν has to be localised in the mid-space between the eyebrows is referred only to Strato "the naturalist" (*Strato physicus*).[35] In both cases, therefore, the possibility of a convergence between Strato the naturalist and Erasistratus is dubious to say the least, and if such a hypothetical convergence is the reason why Strato's name should be inserted to replace Plato's name in the above doxographical account on sleep, it should be recognised that the reason is quite a weak one. Nonetheless, assuming that the thesis can be referred to Strato instead of Plato in combination with the Stoics, is it possible, from an Aristotelian standpoint, to explain the attribution to Strato of the "sensory pneuma" and the belief that the ἡγεμονικόν lies in the space between the eyebrows? I think that it is, but in such a case Strato could

31 Cf. Pl. *Ti.* 45d–e; 73c6–e1. In the Stoics' view, the ἡγεμονικόν was, generally speaking, the whole soul *qua* the ruling part of the body, which governs and administrates it. Strictly speaking, the ἡγεμονικόν was the rational part of the soul *qua* the ruling part of its faculties and of the body, too. But while some Stoics localised it in the head, according to Chrysippus its seat was the heart. See Aët. 4.21.1–4 (DG 410,25–411,24 = *SVF* 2.836); Philodemus, *De pietate* fr. 16 (DG 549,10–18 = *SVF* 2.910). The suspicion of Stoic contamination in the report of Ps.-Plutarch on sleep is addressed also by Sharples in his commentary to fr. 66 in question.

32 In Stoic terms, pneuma holds together whatever it disposes through its τόνος, i.e., a "movement" in different degrees of cohesion and strength or of relaxation and loosening. Cf. Alexander of Aphrodisias, *De mixtione* 10 (Bruns 223,25 = *SVF* 2.441); Galen, *De motu musculorum* 1.7–8 (Rosa 16,3–14 = K. 4.400 = *SVF* 2.450).

33 Cf. Aët. 4.21 (DG 410,25–411,24 = *SVF* 2.836).

34 Ps.-Plut. *Plac.* 4.5, 899a (Mau 117,10–14 = fr. 57 Sharples, with his translation). The section reports only theories in which the seat of the ἡγεμονικόν is held to be the head or a part of it. Beside Strato and Erasistratus, Plato and Democritus are quoted together as assigning the seat of the ἡγεμονικόν to the whole head.

35 Tertullian, *De anima* 15.4–5 (Waszink 19,15–20,3 = fr. 58 Sharples). In his commentary on the passage, Sharples *ad loc.* remarks that the mention of two Stratos is the primary basis for distinguishing between Strato the head of the Lyceum and Strato the medical follower of Erasistratus.

hardly be seen as supporting any ἡγεμονικόν or psychic pneuma in the Stoic fashion, materially localised in the mid-space between the eyebrows.

Aristotle takes sleep to be a condition pertaining to both soul and body: the body is in a state of relaxation and the soul in a pause from its activities, as a consequence of a momentary incapacity in the κύριον αἰσθητήριον (something like the "ruling guide of perception") which is the seat of the first αἴσθησις.[36] If Strato had adopted Aristotle's theory, it is not impossible in my opinion that the doxographer described Strato's Aristotelian view in Stoic terms. He may have used the Stoic concept of a relaxation of the sensory pneuma to render Aristotle's and presumably Strato's idea of a temporary suspension of the activities of all senses, and the Stoic term of ἡγεμονικόν to render Aristotle's and possibly Strato's concept of κύριον αἰσθητήριον. If this were the case, Strato simply considered sleep the condition in which the sensorial power of the soul loosens up in correspondence with the loosening of that stuff whose retention, according to Aristotle himself, gives the body its strength, i.e., the pneuma, be it connate or not.[37] An Aristotelian background could also be hypothesised regarding the question of the localisation of the ἡγεμονικόν between the eyebrows in all the texts examined above: the account of Ps.-Plutarch on sleep[38], supposing that it transmits Strato's opinion, and the accounts of Ps.-Plutarch and Tertullian[39] on the soul and the seat of the ἡγεμονικόν. It will suffice to remember that in Aristotle the place of the brain, too, is termed κύριος and that the asserted dependence of all senses on the heart *does coexist* with the asserted dependence of *some of them*, particularly sight and hearing, on the

36 Aristotle, *De somno et vigilia* 1, 454b23–27: "That, therefore, all animals sleep may be gathered from these considerations. For an animal is defined as such by its possessing sense-perception; and we assert that sleep is, in a certain way, an inhibition of function, or, as it were, a tic (ἀκινησίαν καὶ οἷον δεσμόν), imposed on sense-perception, while its loosening (λύσιν) or remission (ἄνεσιν) constitutes the being awake." *Ibid.* 2, 455b8–13: "But sleep supervenes when such incapacity (ἀδυναμία) of exercise has neither arisen in some casual organ of sense, nor from some chance cause, but when, as has been just stated, it has its seat in the primary organ with which one perceives objects in general. For when this has become powerless all the other sensory organs also must lack power to perceive (ἀδυνατεῖν)." *Ibid.* 3, 456b17–24: "As we observed above, sleep is not co-extensive with any and every impotence of the perceptive faculty, but this affection is one which arises from the evaporation attendant upon the process of nutrition. The matter evaporated must be driven onwards to a certain point, then turn back and change its current to and fro, like a tide-race in a narrow strait. Now, in every animal the hot naturally tends to move … upwards, but when it has reached the parts above, … it turns back again, and moves downwards in a mass" (tr. Beare).

37 Arist. *Somn.* 2, 455b34–456a10: "Now, it has been definitely settled already in another work that sense-perception in animals originates in the same part of the organism in which movement originates. This locus of origination is one of three determinate loci, viz., that which lies midway between the head and the abdomen. This in sanguineous animals is the region of the heart; for all sanguineous animals have a heart; and from this it is that both motion and the controlling sense-perception (τῆς αἰσθήσεως τῆς κυρίας) originate. Now, as regards movement, it is obvious that that of breathing and of the cooling process generally takes its rise there" (tr. Beare).

38 Ps.-Plut. *Plac.* 5.24, 909e–f (Mau 148,21–149,2 = fr. 66 Sharples).

39 *Ibid.* 4.5, 899A (Mau 117,10–14 = fr. 57 Sharples); Tert. *De an.* 15.4–5 (Waszink 19,15–20,3 = fr. 58 Sharples).

brain, directly or through the encephalic veins.[40] Strato's point therefore could have been simply to stress such a dependence and for that reason his name might have been inserted in a κοινή of philosophical and medical theories such as Plato's, Democritus' and Erasistratus', focused on the brain or the head as the *ruling part*.[41] But if this is so, Strato's ἡγεμονικόν can hardly be identified with the rational soul reduced to the psychic pneuma, as the Stoics would have it, nor consequently would there be any reason for crediting him with a materialisation of the soul.

There is another account of Strato's explanation of sleep. It is transmitted by a Christian author, but is no less problematic than the preceding one. Here the definition of sleep as *segregatio consati spiritus* is assigned to Strato.[42] The most interesting point here is the introduction of the typically Aristotelian notion of *connate pneuma*. Hence, reading between the lines, we might suggest the existence of some sort of debate in the Peripatetic school on this important Aristotelian notion and try to implicate also the Peripatetic author of *De spiritu*, in which questions pertaining to the connate pneuma are introduced from the outset.[43] But after that problems begin. One problem is the meaning of *segregatio*. Separation would seem *prima facie* to be an appropriate rendering; yet a movement of *withdrawing*, or *departing*, or *retreat* could not be excluded. On the other hand, nothing is said either about where the connate pneuma separates, or withdraws, or departs, or retreats, or about *where it moves to* when separating, or withdrawing, or departing, or retreating. But, supposing that there is a connection with the view ascribed to Strato in the preceding report from Ps.-Plutarch on sleep,[44] we can argue that to him sleep arises when the connate pneuma separates from the peripheral sensory organs and moves towards the κύριον αἰσθητήριον, temporarily taking away from the sleeper his actual capacity of sense-perception together with his strength. In

40 On these different approaches, see Arist. *Somn.* 3, 457b28; *Gen. an.* 5.2, 781a21; *De partibus animalium* 2.10, 656a17–19; *De sensu* 2, 438b25–26; *De juventute et senectute* 3, 469a20–23; *Historia animalium* 1.11, 492a21–22; 1.16, 495a11–12; 4.8, 533b3.

41 Cf. Ps.-Plut. *Plac.* 4.5, 899a (Mau 117,10–14 = fr. 57 Sharples), quoted above.

42 Tert. *De an.* 43.1–2 (Waszink 58,21–28 = fr. 67 Sharples). Beside Strato's opinion, the opinions of Stoics, Epicureans, "Anaxagoras along with Xenophanes," Empedocles and Parmenides, Democritus and Aristotle are also registered. In the next paragraphs (2–5, not reported by Sharples), Tertullian elaborates his critical, no less instructive remarks on all of them. The *spiritus* as a cause of sleep occurs also in Epicurean and Democritean definitions, focused respectively on a *deminutio spiritus animalis* and an *indigentia spiritus*; but in neither case is *spiritus* said to be connate as in Strato's definition.

43 On this problematic work see Pavel Gregoric in this volume, as well as Gregoric, Lewis and Kuhar 2015, 101–124; Lewis and Gregoric 2015, 125–149. In the classical studies of Diels 1893 and Jaeger 1913, Erasistratus' view on the question is notoriously associated with the Peripatetic discussion, if there was any discussion in the school, concluding in short that he would have applied to his medical theory a mechanistic standpoint derived from Strato's *Naturphilosophie* and *Pneumalehre*. See also Wehrli 1950, 71–72, *ad* his fr. 108–109. Doubts on this reconstruction, systematically devised despite the precarious condition of the evidence, can be found in Repici 1988, 85–90, 117–148.

44 Ps.-Plut. *Plac.* 5.24, 909e–f (Mau 148,21–149,2 = fr. 66 Sharples).

which case, hardly any difference would exist between Aristotle and his pupil, nor could Strato be credited with a *pneumatisation* of the soul, i.e., with a reduction of the soul to matter with the nature of pneuma. The latter need not be the case, seeing, too, that in Tertullian's view the real danger in explanations of sleep such as those of Strato, Democritus, the Epicureans or Aristotle himself is not the reduction of the soul to any kind of matter at all. The real danger actually lies, according to Tertullian, in limiting or restricting the soul's incessant activities and operative abilities, which in the end would compromise its immortality. So, saying with Aristotle that sleep is the weakening of the cardiac heat is a threat to the conception of an immortal soul, not because a reduction of the nature of the soul to the nature of the heat would ensue, but because it would mean that during sleep the soul is temporarily stripped of its power to concoct food and thus supply the body with the nourishment which it requires. Analogously, in the case of Strato the problem with his definition of sleep could have been not the pneumatisation of the soul, but probably a restriction during sleep of its power to secure the body, its sensorial capacity and its strength.[45] Aristotle's definition of sleep would therefore once again constitute the background for Strato's and I wonder whether the movement of *segregatio* could be the Latin version of the movement of *contraction by reduction* (συστέλλεσθαι; συνιζάνειν), which represents in Aristotle the movement of the connate pneuma contrary to *expansion* (ἐκτείνεσθαι; ἀναφῦσαι).[46] In which case Strato's definition would amount to saying, like Aristotle, that sleep corresponds to a temporary interruption both of physical strength and of the soul activity of sense-perception, given

45 As a consequence, not only Strato but also Aristotle should be reproached for ruining the immortality of soul. Admittedly, both criticised the sort of immortality argued for by Plato in the *Phaedo*; Strato particularly elaborated against it an impressive series of *aporiai*. See frs. 76–81 Sharples and, on the question, Repici 2011, 413–442.

46 For Aristotle's terminology see *De motu animalium* 10, 703a6–23: "Now that which is moved but does not by nature initiate movement can be affected by an external power, but a mover must of necessity have some power and strength. It is clear that all animals have connate pneuma and derive their strength from this. … And since the origin is for some animals situated in the heart, for some in an analogous part, it is clear that the connate pneuma is also there. … And it is obviously well disposed by nature to impart movement and supply strength. Now the functions of movement are pushing (ὦσις) and pulling (ἕλξις), so the tool of movement has to be capable of expanding (αὐξάνεσθαι) and contracting (συστέλλεσθαι). And this is just the nature of pneuma. For it contracts (συστελλομένη) and expands (ἐκτεινομένη) without constraint (ἀβίαστος), and is able to pull (ἑλκτική) and push (ὠστική) for the same reason" (tr. Nussbaum; for commentary see Nussbaum 1978, 143–164). See also Arist. *Somn.* 2, 456a11–24: "In bloodless animals, and insects, and such as do not respire, the 'connatural spirit' (σύμφυτον πνεῦμα) is seen puffed up (ἀναφυσώμενον) and subsiding (συνιζάνον) in the part which is in them analogous …. … And since to move anything, or do anything, is impossible without strength, and holding (κάθεξις) the breath produces strength – in creatures which inhale, the holding of that breath which comes from without, but, in creatures which do not respire, of that which is connatural …; and since movement is, in any animal, attended with some sense-perception … in the primary organ of sense (πρῶτον αἰσθητήριον), [we conclude] accordingly that if sleeping and waking are affections of this organ, the place in which, or the organ in which, sleep and waking originate, is self-evident" (tr. Beare).

that strength in animals, and their capacity of moving and acting, are secured by the movements of pulling and pushing which depend in their turn on the movements of contraction and expansion of pneuma.

## 4 Strato on pneuma in sensation and soul activities

A possible reference to materialisation and pneumatisation in Strato's conception of soul is seen also in a passage from Sextus Empiricus on whether thought (διάνοια) is the criterion of truth:

**T4** Καὶ μὴν οὐδὲ ἡ διάνοια. εἴπερ γὰρ ἐπιγνώμων ἐστὶ τἀληθοῦς ἡ διάνοια, πρότερον ὤφειλεν ἑαυτὴν ἐπιγινώσκειν· καὶ ὡς ὁ ἀρχιτέκτων κρίνει τό τε εὐθὺ καὶ στρεβλὸν καὶ χωρὶς τοῦ ἐπιβάλλειν τῇ κατασκευῇ τῶν κριτηρίων ..., οὕτως ἐχρῆν καὶ τὴν διάνοιαν, εἴπερ διακριτική ἐστι τοῦ ἀληθοῦς καὶ τοῦ ψεύδους, πολλῷ πρότερον τῇ ἑαυτῆς φύσει συνεπιβάλλειν δι' ἥν, οὐσίᾳ τῇ ἐξ ἧς ἐστι, τόπῳ τῷ ἐν ᾧ πέφυκε, τοῖς ἄλλοις ἅπασιν. οὐ πάνυ δέ γε τὰ τοιαῦτα συνορᾶν δύναται, εἴγε οἱ μὲν μηδέν φασιν εἶναι αὐτὴν παρὰ τὸ πῶς ἔχον σῶμα, καθάπερ ὁ Δικαίαρχος, οἱ δὲ εἶναι μὲν ἔλεξαν, οὐκ ἐν τῷ αὐτῷ δὲ τόπῳ περιέχεσθαι, ἀλλ' οἱ μὲν ἐκτὸς τοῦ σώματος, ὡς Αἰνησίδημος κατὰ Ἡράκλειτον, οἱ δὲ ἐν ὅλῳ τῷ σώματι, καθάπερ τινὲς κατὰ Δημόκριτον, οἱ δὲ ἐν μέρει τοῦ σώματος, ὧν πάλιν πολυσχιδεῖς εἰσιν αἱ γνῶμαι. καὶ οἱ μὲν διαφέρειν αὐτὴν τῶν αἰσθήσεων, ὡς οἱ πλείους, οἱ δὲ αὐτὴν εἶναι τὰς αἰσθήσεις, καθάπερ διά τινων ὀπῶν τῶν αἰσθητηρίων προκύπτουσαν, ἧς στάσεως ἦρξε Στράτων τε ὁ φυσικὸς καὶ Αἰνησίδημος. οὐκ ἄρα κριτήριόν ἐστιν ἡ διάνοια.

And indeed neither is thought (the criterion of truth). For, if thought judges the truth, it ought first of all to have judged itself. And just as the master-craftsman judges the straight and the curved even without applying his tools for judging …, just so thought too, if it is able to distinguish between the true and the false, ought much sooner to apply itself to its own nature on account of which (it exists), to the substance of which (it consists), to the place in which it is naturally (found), and to all the rest. But it is completely unable to observe these things, seeing that some say that it is nothing besides (παρά) body in a certain state, as does Dicaearchus, while others says that it exists, but not that it is contained in the same place; some (say that it is) outside (ἐκτός) the body, like Aenesidemus following (κατά) Heraclitus, others that it is in the whole body, as some people do following (κατά) Democritus, and others that it is in a part of the body. The opinions of these again are divided in many ways. Some

> say that it is different (διαφέρειν) from the senses, as the majority do, others that it is the senses, peeping out (προκύπτουσαν) through the sense-organs as if through apertures (διά τινων ὀπῶν); this view was originated by Strato the naturalist (φυσικός) and Aenesidemus. So thought is not the criterion.[47]
>
> Sextus Empiricus, *Adversus mathematicos* 7.348–350
> (Mutschmann 80,1–80 = fr. 61 Sharples)

Thus, the view attributed to Strato, here qualified as "the naturalist," is that thinking is the same as perceiving and that the sense organs are like "apertures" through which thought "peeps out," but Strato would have shared this opinion with Aenesidemus, a "Sceptical" philosopher. This passage has been generally taken to mean that Strato not only reduced mind to the senses, but also considered pneuma to be the substance of the soul. For, pneuma (i.e., the psychic pneuma or the ruling principle or the rational soul) would be the matter that "peeps out" through the sensory organs.[48] But, apart from the obscure and ambiguous connection between Strato and Aenesidemus and/or "Aenesidemus following Heraclitus,"[49] it should be observed that in Sextus' testimony

47 In his commentary Sharples suggests that the expression "this view was originated" etc. in the conclusive lines could also be rendered as "this faction was led" etc. An attitude apparently different from Strato's is attributed by Sextus to another Peripatetic philosopher mentioned in the account, i.e. Dicaearchus fr. 24 Mirhady (= Sext. Emp. *M.* 7.348–9, Mutschmann 80,6–12); for the latter is said to hold that thought "is nothing beside body in a certain state." Finally, Democritus (or, more precisely, "some people following Democritus"), too, makes his appearance into the scheme, as saying that thought is "in the whole body." His approach therefore diverges from Strato's, for it assumes a distribution of rational faculty everywhere in the body, in accordance with an apparent relationship between body and soul in which the former is a sort of a container of the latter. But no such conception can be assigned to Strato on the basis of the surviving evidence.

48 In modern scholarship materialism and "physicalism" are quite common labels for describing Strato's psychology. See, e.g. Rodier 1890, 92–103 and, more recently, Modrak 2011, 383–397. Some ancient sources (Stobaeus, *Eclogae* 1.52, tit. and 3 (Wachsmuth 483,5; 16–17 = fr. 64 Sharples); Alexander of Aphrodisias, *In librum De sensu commentarium ad* 6, 446b2–28 (Wendland 126,12–14 = fr. 65 Sharples) seem to suggest a connection of Strato's views on particular aspects of sense-perception with Democritus' or a Democritean attitude, in opposition to Aristotle. But, as Morel 2011, 368, argues, a closer examination shows that "l'opposition à Aristote n'est que partielle et qu'elle ne suffit pas, en tout état de cause, à ranger Straton aux côtés des atomistes sur le point qui nous intéresse."

49 As for Aenesidemus, the question arises whether the two views ascribed to him (that in which he was "following" Heraclitus and that which he shared with Strato) conflict with each other. For different interpretations of the point, cf. Hankinson 1995, 337, n. 28; Bett 2000, 227–228; Polito 2004, 119–139. Polito 2004, 108–118, in particular argues that Heraclitus is interpreted, more than followed, by Aenesidemus as supporting the identification of thought and sensation and their common dependence on factors external to us. This effort of interpretation would explain the indirect reference to Aristotle *via* Strato, while Aenesidemus himself would assume the topic as an argument in favour of scepticism. Polito 2004, 112–113, also suggests that "thought" (διάνοια) in Sextus' passage would be a modification for the ruling part or psychic pneuma reported by parallel sources where it is ascribed to Strato, like, e.g. Tert. *De an.* 15.4–5 (Waszink 19,50–20,3 = fr. 58 Sharples) examined above.

the problem is not the identification of the material of which thought is composed (pneuma or whatever else). The passage actually discusses the possibility that thought can be a criterion of truth by examining whether or not it is related (a) to the body and (b) to the sensory organs. Moreover, there are Aristotelian remarks on the basis of which we could absolve Strato of the blame of *Sensualismus* and reductionism, and think that he, too, not unlike Aristotle, could have paralleled thinking and perceiving from the standpoint of their functioning, not of their objects, with the sense organs being the primary ways of access through which or by means of which images of real objects can arise and sustain the activity of thought.[50]

A similar conclusion can be drawn also from a report of Tertullian in which the *apertures* in Sextus' account above are substituted for the *holes* of a wind instrument like a pipe, through which pneuma flows outwards. Tertullian's aim is to prove that soul has no parts or separate divisions, but "powers (*uires*) and efficacies (*efficaciae*) and operations (*operae*), as Aristotle too judged concerning some of them." And, intent on illustrating his point, Tertullian uses the analogy with the "water-organ" (*organum hydraulicum*), the "impressive benefit (we have been given) by Archimedes" (*portentosissimam Archimedis munificentiam*). The purpose of such an analogy is to show (a) that, despite so many members, so many parts, so many connections, so many routes for the voices, so many combinations of sounds, so many interaction of modes, so many rows of pipes (*acies tibiarum*), the instrument is a single structure (*una moles*); and accordingly (b) that just so the breath (*spiritus*), "which gasps there because it is forced by the water, will not be separated into (different) parts, just because it is conducted through (different) parts." Finally, Tertullian informs us that this analogy is "not so far removed (*non longe hoc exemplum*) from Strato and Aenesidemus and Heraclitus." And, in Tertullian's words, their common purpose in establishing such an analogy was the following:

> T5 … *nam et ipsi unitatem animae tuentur, quae in totum corpus diffusa et ubique ipsa, uelut flatus in calamo per cauernas, ita per sensualia uariis modis emicet, non tam concisa quam dispensata*.

50 Cf. Arist. *De an.* 3.4, 429a13–b9; 3.8, 432a12–14 particularly. It is worth remembering that the description of thought as "peeping out" through the senses is ascribed by Sextus Empiricus not only to Strato, but also to Heraclitus with the due differences: see Sext. Emp. *M*. 7.126–134 = 22 A16 DK. More precisely in Sextus' words Heraclitus claimed that reason (λόγος) "stretches out (προκύψας) again through the passages of sense (διὰ τῶν αἰσθητικῶν πόρων), as it were through windows (διά τινων θυρίδων)" (*ibid.* 7.130). But Heraclitus is said to hold (a) that reason is the criterion of truth, the senses being "untrustworthy" (*ibid.* 7.126); (b) that men become intelligent (νοεροί) by inhaling through respiration the "divine reason" from outside (*ibid.* 7.129); (c) that during sleep, as the passages of the senses are closed, the "mind (νοῦς) within us is cut off from its natural union with the enveloping substance"; it is on waking that it "stretches out" through the senses, and "by junction with the enveloping substance is invested with the power of reason" (*ibid.* 7.130, tr. Bury).

> For they too preserve a unity of the soul, which is spread throughout the whole body and everywhere itself darts out through the sense-organs in different ways, as the breath in a pipe does through the holes; it is not so much divided up as distributed.
>
> Tert. *De an.* 14.3–5 (Waszink 18,4–27 = fr. 59 Sharples)

Here again we are faced with the connection of Strato's name with Aenesidemus and Heraclitus, a circumstance that, as noted, makes it difficult to identify differences among their views. But, apart from this circumstance, common to both Sextus and Tertullian, here too it is not impossible to interpret the viewpoint of Strato in Aristotelian terms. For we could suppose that both the *apertures* in Sextus' account above and the *holes* in Tertullian's report could simply be, after all, a metaphorical way of depicting sense organs as sorts of paths (or even windows) open to the external world; nor would Aristotle, I think, have objected. In which case, hardly any *Sensualismus* or reduction of thought to psychic pneuma in a non-Aristotelian attitude could be ascribed to Strato. As for the passage from Tertullian, it ought to be observed that the problem examined here pertains to the possibility of maintaining the unity of the soul, despite its different functions. This is the target for the sake of which Tertullian himself introduces both the analogy with the so-called water-organ (in fact, a wind instrument itself) and that with the pipe and its *holes*. But, to prove the point, both analogies need not assume the reduction of soul to the *spiritus* circulating in the instruments. What has to be established is a correspondence of functioning: just as such instruments, while composed of many different parts, are nevertheless unitary structures functioning as a whole, so too the body, even though it is composed of different parts, does not lose its organic unity, likewise neither does the soul divide into pieces, even though its *ingenia* are distributed in many bodily parts.

Assuming therefore that the analogy is Strato's, his views are not so contrary to Aristotle. For, between the lines, we are told (a) that soul has different functions, which do not overlap; (b) that the body is an organic unity and (c) that the relationship between body and soul is the same as between an instrument and its user. Hence, in all probability the soul which in the analogy is said to "peep out" through the sense organs, is not the psychic pneuma as the ruling principle of the soul, but the Aristotelian sensitive soul. For Aristotle compares the relation between the primary sense organ and the peripheral ones to the relation between the user of an instrument such as a pipe and the instrument itself, which the user sets in motion by using his hands. What is more, by the same analogy Aristotle explains also the relationship between the final cause and the properly instrumental causes – the former being the user, the latter what serves its uses.[51]

51 Cf. Arist. *Juv.* 4, 469b1–3; *Gen. an.* 2.6, 742a16–b17.

Therefore, rather than disclaiming Aristotelian issues, what the analogy demonstrates is the power and strength of pneuma, which in the water-organ must fight against water to flow outwards, while in the pipe it must run through narrow channels before coming out in a melodious sound. And, if this is true, Strato could once again have based his claim on Aristotle's own view of pneuma as the instrument which conveys psychic functions and bodily operations such as movement and perception, while giving the body its power and strength to move.[52]

## 5 Conclusion

From the fragmentary evidence reviewed in this paper, it seems difficult to infer any systematic view on pneuma that can be assigned to Strato. We are informed of several applications of this concept in his biology, physiology and psychology with reference to relevant questions pertaining to animal life and conditions: reproductive processes, sleep, the relation in the soul between sense perception and thought and, though indirectly, between soul and body. But nothing is said either about his definition of pneuma, if he gave any, or about the general guidelines of his theory, if he had any. For, given his interests in dialectic, it cannot be excluded that Strato aimed at *discussing* the above topics more than at *settling* them systematically.[53] Therefore, caution is needed both in crediting Strato with a *Pneumalehre* developed as a whole and accordingly applied in the above different areas, and in interpreting his view in terms of mechanism, materialism and *Sensualismus* in opposition to Aristotle. On the contrary, Aristotle's explanatory pattern, when it is read without prejudices, could supply Strato's project of research with all the required inputs. His adoption of the Aristotelian connate pneuma

52 Arist. *De an.* 3.10, 433b13–30; *De motu an.* 10, 703a4–28. For the connection of perception and movement with respiration see *Somn.* 2, 455b34–456a10; *Resp.* 21, 480a16–b1, already quoted.

53 According to the historian Polybius, *Historiae* 12.25c.1–3 = fr. 10 Sharples, Strato "the naturalist" was indeed "marvellous" (θαυμάσιος) when "he tried to set out (διαστέλλεσθαι) and falsify (ψευδοποιεῖν) the opinion of others"; but whenever he contributed something of himself and explained some one of his own ideas, he seemed to those who have understanding to be "by a very long way more simple-minded (εὐηθέστερος) and slow-witted (νωθρότερος)" than he seemed to be before. And probably as a supporter of such a destructive dialectic Strato was criticised by the Stoic Chrysippus: cf. Plutarch, *De Stoicorum repugnantiis* 24, 1045f–1046a (Pohlenz and Westman 32,6–23 = fr. 14 Sharples). In any case, Strato employed precisely such a destructive dialectical approach when he raised the numerous *aporiai* on Plato's psychology in the *Phaedo*, following a typical dialectical attitude of Aristotle. See on that Repici 2011, 413–442. For a similar suggestion, cf. Morel 2011, 380. He argues that Strato would have seemingly interwoven the Aristotelian distinction, in the domain of sensation, between alteration and local movement, and that some sort of "'démocritéisme' diffus" could be taken as a background of this operation. Yet, such a background would not be the most important factor, "si l'on retient l'hypothèse selon laquelle Straton formule ses propres positions dans le cadre dialectique et problématique qu'Aristote avait institué."

is a typical example of this state of affairs. Consequently, in an unprejudiced reading of his position Strato should be evaluated as a head of the Peripatos and one "among the best of the Peripatetics,"[54] and his philosophical attitudes, accordingly, as related to Aristotle and Aristotelian philosophy. An analytical comparison between the headmaster and the pupil will show, inevitably, similarities and dissimilarities. But it would be misleading, I think, to interpret such correspondences or differences in terms of categories like "orthodoxy/heterodoxy," quite inadequate by themselves to describe the intellectual approaches of ancient philosophers.

54 The praise occurs in a passage from Simplicius, *In Aristotelis Physica ad* 6.4, 234b10–20 (Diels 964,29–965,19 = fr. 41,12–13 Sharples).

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Michiel Meeusen

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


## Summary

This contribution deals with the reception of Aristotle's pneuma theory (to the extent that there is one) in the Aristotelian *Natural Problems*, especially book four on sexual intercourse. I aim to demonstrate that there are clear overlaps between Aristotle's pneuma concept and the pneumatic processes described in the *Problems*, but that there are also significant discrepancies. The *Problems* employ the concept in a more liberal way than Aristotle's texts seem to allow. I argue that this procedure was deliberate, in view of re-opening Aristotle's texts for debate, for testing alternative approaches and for venting criticism. This further supports the idea that the problems originated from debates in the Lyceum, where Aristotelian dogma was not yet fully formed, let alone strictly canonised.


Keywords: pneuma; Aristotle; *Natural Problems*; sexual intercourse; Lyceum; Peripatetic tradition


Dieser Beitrag behandelt die Rezeption von Aristoteles' Pneuma-Theorie (soweit es sie gibt) in den *Naturproblemen*, besonders Buch IV über den Geschlechtsverkehr. Ich versuche zu zeigen, dass es klare Überschneidungen gibt zwischen Aristoteles' Pneuma-Konzept und den pneumatischen Prozessen, die in den *Naturproblemen* beschrieben werden, aber auch signifikante Widersprüche. Die *Naturprobleme* nutzen das Konzept in einer liberaleren Weise als Aristoteles' Texte das zu erlauben scheinen. Ich argumentiere, dass dieses Vorgehen absichtlich ist, um die Texte für die Debatte zu öffnen, alternative Zugänge zu erproben und Kritik zu ventilieren. Dies bekräftigt die Idee, dass die Probleme aus den Debatten im Lyceum rührten, wo Aristoteles' Dogma noch nicht voll herausgebildet, geschweige denn kanonisiert war.


Keywords: Pneuma; Aristoteles; *Naturprobleme*; Geschlechtsverkehr; Lyceum; Peripatetische Tradition

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> Wer wissen will, wie unglaublich weit die *Unwissenheit* der Alten in der Physik und Physiologie ging, lese die „Problemata" *Aristotelis*: sie sind ein wahres specimen ignorantiae veterum.
>
> A. Schopenhauer, *Parerga und Paralipomena* 2.17

## 1 Aristotle's "second breath"?

One of the aims of this paper is to examine how Aristotle's theories about pneuma became embedded in the post-Aristotelian tradition and how they were received by his acolytes in the Lyceum. Verbeke claimed that the Aristotelian doctrine of connate pneuma is not incoherent and is not an "*asylum ignorantiae*" either.[1] Rather than assessing this claim, it is my intention to determine – in light of Schopenhauer's acclamation of "*ignorantia veterum*" in the Aristotelian *Problemata* (*Natural Problems*) – what is the situation in this work in terms of their coherence with and departures from Aristotle's pneumatology. Investigating this procedure is important for determining the influence of Aristotle's authority on his own intellectual legacy, or at least on a very specific branch of natural scientific inquiry in that tradition, viz., as witnessed in the *Problemata*, a collection of (mainly) natural and physiological questions in thirty-eight books. It is accepted that Aristotle initiated the work by authoring an unknown number of chapters in it, but most of the content should be ascribed to his acolytes in the Lyceum. As such, the uncertainty about the historical authorship, far from being a mere scholarly issue, may hint at the popularity of the genre of natural problems in a large and largely anonymous scientific community in Aristotle's school. As we will see, in the *Problemata* the author (or, indeed, authors) sometimes simply adopts Aristotle's claims about pneuma, scattered around his corpus, to solve certain problems; sometimes develops and refines Aristotle's claims about pneuma in response to new problems; and sometimes takes up claims about pneuma that derive from other sources, and incorporates them into an Aristotelian scientific explanatory framework.

Considering the specificity of each problem unit, it is not an easy undertaking to determine the degree of conceptual systematicity and coherence of the use of pneuma as an explanatory principle in the collection of *Problemata* as a whole. Therefore, instead of providing a general overview of pneumatic processes, this contribution investigates (in the form of a case-study) the influence of Aristotle's pneumatic theory – to the extent

1 Verbeke 1978, 207: "[l]a doctrine aristotélicienne du pneuma congénital n'est pas incohérente, elle n'est pas non plus un *asylum ignorantiae* (the Aristotelian doctrine of connate pneuma is not incoherent, nor is it an 'asylum of ignorance')."

that there is one – on one specific set of problems. A manageable case is found in the problems on sexual intercourse (esp. in *Pr.* 4). Relevant questions for the study include: Where does the author/s follow Aristotelian dogma and how strict or flexible is this procedure? Where does the text show clear departures from the traditional viewpoint? To which degree does the pneuma theory function as an explanatory tool to be freely used whenever necessary and why? By answering questions such as these this paper aims to contribute to our knowledge regarding early Peripatetic conceptions of pneuma and the reception of Aristotle's ideas of pneuma. Before tackling the problems on sexual intercourse, I give a short and preliminary outline of Aristotle's pneuma theory (I will zoom in further on some specific aspects of it in due course).

Aristotle's concept of pneuma plays a key-role in his view on several vital animal functions: it is at the core of his theory of animal movement and plays a central role in the processes of sensation and generation. Unfortunately, we do not have a systematic account by Aristotle himself on this topic, where he discusses the types and functions of pneuma in full detail.[2] Therefore, scholars have felt the need to synthesise his views that lie scattered throughout his oeuvre.[3] I here summarise what seems to be beyond controversy. The most basic distinction which Aristotle makes between types of pneuma is between the connate (σύμφυτον) and the external (ἐπείσακτον) pneuma. He believes that all living beings have a measure of connate pneuma, which is not introduced from outside (*De partibus animalium* 2.16, 659b18–19: οὐ θύραθεν ἐπείσακτόν ἐστιν), but is already present in the embryo.[4] Generally speaking, only blooded (ἔναιμα)

2 Discussing *De spiritu* here would take us too far off-track. The work is generally considered spurious: see, most recently, Gregoric and Lewis 2015. To the contrary, see Macfarlane 2007, 17, 20–22, and Bos and Ferwerda 2008, 24: "If we read *De spiritu* as a preliminary 'shorthand' study by Aristotle, in the style of the *Problemata* but also many parts of the *Parva naturalia*, we find no compelling reason in the discussion to regard any part of it as post-Aristotelian."

3 Useful summaries of the evidence are in Peck 1942, 576–93; Peck 1953; Balme 1972, 158–65. Still useful are Beare 1906, 333, and Jaeger 1913. More recent studies are by Nussbaum 1978, 143–164; Verbeke 1978; Freudenthal 1995, 106–148 (with n. 3 for further literature); Berryman 2002.

4 I am not so sure whether Aristotle distinguishes yet a third type of pneuma by which the parts of animals are delimited (διορίζεσθαι) during the development of the embryo, but rather sees this as a function of the connate pneuma itself, present in the embryo. See *De generatione animalium* 2.6, 741b37–742a1: "this is not the pneuma of the mother, nor that of the creature (*sc.* the embryo) itself, as some of the physiologers allege" (οὐ μέντοι οὔτε τῷ τῆς γεννώσης οὔτε τῷ αὐτοῦ, καθάπερ τινὲς τῶν φυσικῶν φασίν – translations are from the Loeb Classical Library with sporadic adaptations). Aristotle is probably rejecting the belief formulated by the author of the Hippocratic *De natura pueri* that the embryo receives nourishment and breathes through the umbilicus (Hipp. *Nat. puer.* 13, Potter 34–36 = L. 7.488–492; *ibid.* 15, Potter 38–42 = L. 7.492–496), and that this (external) breath articulates its body (*ibid*. 17, Potter 42–44 = L. 7.496–498; *ibid.* 19 Potter 52 = L. 7.506). In what follows, Aristotle makes the point that embryos, which both breathe and get their articulation within the uterus, do not breathe *before* (πρίν) their lungs have reached completion. This supports reading the mention of the "[pneuma] of the creature itself" (τῷ αὐτοῦ [πνεύματι]) in Aristotle's text as referring to external pneuma (i.e., inhaled breath) which is being distinguished from the embryo's connate pneuma.

creatures which have passed the formational embryonic phase and that respire (e.g. human beings) require external pneuma in addition to their connate pneuma. This external pneuma is brought in by breathing and is responsible for cooling (κατάψυξις) and, thus, tempering of the innate heat.[5] Lower lifeforms, such as small, bloodless animals and most of the aquatic animals, have a cooler nature and do not require this external pneuma, since their connate pneuma suffices for κατάψυξις.

Aristotle seldomly renders the distinction between connate and external pneuma explicit, leaving it unclear how "substantial" this distinction really is.[6] The same applies to the Aristotelian *Problemata*. A number of problem chapters specifically deal with phenomena related to breathing and suffocation. For instance, in *Problemata* 34.12, 964b5–19, the author wonders why we breathe (Διὰ τί ἀναπνέομεν;). As a rule, the introductory "Why?" (Διὰ τί;) of the *Problemata* inquires specifically into the material and efficient causes of the natural phenomena at issue, leaving teleological causality largely unexplored, as is the case in the chapter at hand (I will come back to this later). The author starts off with a general observation according to which moisture dissolves into pneuma just as pneuma dissolves into fire. When the greater part of the pneuma produces fire, the natural heat (τὸ τῆς φύσεως θερμόν) causes pain and pressure in the passages. Therefore, we breathe out, thus pushing out the fire with the pneuma. But this causes the passages to contract and cool down (καταψυχόμενοι), so that we feel pain again and breathe in: "and we continue doing this until the end, … the mind (διανοίας) itself steering us" (*Pr.* 34.12, 964b13–17).

This chapter shares some common features with Aristotle's theory of breathing (cf. *Resp.* 21, 480a17–b21). The "natural heat," which is ventilated by exhalation, can be identified with the heat of the connate pneuma.[7] The allusion to κατάψυξις also points to an Aristotelian context.[8] But there are also divergences. The lack of an explicit distinc-

Aristotle concludes that the presence of this (connate) pneuma is the result of necessity (ἀναγκαῖον), because liquid substance and hot substance are present, one being active and the other being acted upon. This suggests that connate pneuma is some kind of vapour in the body, deriving from heated liquid.

5 Cf. Aristotle, *De respiratione* 21, 480a30–b1: "for as the chest rises the air from outside must flow in and … being cold and refrigerative, quench the excess of fire" (ἀναγκαῖον εἰσφρεῖν τὸν ἀέρα τὸν θύραθεν, καὶ ψυχρὸν ὄντα καὶ καταψύχοντα σβεννύναι τὴν ὑπεροχὴν τὴν τοῦ πυρός).

6 Jaeger 1913, 46, n. 1. The external (ἐπείσακτον) pneuma is mentioned only in *Part. an.* 2.16, 659b19.

7 See nn. 5 and 13 for the association of (connate) pneuma and heat in Aristotle's writings. Notably, the concepts of connate and external heat (θερμόν, θερμότης) are found at a number of places in the *Problemata*. For connate heat, see *Pr.* 1.9, 860a34; 5.21, 883a7; 14.8, 909b16–17; 28.1, 949b5. For external heat, see *Pr.* 6.1, 885b20; 30.1, 955a22. In *Pr.* 5.21, 883a7–8, a distinction is made between connate and additional (ἐπίκτητος) heat in the context of suffocation due to exertion in moist people. A likely source is Theophrastus' *De animi defectione* (= fr. 345 FHSG), esp. 2, where the same distinction is made in the same context. Yet, as Flashar 1962, 476 notes, this distinction is "sowohl dem Corp. Hipp., als auch Ar. ganz geläufig …" ("common in both the Hippocratic Corpus and Aristotle").

8 The same concept recurs in other problems on breathing and suffocation: see, e.g. *Pr.* 32.5 (also, e.g. *Pr.* 34.7 and 9).

tion between connate and external pneuma is puzzling. According to Aristotle, inhaled pneuma is cold, not hot, and thus cools down the internal heat, thus becoming hot itself so that it is exhaled again. In the problem at hand, however, the author implies that inhaled pneuma causes heat: it produces/dissolves into fire (πῦρ), and we breathe in once the passages have cooled down (καταψυχόμενοι). Aristotle, by contrast, says that "it is absurd (ἄτοπον) that inhalation should be the entrance of the hot, for the opposite appears to be true; what is exhaled is hot and what is inhaled cool" (*Resp.* 5, 472b33–36). He does this in order to reject the idea that inhalation augments bodily temperature by feeding the internal fire (*Resp.* 6, 473a4–14).

The belief that inhaled pneuma nourishes the bodily heat – by fuelling the internal fire – is found in the *Corpus Hippocraticum*, viz., in *De carnibus* 6 (Joly 192–193 = L. 8.592–594). Whether the author of *Pr.* 34.12 relies on *De carnibus* directly or indirectly is difficult to say. In any case, the medical-pathological orientation of this problem is clear in the mentioning of pain.[9] The fact that the same theory resurfaces in *Pr.* 34.12, while Aristotle explicitly rejected it, is interesting for questions relating to authorship, authenticity and authority (we will come across similar instances later on). As noted, it is generally accepted that we are dealing with a school text that originated in Aristotle's Lyceum, where such problems must have provided many topics for discussion.[10] As is the case more often in the *Problemata*, it may well be that the author of the chapter at hand attempted to combine Aristotelian physiology with ideas found in medical writings, in this case by reinterpreting the Hippocratic theory of breathing (as formulated in *De carnibus*) within the framework of the Aristotelian theory of κατάψυξις – or vice versa –, thus suggesting that the Hippocratic theory is not as "absurd" or even incompatible with Aristotle's theory as Aristotle himself had previously claimed.[11]

9 Cf. Flashar 1962, 750–751. Alternatively, one may wonder if we are perhaps dealing with a reference to Democritus' theory of πῦρ ἐπὶ πῦρ mentioned (and rejected) in *Resp.* 4, 472b6. The idea that inhalation normally has a cooling effect was also acknowledged by Plato, *Timaeus* 70c–d (in *Resp.* 5, 472b7–473a2, Aristotle is criticising Plato's theory of breathing, as formulated in Pl. *Ti.* 79a–e, but he does agree with him about this specific point), and it is also found in medical literature. It is even found in some of the Hippocratic writings: see *De morbo sacro* 4 (Jouanna 12 = L. 6.368) and *De corde* 5 (Duminil 192 = L. 9.84). See also Galen, *De utilitate respirationis* 1 (Furley/Wilkie 80 = K. 4.471) and Anonymus Londinensis, col. xxiii,38–42.

10 As stated, the authorship and authenticity of the *Problemata*, as the collection stands today, is notoriously dubious. Aristotle sporadically refers to a work he calls *Problemata*, but not all of these references can be traced in the collection that came down to us, and there are also clear post-Aristotelian influences in it (esp. Theophrastean). See Flashar 1962, 304–306; Louis 1991, xii–xiv and xxv–xxx. Nevertheless, the *Problemata* are generally "Aristotelian" in so far that their causal approach and theoretical-conceptual framework are clearly informed by Aristotle's scientific writings (cf. the titles in Centrone 2011a and Mayhew 2015b). On the Democritean origins of problem literature, see Menn 2015.

11 This procedure is well-known from book 1 of the *Problemata*, which specifically concerns medical problems (ὅσα ἰατρικά). See, most recently, Ulacco 2011 and Thomas 2015. For a list of possible sources of the problems in *Pr.* 1, see Mayhew 2015a, 180, n. 20.

As passages like these show, at certain points, the *Problemata* display a dynamic appropriation and reuse of traditional Aristotelian theories and concepts (including the ones about pneuma). It is tempting to hypothesise that this was done with an eye to reopening Aristotle's texts for debate in the Lyceum where, presumably, Aristotelian dogma was not yet fully formed (at any rate, a clear doctrine of pneuma was not available), or not at least strictly canonised (as it was later, by the time and under the influence of the commentators). This may suggest that there was enough space for debate of very specific topics and for exploring alternative – if not conflicting – explanatory models, without therefore abandoning Aristotle altogether. The notion of "conceptual plasticity" in the *Problemata*, understood as a discursive phenomenon marked by conceptual shifts – perhaps, indeed, *deliberate* manipulations of received knowledge –, will prove a useful analytical tool in the study of the reception of Aristotle's ideas about pneuma in the Lyceum context.[12]

The concept of pneuma plays an important explanatory role throughout the *Problemata* in a great variety of natural processes that belong to either the animate or the inanimate realms in nature. We encounter, for instance, pneumatic processes in problems related to wind, voice, breathing, sneezing, sexual intercourse, etc. As stated, most of the explanations are of a material and efficient, that is generally "natural," kind. Only in one specific problem a connection is drawn between pneuma and the "supernatural"/divine, where the author examines why sneezing alone among other types of pneumatic discharges (πνευμάτων αἱ ἔξοδοι), such as farting or belching, is considered holy (ἱεραί) (*Pr.* 33.9 = *Suppl. Pr.* 2.50; cf. also *Pr.* 33.7). The conclusion is that sneezing is considered a good omen (φήμη ἀγαθή), but even this is framed in a material/physiological interpretation of the phenomenon (so as to suggest, it seems, that what is considered divine, is actually based on natural principles). The author gives two explanations: 1. sneezing is from the head, which is considered the most sacred body-part; 2. sneezing is a sign of health in the head. A likely source for the question is *Historia animalium* 1.11, 492b7–8, where Aristotle mentions – but does not explain – that "sneezing is the only sort of pneuma which has divinatory significance and is holy" (σημεῖον οἰωνιστικὸν καὶ ἱερὸν μόνον τῶν πνευμάτων). Since Aristotle does not provide an explanation, it may well be that the author of *Pr.* 33.9 saw a problem here that required separate discussion and further consideration.

12 For "conceptual plasticity" in the *Problemata* on music (books 11 and 19) as evidence of scholastic debate in the early Peripatos, cf. Petrucci 2011, 197, 199, 208, 219, 238.

## 2 Problems related to sexual intercourse

Pneuma plays an important role in the biological processes related to reproduction and sexual intercourse in Aristotle's writings. Aristotle believes that male seed is a residue (περίττωμα) of the useful nourishment, concocted from the blood (*Gen. an.* 1.18, 725a4). It contains both water and pneuma, and the latter is described as "hot air" (*Gen. an.* 2.2, 736a1: θερμὸς ἀήρ), although it is not simply air or fire.[13] Rather, pneuma is a special kind of air, "analogous to the element of the stars," i.e., *aithēr*, with which it shares its generative property (*Gen. an.* 2.3, 736b37–737a1: ἀνάλογον οὖσα τῷ τῶν ἄστρων στοιχείῳ). Since spermatic pneuma derives from nourishment, I think it reasonable that this is external/acquired pneuma, not connate pneuma – but again one may wonder how "substantial" the difference between the two really is.

The same Aristotelian concepts of seed and pneuma can be traced throughout the Aristotelian *Problemata*, esp. in those problems concerning sexual intercourse. These are mainly (but not exclusively) collected in book 4, entitled ὅσα περὶ ἀφροδίσια. These problems, though written within a framework determined by Aristotle's biological writings (*Gen. an.*, *Part. an.*, *Hist. an.*), are also responding to ideas found in other sources, especially to medical ones.[14] In what follows I will zoom in on three specific topics. The first two topics concern the "physical" aspects of pneuma theory in the problems relating to sexual intercourse: viz., the relationship between pneuma and melancholy, and between pneuma and residual theory respectively. The third topic examines how the conceptualisation of pneuma relates to Aristotelian causality more generally.

13 Pneuma is closely associated with heat in Aristotle's writings – a special kind of heat. We read that "there is psychic heat in all pneuma" (Arist. *Gen. an.* 3.11, 762a20: ἐν δὲ τούτῳ παντὶ θερμότητα ψυχικήν; cf. also *ibid.* 3.1, 752a2–3). Semen contains θερμόν with a "vital principle" (ζωτικὴ ἀρχή; cf. *ibid.* 2.3, 737a5, also 2.3, 736b30–737a1). Cf. *Pr.* 4.6, 877a20–21: moisture produces the quantity of the seed, and the heat its "spermatic nature" (φύσιν σπερματικήν). The concept of "vital heat" is also named ἔμφυτος θερμότης, ἔμψυχος θερμότης (Aristotle, *De anima* 2.4, 416b30), φυσικὴ θερμότης (cf. *Meteorologica* 4.3, 380a20), τὸ θερμόν (Arist. *De an.* 2.4, 416b30; Ps.-Arist. *Spirit.* 9, 485a28), τὸ φυσικὸν θερμόν (cf. Arist. *Mete.* 4.3, 380a22), ἔμψυχός τε καὶ γόνιμος οὐσία (Ps.-Aristotle, *De mundo* 4, 394b12), ψυχικὸν πῦρ (cf. *Resp.* 15, 478a17), φυσικὸν πῦρ (cf. *Resp.* 8, 474b13), etc. For useful discussions of the relation between pneuma and vital heat, see Rüsche 1930, 188–250; Lesky 1950, 128–159; Solmsen 1957; Freudenthal 1995, 106–148.

14 See Flashar 1962, 456 and Mayhew 2011, 1, 143: "On the whole, the chapters of *Pr.* 4 raise questions about the Aristotelian concept of generation and the mechanics of sexual intercourse. The sources are in large part Aristotle's biological treatises (especially the *Generation of Animals*), but also include the Hippocratic writings that deal with this subject." For a study of how *Problemata* 4 raises questions about Aristotle's rejection of the Hippocratic pangenesis theory of generation (as formulated in *Gen. an.*), see Mayhew 2020.

### 2.1 Pneuma and melancholy

The idea that sexual excitement involves the presence of pneuma is most clearly formulated in the problems relating to the nature and habit of melancholics. The problem at hand in *Pr.* 4.30 is why melancholics are highly sexual. The author argues that they are full of pneuma (πνευματώδεις)[15] and that they frequently have to purge themselves (ἀποκαθαίρεσθαι) from this material in order to be relieved (κουφίζεσθαι). This is done by emitting the pneuma, along with the semen, during sexual intercourse. Thus, semen involves a discharge of pneuma (πνεύματος ἔξοδος). The idea that the majority of melancholics are lustful is repeated in the famous chapter on melancholy in *Pr.* 30.1 (953b33: λάγνοι, cf. also 954a33: ἐρωτικοί), where lust is again attributed to the abundance of pneuma in the body – more precisely in the context of an analogy between the physiological effects of wine and melancholy, both of which, so we read, contain pneuma (953b25: πνευματικά).[16] Here, the author discusses at greater length the idea that sexual excitement involves the presence of pneuma (953b33–34: ὅ τε γὰρ ἀφροδισιασμὸς πνευματώδης). A list of indications/signs is given to support this view (953b34–954a12).

A first indication, according to the author, that sexual excitement involves the presence of pneuma is the expansion of the penis, which is caused by inflation (ἐμφυσᾶσθαι) (I will discuss some parallels below). Even in the case of children, so the author continues, who are unable to emit seed but are close to puberty, a certain kind of pleasure arises when they, out of licentiousness, rub their private parts.[17] This is manifest (δῆλον) by the fact that pneuma exits through the pores, via which the moisture later travels (cf. *Gen. an.* 1.20, 728a9–17 quoted below, from which we learn that what is manifest, δῆλον, is probably the pleasure occurring in children). Pneuma also causes the ejection of semen by pushing it outside (ὑπὸ τοῦ πνεύματος ὠθοῦντος) (see the parallels below). Moreover, those foodstuffs and drinks that produce pneuma (ὅσα πνευματώδη) in the region around the private parts are considered aphrodisiacs (red wine, for instance, is highly "spirituous"; cf. *De somno et vigilia* 3, 457a17: πνευματῶδες γὰρ ὁ οἶνος). And the author also thinks that most of melancholics are thin and their veins prominent, which is due not so much to a large quantity of blood but of pneuma.[18] The passage runs as follows:

15 Mayhew 2011, 1, 173, n. 48: "Πνευματώδεις ('full of pneuma') can also be rendered 'flatulent.'"

16 The idea is repeated at the end of *Pr.* 30.1, 955a36: "both wine and black bile are full of breath" (ἄμφω δὲ πνευματικά, καὶ ὁ οἶνος καὶ ἡ μέλαινα χολή).

17 Cf. *Pr.* 28.7, 950a1: "For those who are excessive in sexual intercourse are called licentious" (οἵ τε γὰρ περὶ τὰ ἀφροδίσια ἀκόλαστοι).

18 This last point is not further explained, but a parallel can be found in *Somn.* 3, 457a29–34, where Aristotle argues that although the melancholic are inclined to eat much, they are thin, because the coldness of black bile cools the nutritive region (there is no mention of pneuma). By contrast, Diocles of Carystus (fr. 109,23–35; 38–44 van der Eijk = Galen, *De locis affectis* 3.10 = K. 8.185–189) attributes the non-intake of food in those who are called "flatulent" (φυσώδεις – previously connected with the melancholic) to heat, not cold. Similarly, the author of *Pr.* 30.1 explains their thinness in terms of a large quantity of pneuma (as we just saw), which was previously connected with heat in 953b22–24 (and will be again further on in 955a25–27). Aristotle also argues that neither people with marked veins nor the melancholic are

**T1** ὅ τε γὰρ ἀφροδισιασμὸς πνευματώδης. σημεῖον δὲ τὸ αἰδοῖον, ὡς ἐκ μικροῦ ταχεῖαν ποιεῖται τὴν αὔξησιν διὰ τὸ ἐμφυσᾶσθαι. καὶ ἔτι πρὶν δύνασθαι προΐεσθαι σπέρμα, γίνεταί τις ἡδονὴ ἐπὶ παισὶν οὖσιν, ὅταν ἐγγὺς ὄντες τοῦ ἡβᾶν ξύωνται τὰ αἰδοῖα δι' ἀκολασίαν· γίνεται δὲ δῆλον διὰ τὸ πνεῦμα διεξιέναι διὰ τῶν πόρων, δι' ὧν ὕστερον τὸ ὑγρὸν φέρεται. ἥ τε ἔκχυσις τοῦ σπέρματος ἐν ταῖς ὁμιλίαις καὶ ἡ ῥῖψις ὑπὸ τοῦ πνεύματος ὠθοῦντος φανερὸν γίνεσθαι. ὥστε καὶ τῶν ἐδεσμάτων καὶ ποτῶν εὐλόγως ταῦτ' ἐστὶν ἀφροδισιαστικά, ὅσα πνευματώδη τὸν περὶ τὰ αἰδοῖα ποιεῖ τόπον. διὸ καὶ ὁ μέλας οἶνος οὐδενὸς ἧττον τοιούτους ἀπεργάζεται, οἷοι καὶ οἱ μελαγχολικοί, πνευματώδεις. δῆλοι δ' εἰσὶν ἐπ' ἐνίων· σκληφροὶ γὰρ οἱ πλείους τῶν μελαγχολικῶν, καὶ αἱ φλέβες ἐξέχουσιν· τούτου δ' αἴτιον οὐ τὸ τοῦ αἵματος πλῆθος, ἀλλὰ τοῦ πνεύματος. διότι δὲ οὐδὲ πάντες οἱ μελαγχολικοὶ σκληφροὶ οὐδὲ μέλανες, ἀλλ' οἱ μᾶλλον κακόχυμοι, ἄλλος λόγος ....

For sexual excitement involves the presence of breath. A sign of this is the penis, in that its expansion is produced quickly from a small size, owing to being inflated. Even before seed is able to be emitted, a certain pleasure occurs in the case of children, when they are near puberty, in rubbing their private parts owing to licentiousness; this becomes clear because of the breath passing through the channels through which the moisture later travels. The outflow of the seed in intercourse and its ejection is obviously due to pushing by the breath. So those foods and drinks, which produce breath in the region around the private parts, are with good reason aphrodisiacs. And this is why red wine more than anything makes people have such a condition, just like melancholic people, (namely) containing abundant breath. Now these are clear in some cases: for the majority of melancholic people are thin, and their veins stand out; and the reason for this is the quantity not of blood, but of breath; but why all melancholic people are neither thin nor dark, but only the evil-humored ones, is another story.

Ps.-Arist. *Pr.* 30.1, 953b33–954a12

much given to sleep (*Somn.* 3, 457a26–30): in the case of people with marked veins this is due to the easy flow of exhalation (ἀναθυμίασις, some kind of vapour/pneuma originating from concocted food) and, afterwards, condensed moisture through the veins, whereas in the case of melancholics this is due to the fact that their interior region is cooled so that the quantity of exhalation is not great. For the sleeplessness of melancholic people (caused by the moisture in them that has cooled down), cf. also *Pr.* 3.25b, 874b18–21. There are two other passages on sleep and sleeplessness in the *Problemata* where a connection is drawn between melancholy and pneumatic movements, viz., in *Pr.* 18.1 and 7, which both deal with the same problem, but explain it in a different way ("Why are some people unwillingly overwhelmed by sleep when they start to read a book, whereas others, who want to sleep, become more awake when they take up a book?," *Pr.* 18.7, 916b2–5).

In a related discussion further on in *Pr.* 30.1, 955a22–26, we read that most people are more spiritless after sexual intercourse, but that those who emit a lot of residue (περίττωμα) together with their seed are more cheerful (see the parallels below). This is because they are relieved (κουφίζεσθαι) of residue and of an excess of breath and heat (πνεύματος καὶ θερμοῦ).[19] This is basically the same idea as in *Pr.* 4.30 (discussed above), where we find an obvious parallel about the sexual appetite of melancholic people, and where the relief is also explained in terms of the discharge of pneuma (the verb κουφίζεσθαι is repeated). It is not unlikely, therefore, that the author of *Pr.* 30.1 also composed *Pr.* 4.30, or at least relied on the same source.

Whoever the author may be, s/he seems to base the discussion of melancholy on Aristotle's sporadic remarks on the topic. The idea that the melancholic are in a constant state of intense desire (ἐν ὀρέξει σφοδρᾷ) is formulated by Aristotle in *Ethica Nicomachea* 7.14, 1154b13, where this is related to their bodily constitution (διὰ τὴν κρᾶσιν).[20] Elsewhere, Aristotle emphatically characterises melancholy as a "pneumatic affection," viz., in *De insomniis* 3, 461a21–25, where it is ranged among other πάθη πνευματώδη, such as fever and drunkenness (see n. 24). The topic of melancholic disorders is treated throughout Aristotle's writings, but we have no knowledge of him having ever composed a treatise on this subject. Theophrastus, by contrast, is known to have written a work περὶ μελαγχολίας (Diogenes Laërtius, *Vitae philosophorum* 5.44.18), but doubt remains as to whether he was the author/source of the problem chapters at hand.[21] Whatever may be the case, as van der Eijk has convincingly shown, the author of *Pr.* 30.1 "was clearly familiar with Aristotle's scattered remarks on melancholy."[22] The least that can be said,

19 By contrast, we read that those who do not have a great outflow of seed are more spiritless (ἀθυμότεροι), being deprived of "something significant" (ἱκανῶν τι) so that they cool down. The parallel idea that "what exits (the body during sex) is so very important (ἐπίκαιρον)" and that "what is little in quantity comes from a great deal of nourishment, like a cake comes from flour" is formulated in *Pr.* 4.21, 879a11–12. Cf. also *Pr.* 4.12, 877b30–40, where we read that natural heat concocts the seed, which is small in quantity but has great potency, since it is distilled from a large quantity. When the seed leaves, so it is argued, people become relaxed and cool down (καταψύχεσθαι). The problem at hand (viz., why sweat of adults is saltier and more ill-smelling than that of children; cf. Theophrastus, *De sudore* 7–8) is paralleled in *Pr.* 4.24, where the concept of "natural heat" is replaced by "pneuma" – not exactly "as had been said" (879a25: ὥσπερ εἴρηται), but close enough. We read that people who (are able to) have sex reek of "goat smell" (879a24: γράσος; cf. *Pr.* 13.9).

20 Cf. Diocles fr. 182,215–217 van der Eijk (= Oribasius, *Collectiones medicae*, *libri incerti* 40). Cf. also Pl. *Ti.* 86d.

21 Flashar 1962, 713–714, (also Flashar 1966, 118–26) seems more lenient in this matter than van der Eijk 1990, 70–71, n. 91. The most recent studies are by Centrone 2011b and Schütrumpf 2015. Galen, on referencing the problem of "why the melancholic happen to be highly sexual" (= *Pr.* 4.30; cf. *Pr.* 30.1, 953b32–34), attributes it to Aristotle at *In Hippocratis Epidemiarum librum VI commentaria* 3.12 (Wenkebach 138,19–139,5 = K. 17B.29).

22 Mayhew 2011, 2, 274–275. See van der Eijk 1990 for an excellent analysis of the material. According to Schütrumpf 2015, 357, however, this familiarity is only superficial, and the author of *Pr.* 30.1 "moves away from Aristotelian concepts on the formation of character qualities." Therefore, the views of Aristotle and *Pr.* 30.1 cannot be reconciled in

then, is that Aristotle's concept of melancholy served as the author's model.

Throughout his writings, Aristotle alternately points at the bodily heat and coldness of melancholics, without further detail, thus offering an apparently contradictory account of melancholic disorders, *prima facie* at least.[23] It seems that the author of *Pr.* 30.1 (or its source) aims to provide a more coherent account, without forsaking Aristotle's contradictory/binary approach but still by taking a personal position. To this end, s/he explains melancholic disorders in terms of a person's natural constitution rather than as a disease (*pace* Aristotle)[24] and interprets the changeable character of the melancholic – and more precisely its positive/"manic" and negative/"depressive" manifestations – in terms of the fluctuating degree of heat and coldness in the body respectively (*Pr.* 30.1, 954a12–14). In this context, heat is closely connected, in several places, with the concept of pneuma (*Pr.* 30.1, 953b22–24; 955a25–26). There are some notable Hippocratic parallels in *Pr.* 30.1, especially regarding the "manic" and "depressive" manifestations of melancholy, but unlike the Hippocratic writers Aristotle, and with him the author of *Pr.* 30.1, did not think of the concept of black bile in terms of a humoral vision of the body.[25] The systematicity with which the problem is solved, compared to Aristotle, is

Schütrumpf's opinion (375): "since both Aristotle and *Pr.* 30.1 offer an explanation of their position that is complete in itself and excludes the explanation the other proposes: neither does Aristotle indicate, or allow, that black bile could be more than a very limited factor that affects man's behavior, nor does *Pr.* 30.1 indicate that acquired attitudes play any role and could act as a counterbalance against the physiological impact of black bile." Schütrumpf adds that "[t]he treatment envisioned there (*sc.* in *Pr.* 30.1) is not ethical but focuses on black bile itself (954b2ff.), it is medical" (but see n. 24 below).

23 Heat: *Insomn.* 3, 461a24; *De divinatione per somnum* 2, 464a33–34; *Eth. Nic.* 7.7, 1150b25–28, 7.10, 1152a27–28, 7.14, 1154b11–15; coldness: *Somn.* 3, 457a30–34; *Magna moralia* 2.6, 1203b1 (probably post-Aristotelian). Cf. van der Eijk 2008, 170–171: "It is true that the 'hot' type dominates in Aristotle's discussions, but the cold is not entirely absent …." He speaks of a "bipolar" division, contrasting "manic" (hot, excited) with "depressive" (cold, despondent) melancholy. Passim throughout the *Problemata*, allusion is (either explicitly or implicitly) made to heat and coldness in the context of melancholy and the melancholic: see *Pr.* 1.12, 860b24 (heat); *Pr.* 1.19, 861b20 (heat); *Pr.* 3.16, 873a32–33 (heat); *Pr.* 3.25, 874b18–19 (coldness); *Pr.* 4.20, 878b39 (coldness); *Pr.* 4.30, 880a30 (heat: cf. *Pr.* 30.1); *Pr.* 11.38, 903b19–20 (coldness/heat: cf. *Pr.* 11.60); *Pr.* 18.1, 916b5–6 and 18.7, 917a21–22 (coldness); *Pr.* 30.14, 957a32 (heat) (this list excludes *Pr.* 30.1). See also van der Eijk 1990, 71–72, n. 92.

24 Cf. the concluding remark in *Pr.* 30.1, 955a39–40: "all melancholic people are extraordinary, not owing to disease but owing to nature" (περιττοὶ μέν εἰσι πάντες οἱ μελαγχολικοί, οὐ διὰ νόσον, ἀλλὰ διὰ φύσιν). In *Insomn.* 3, 461a24–25, Aristotle mentions melancholy, together with fever and drunkenness, as πάθη πνευματώδη (cf. also Diocles, fr. 110 van der Eijk = Galen, *Hipp. Epid.* 6.3.12, Wenkebach 138,19–139,2 = K. 17B.29), thus classifying each of these conditions in the realm of disease/pathology (πάθος ~ νόσος), and in *Eth. Nic.* 7.14, 1154b11–12 he says that the melancholic "need healing perpetually" (ἀεὶ δέονται ἰατρείας). According to van der Eijk 1990, 46, however, the word πάθος is probably used primarily with regard to fever and drunkenness. Nevertheless, Flashar 1962, 713, is convinced that the negative aspect is predominant in Aristotle, who considers melancholy as pathological ("krankhaft"). In that case, the aim of *Pr.* 30.1 may be to provide a more nuanced physiological (rather than nosological) account.

25 See van der Eijk 1990, 52–53. For melancholy in the *Corpus Hippocraticum*, see Flashar 1962, 712. Hippocratic parallels are also traceable, e.g. in *Pr.* 4.20, where we read that varicocele is beneficial in cases

noteworthy.[26] Therefore, we can only guess – since guessing it is – that the author/source of *Pr.* 30.1, saw a problem here left by Aristotle to be solved in a coherent fashion.[27]

There are also clear allusions to Aristotle's vision of the human body and its functioning in *Pr.* 30.1. The idea, for instance, that "heat (θερμόν) around the region in which we think and hope (*sc.* the heart) makes us cheerful" (*Pr.* 30.1, 955a1–2; cf. also 954a34–35 for the effect of heat on the νοερὸς τόπος) reiterates Aristotle's cardiocentrism (cf. *De motu animalium* 7, 701b13–8, 702a5). Aristotle's ideas about pneuma and, more specifically, about its function in the process of sexual intercourse are also relevant here. I have already mentioned a number of parallel passages, but the following can be added.

– The idea that pneuma inflates the penis is paralleled in Arist. *Part. an.* 4.10, 689a29–31, where we read that the penis "can contract and expand and admits pneuma into itself (πνεύματός ἐστι δεκτικόν)." This was, however, commonly accepted in ancient medical literature and is not exclusive to Aristotle.[28] It recurs as a material/mechanical principle also in several *Problemata*. In *Pr.* 13.6 we read that the region around the bladder and private parts is full of pneuma (πνευματικός), as the rigidness of the penis shows (this problem also connects sexual pleasure with the presence of pneuma). *Pr.* 4.23 argues that the tension and growth of the penis is due to the fact that its passages become full of pneuma (this is combined with the further suggestion that there is some weight added behind the testicles, and they become the fulcrum raising the inflated

of melancholy, since the varicocele arise when the pneuma is displaced. (Similarly, in *Pr.* 6.3, 885b30–32, we read that varicocele and the other abscesses restore health, because they have hollows in which they receive pneuma.) The idea that varicocele is beneficial for melancholic people may be an allusion to Hippocrates, *Aphorismi* 6.21 (Jones 184 = L. 4.568): "For those in rage, when varicocele … supervenes, rage is solved (μανίης λύσις)." The connection between μανία and melancholy recurs in *Pr.* 30.1 (953b4; 954a32, 36).

26 The fact, however, that the problem does not provide a *fully* systematic account (Schütrumpf 2015, 359–361) may be due to the extract-like nature of the problem and "the less than perfect reworking of the original by the ancient editor of the *Problemata*" (361, n. 20). See also Flashar 1966, 64.

27 Any claim about the actual authorship must remain conjectural. van der Eijk 1990, 70–71, concludes that it remains unclear whether the text of *Pr.* 30.1 goes back on a discourse about melancholy probably in Aristotle's lost *Problemata* or on an attempt of a later Peripatetic (probably Theophrastus) to systematise the master's scattered remarks. Schütrumpf 2015, 375–376, is even more sceptical: "While it is possible that he knew Aristotle's few comments about melancholics I see no way that the specific assumptions about the working of black bile found in *Pr.* 30.1 are developed out of, or were inspired by, the few remarks about melancholics we find in Aristotle. … However, there are in the larger scheme of things commonalities that unite Aristotle and *Pr.* 30.1 and separate them from a way of thinking that still can be found in the fourth century B.C. We see Aristotle sharing with the author of *Pr.* 30.1 the approach of moving away from any sort of religious explanation by focusing on nature. Were other intellectuals of the fourth century aware that such a move should be made, did anyone articulate it? I think so: we find a similar approach in Dicaearchus 56A sect. 3 (Fortenbaugh/Schütrumpf)." In that case, the influence of the Hippocratic tradition is also, if not more, plausible (esp. *De morbo sacro*: notably, epilepsy is mentioned at the very beginning of *Pr.* 30.1, 953a14–16, and again in 953b6 and 954b30–31). Cf. van der Eijk 1990, 56–57.

28 See Hopfner 1938, 77, and Flashar 1962, 466.

penis up). The same idea recurs in *Pr.* 4.26, where we read that when there is an exertion (πόνος), the pneuma, on exiting, causes swelling and secretes the residue in the place where it is naturally secreted: in the case of the seminal residue these are the testicles and penis. Once the pneuma goes out (via the semen), the erections cease (I will come back to this passage shortly).

– The idea that pneuma thrusts out the seed is paralleled most clearly in Arist. *Hist. an.* 9.7, 586a16–18: "In the discharge (ἐξόδῳ) of the seed, pneuma first leads it; and the actual discharge (ἔξοδος) shows that it occurs under the compulsion of pneuma, for nothing is thrown to a distance without the force of pneuma (ἄνευ βίας πνευματικῆς)." Parallels are also found throughout *Gen. an.*, e.g. 1.20, 728a9–11: "The pleasure (ἡδονήν) which accompanies copulation is due to the fact that not only semen but also pneuma is emitted (cf. *Pr.* 30.1 above, and *Pr.* 4.15 below): it is from this pneuma as it collects together that the emission of the semen results." This collecting of pneuma happens by holding the breath:[29] "men and all such (*sc.* breathing) animals in order to emit the semen must of necessity hold their breath" (*Gen. an.* 1.6, 718a3–4). See also *Gen. an.* 2.4, 737b34–35: "our discharge (ἐξόδους) of these residues is accompanied by the collecting of the pneuma." Whether and how this pneumatic discharge of seminal residue relates to Aristotle's theory of projectile motion (cf. *Physica* 8.10, 266b28–267a20) remains unclear.[30] In any case, Aristotle continues that "this is a phenomenon which is common to all cases where something has to be moved (κινῆσαι), because holding the breath is the way in which the required strength (ἰσχύς) is obtained." The broader context of the latter account (to which we will turn in the following section) is a critique of commonly held theories about secretion of residues (such as semen) in the body.

– The idea that the emission of residue via the semen contributes to a person's well-being (as formulated in *Pr.* 30.1, 955a22–26) is paralleled in *Pr.* 4.29, where the author ascribes some harmful faculty to the residue (cf. 880a28: λυπεῖ). Similarly, Aristotle in *Gen. an.* 1.18, 726a22–24 writes that "removal of residue is beneficial (ὠφέλιμος); and

29 This is not the connate but the external pneuma in the case of breathing animals, as opposed to insects. See *Somn.* 2, 456a16–20: "the holding of the breath produces strength (ἰσχύν) – pneuma from outside (θύραθεν) in the case of animals which inhale, and connate pneuma (σύμφυτος) in the case of those which do not (which is why winged insects of the class holoptera are observed to buzz when they move, through the friction of the breath pulsating against the diaphragm) … ."

30 Interestingly, in *De caelo* 3.2, 301b22–30, Aristotle argues that "air (ἀέρι) is employed as a kind of instrument of the action, since it is the nature of this element to be both light and heavy. In so far as it is light, it produces the upward movement, as the result of being pushed and receiving the impulse from the original force, and in so far as it is heavy the downward. In either case the original force transmits the motion by, so to speak, impressing it on the air. That is the reason why an object set in motion by compulsion (βίᾳ) continues in motion though the mover does not follow it up. Were it not for a body of the nature of air, there could be no such thing as enforced (βίᾳ) motion. By the same action it assists the motion of anything moving naturally."

the discharge of semen … includes some of the useless (μὴ χρησίμου) nourishment." The topic of lustfulness having a positive effect on the body by ejecting residual matter recurs in *Pr.* 1.50 and 4.16. A similar point is made in Hippocrates, *Epidemiae* 6.5.15 (Smith 244 = L. 5.320), where it is suggested that phlegm is cleared, rather than residue: "venery helps diseases from phlegm" (λαγνείη τῶν ἀπὸ φλέγματος νούσων ὠφέλιμον). It should be noted, in this regard, that the concept of περίττωμα does not occur in the *Corpus Hippocraticum*, and that it may have been introduced in the field of nosology by Aristotle or one of his students.[31]

### 2.2 Pneuma and residues

As seen previously, Aristotle believes that male seed is a residue of the useful nourishment, concocted from the blood (*Gen. an.* 1.18, 725a4–5: ἀνάγκη ἄρα περίττωμα εἶναι). In *Gen. an.* 2.4, 737b27–738a9 he draws a basic distinction between the secretion (ἀπόκρισις) and the discharge (ἔξοδος) of such residues. He considers the former an internal process during which matter is secreted inside the body, the latter an external process, from the body to the outside. Regarding secretion of residue in the "proper places" in the body (internally), Aristotle rejects the idea that it comes about 1) by the force (βία) of pneuma or 2) by attraction (ὁλκή) exerted by the proper places themselves (possibly a Hippocratic theory: see n. 34). He does not formulate a clear alternative, but it seems that he is supporting the theory of natural movement (φορά), according to which the residue naturally/by necessity moves to its "proper place" (οἰκεῖον τόπον).[32] In doing so he does *not*, however, reject the idea that pneuma plays an important role in the discharge of residues out of the body (such as semen, as we saw previously):[33]

> **T2** Ἡ μὲν οὖν ἀπόκρισις γίνεται πᾶσι τοῦ σπέρματος ὥσπερ ἄλλου τινὸς περιττώματος. φέρεται γὰρ ἕκαστον εἰς τὸν οἰκεῖον τόπον οὐθὲν ἀποβιαζομένου τοῦ πνεύματος, οὐδ' ἄλλης αἰτίας τοιαύτης ἀναγκαζούσης, ὥσπερ τινές φασιν, ἕλκειν τὰ αἰδοῖα φάσκοντες ὥσπερ τὰς σικύας, τῷ τε πνεύματι βιαζομένων, ὥσπερ ἐνδεχόμενον ἄλλοθί που πορευθῆναι μὴ βιασαμένων ἢ ταύτην τὴν περίττωσιν ἢ τὴν τῆς ὑγρᾶς ἢ ξηρᾶς τροφῆς, ὅτι τὰς ἐξόδους αὐτῶν ἠθροισμένῳ τῷ πνεύματι συνεκκρίνουσιν. τοῦτο δὲ κοινὸν κατὰ πάντων ὅσα δεῖ κινῆσαι,

31 See van der Eijk 1990, 53, with n. 57 for further literature.

32 The fact that this happens according to nature/necessity is implied in the idea that the residues cannot actually "follow any other course" (ἄλλοθί που πορευθῆναι, *Gen. an.* 2.4, 737b33) than the one they take. The idea that nature has provided each residue with its proper place, as formulated in *Gen. an.* 1.18, 725a34–b4, is repeated in *Pr.* 4.26, 879a37–b2 (discussed below): "for each residue there is a place into which it is naturally secreted according to nature" (ἔστιν ἑκάστῃ περιττώσει τόπος εἰς ὃν πέφυκεν ἀποκρίνεσθαι κατὰ φύσιν).

33 *Pace* Gravel 1982, 141, who neglects the distinction between secretion and discharge.

διὰ γὰρ τοῦ τὸ πνεῦμα κατασχεῖν ἡ ἰσχὺς ἐγγίνεται· ἐπεὶ καὶ ἄνευ ταύτης τῆς βίας ἐκκρίνεται τὰ περιττώματα καὶ καθεύδουσι, ἂν ἄνετοί τε καὶ πλήρεις περιττώματος οἱ τόποι τύχωσιν ὄντες. ὅμοιον δὲ κἂν εἴ τις φαίη τοῖς φυτοῖς ὑπὸ τοῦ πνεύματος ἑκάστοτε τὰ σπέρματα ἀποκρίνεσθαι πρὸς τοὺς τόπους πρὸς οὓς εἴωθε φέρειν τὸν καρπόν. ἀλλὰ τούτου μὲν αἴτιον, ὥσπερ εἴρηται, τὸ πᾶσιν εἶναι μόρια δεκτικὰ τοῖς περιττώμασι τοῖς τ' ἀχρήστοις <καὶ τοῖς χρησίμοις> [οἷον τῇ τε ξηρᾷ καὶ τῇ ὑγρᾷ, καὶ τῷ αἵματι τὰς καλουμένας φλέβας].

In all of them (*sc.* the viviparous animals) the semen is secreted in precisely the same way as any other residue. Each of the residues is carried to its proper place without the exertion of any force from the pneuma and without compulsion by any other cause of that sort, although some people assert this, alleging that the sexual parts draw the residue like cupping-glasses[34] and that we exert force by means of the pneuma, as though it were possible for the seminal residue or for the residue of the liquid or of the solid nourishment to take any other course unless such force were exerted. The reason given for this view is that our discharge of these residues is accompanied by the collecting of the pneuma (the holding of the breath). But this is a phenomenon which is common to all cases where something has to be moved, because holding the breath is the way in which the required strength is obtained. (Besides, even without the exertion of this force residues are actually emitted during sleep, if the places concerned are relaxed and full of residue.)[35] Such statements are on a par with saying

34 Cf. Hippocrates, *De vetere medicina* 22.3 (Jouanna 150,2–5 = L. 1.626–628): the bladder, the head and the womb have the same structure and action as cupping-glasses, as they draw (ἕλκει) fluid to themselves. The idea that pneuma plays a role in the drawing of male seed into the uterus of females is found in Arist. *Hist. an.* 10, 634b34–35; 636a5–6; 637a17 (the context is, however, different from the *Gen. an.* passage at hand). The authorship of *Hist. an.* 10 is, of course, controversial: see van der Eijk 1999, 501 (also 498 for the relation between *Hist. an.* 10 and the *Problemata*).

35 By alluding to nocturnal emissions of residue (seed, but also, e.g. urine?) Aristotle seems to add an exception to the theory of pneumatic discharge of residue, which is why I have bracketed it. The idea that nocturnal emission occurs quickly and without effort (ἄνευ ἐργασίας) in sleeping people (viz., because their body is hot and moist, as is favorable for sexual performance; cf. also *Pr.* 3.33 and 5.31), whereas, while awake, people emit seed with exertion (μετὰ πόνου), recurs in *Pr.* 4.5, 877a8–10 (regarding the problem of why being barefoot is not beneficial for sexual intercourse – this is because it dries and cools). The same logic seems to apply to the *Gen. an.* passage at hand: while awake, effort is needed to emit semen (this requires strength, produced by holding the breath), whereas in the case of nocturnal emissions no such effort is needed since one is asleep and relaxed (therefore, holding the breath is not necessary). Presumably, the seminal residue is not "thrown to a distance" in that case, but this is enclear (cf. *Hist. an.* 9.7, 586a16–18 above). The idea that the places concerned are "full of residue" (πλήρεις περιττώματος) is repeated in *Pr.* 33.15, where we read that "the quantity of pneuma" (963a11: τὸ πνεῦμα τὸ πολύ) causes nocturnal emissions (= *Suppl. Pr.* 2.40). For further discussion of nocturnal emissions as a recurrent topic throughout the *Problemata* and for its connection with Theophrastus' *De lassitudine*, see Fortenbaugh 2015, 113–118 (with n. 67 for the suggestion that the role ascribed to pneuma in nocturnal emissions

> that the seeds of plants are on each occasion secreted to the places where they commonly bear their fruit by means of pneuma. No, the real reason for this, as has been said, is that in all animals there are parts for the reception of the residues, both for the useless <and for the useful ones> [e.g., both for the solid and the fluid (cf. *Hist. an.* 1.4, 489a7–8; *Part. an.* 4.10, 689a5–6); and for the blood there are the blood-vessels as they are called].[36]
>
> Arist. *Gen. an.* 2.4, 737b27–738a9

Allusion is made to this account in *Pr.* 4.26. The problem at hand is: "Why do some men enjoy submitting to sex, and some at the same time enjoy being active, whereas others do not?" (*Pr.* 4.26, 879a36–37). This problem explains homoerotic desire in a very physiological way.[37] The author starts by reiterating Aristotle's theory of natural places: s/he argues that there are places in the body where the residue is naturally secreted (ἀποκρίνεσθαι κατὰ φύσιν, 879b1) and that when there is exertion (πόνος ἐγγινόμενος; cf. 879b1–2) the pneuma on its way out causes swelling/inflation (ἀνοιδεῖν, 879b2) and excretes the residue (συνεκκρίνειν, 879b2) into the proper places: e.g. urine in the bladder, nourishment from which the moisture has been extracted in the stomach, tears in the eyes, mucus in the nose, blood in the veins.[38] The idea that pneuma forces residues into their proper places was, however, rejected in the *Gen. an.* passage (cf. the theory of pneumatic βία), and Aristotle did not regard blood as a residue.[39] On the other hand, the concept of natural places in *Pr.* 4.26 is clearly reminiscent of the *Gen. an.* account, but more emphasis seems to be put on the mechanism behind the motion of residues to their natural places than on the fact that there are such natural places in the body to begin with, in which the residues naturally collect, as seems to be Aristotle's concern (cf. *Gen. an.* 1.18, 725a34–b4). The fact that our author generalises the working of pneumatic force to secretion of residue into the proper places just as well (so not exclusively to discharge out of the body via ejaculation) does not negatively affect the outcome of

may also be Theophrastean, although it is not found in *De lassitudine*).

36 The last phrase may be part of a gloss, according to Peck 1942, 562 (Aristotle did not hold that blood is a residue), but this is not necessarily the case (see n. 39).

37 Although the author's approach in explaining homosexuality is overtly somatic, habituation is also invoked as explanatory factor. The idea (formulated at the end of the problem) that homosexual habit becomes a second nature has a clear Aristotelian backdrop; probably based on *Eth. Nic.* 7.5, 1148b15–34. Cf. *Rhetorica* 1.10, 1369b6–18, *De memoria* 2, 452a28–29, *Eth. Nic.* 7.10, 1152a30–33; cf. also *Pr.* 21.14 and 28.1 (see Flashar 1962, 468). For an annotated translation of *Pr.* 4.26 by Lesley Dean-Jones, see Hubbard 2003, 262–264. For its hesitative reception in the Middle Ages, see Cadden 2013. See also Flashar 1962, 467: "Septalius hat aus moralischen Bedenken das Problem unkommentiert gelassen."

38 Flashar 1962, 467, is correct that the examples show that the author is not concerned with the discharge of residual matter but with the entrance of this matter in the reservoirs (e.g. urine in the bladder).

39 The author seems to rely on the alleged gloss to Aristotle's text, see n. 36.

the explanation (and at best it helps explaining swelling/inflation of the penis in the same breath).

The author continues that the seminal residue is naturally (πέφυκεν) excreted into the testicles and penis, but in those people in whom the passages are not according to nature (e.g. in eunuchs, eunuchlike men and "effeminates"), it flows to the anus and the region around it. This is close to the argument in *Gen. an.* 1.20, 728a9–17, where we read that men, whose generative organs have been destroyed, sometimes suffer from looseness of the bowels caused by residue, which cannot be concocted and converted into semen, and is secreted into the intestine. The author of *Pr.* 4.26 explains that those regions where the semen is collected desire friction (ἐπιθυμεῖν τῆς τρίψεως; cf. *Pr.* 4.26, 879b13), which explains why some people prefer an active role during sexual intercourse, others a passive one, and still others both an active and a passive one, the semen collecting in both regions.

Desire (ἐπιθυμία), so the author specifies, arises both from food – aphrodisiacs, I assume, which have a pneumatic constitution (as we saw: cf. *Pr.* 30.1, 954a1–3 above) – and from mind (ἀπὸ διανοίας). The latter is also connected with the working of pneuma:

> **T3** ἡ δ' ἐπιθυμία καὶ ἀπὸ σιτίων καὶ ἀπὸ διανοίας γίνεται. ὅταν γὰρ κινηθῇ ὑφ' ὁτουοῦν, ἐνταῦθα τὸ πνεῦμα συντρέχει, καὶ τὸ τοιοῦτο περίττωμα συρρεῖ οὗ πέφυκεν. κἂν μὲν λεπτὸν ᾖ ἢ πνευματῶδες, τούτου ἐξελθόντος, ὥσπερ αἱ συντάσεις τοῖς παισὶ καὶ τοῖς ἐν ἡλικίᾳ, ἐνίοτε οὐθενὸς ὑγροῦ ἐκκριθέντος, παύονται. ὅταν τε κατασβεσθῇ τὸ ὑγρόν *** ἐὰν δὲ μηδέτερον τούτων πάθῃ, ἐπιθυμεῖ ἕως ἄν τι τούτων συμβῇ.
>
> Now the desire arises both from food and from mind. For when one is moved by anything, the pneuma gathers there, and this residue flows along to its natural region. And if (the semen) is light or full of pneuma, when it goes out the erections cease, just as they sometimes do in boys and in older men when no moisture is excreted and when the moisture dries up.[40] But if one experiences neither of these, desire continues until one of these happens.
>
> Ps.-Arist. *Pr.* 4.26, 879b14–21

40 The text is lacunary before ὅταν and after ὑγρόν: see the comments in Flashar 1962, 467, and Mayhew 2011, 1, 168, nn. 14 and 15. The author is probably referring to the idea that boys cannot emit semen but only pneuma and then extends this idea to old men. Cf. *Gen. an.* 1.20, 728a9–17 (above), where the same case is made for children and men (not, however, old, but unfertile men). Cf. also *Pr.* 30.1, 953b36–954a1 (above).

We would like to know how exactly pneuma gathers at the place in which one is moved (in this case the sexual parts), but neither the author nor Aristotle offer an answer to this question. Indeed, to my knowledge, this idea is not clearly present in Aristotle and a degree of liberal interpretation is required in order to infer this from his writings.[41] As is well-known (from *De motu an.* 10), Aristotle attributes an important function to connate pneuma in giving physical effectivity to the motion of the ὀρεκτικὴ ψυχή (i.e., ψυχή operating in its faculty of ὄρεξις); and desire (ἐπιθυμία) is just such a motion.[42] Connate pneuma is dubbed the instrument (ὄργανον) of the soul, by means of which movement is imparted to the body.[43] As such, pneuma both moves and undergoes movement (κινεῖ κινούμενον). Having its seat in the heart (which is the centre of movement and sensation), it is moved by the soul: it expands and contracts, pushes and pulls, and thus causes movement in the body and supplies strength (Arist. *De motu an.* 10, 703a18–21).[44]

In the passage at hand, however, it seems that the author is thinking of a spatial movement of the pneuma from one point in the body to another (it gathers, συντρέχει, in the part that is moved, and the residue flows along, συρρεῖ), but this seems incompatible with Aristotle's belief, at least as formulated in *De motu an.*, that pneuma is – and stays – located primarily in the heart region (10, 703a14–16; cf. also, e.g. *Somn.* 2, 456a7–11).[45] Elsewhere, however, Aristotle actually seems to promote the belief that pneuma can, indeed, travel through the body in a spatial sense. At least, it can "vent" it-

41 The idea that pneuma is present throughout the body by its presence in the blood, formed by pneumatisation (πνευμάτωσις) of nourishment-liquid in the heart, seems to rest on a liberal interpretation of what Aristotle actually writes on this topic (in *Resp.* 20, 479b18–480a16). According to Peck 1942, LXVI, Aristotle's description of the pneumatisation of the blood implies "the charging of it with Σύμφυτον Πνεῦμα and with the special 'movement' …" (cf. also esp. his assumptions on page 593, §32), but as Nussbaum 1978, 376, pointed out, "there is no reference there to the σύμφυτον πνεῦμα, and the whole discussion is intended to explain the pulsation of the heart." *Pace* also, e.g. Hett 1936, 7: "(pneuma) passing along the blood-vessels, pervades the whole body and causes local changes of temperature with consequent expansion or contraction." Even if we were to accept this view, this is still far off from the idea (formulated in the problem chapter at hand) that pneuma assembles at regions in the body that are moved, carrying the residue along. See also n. 45.

42 Cf. also, e.g. *De an.* 3.10, 433a25–26: ἐπιθυμία ὄρεξίς τις ἐστίν. In fact, both desire (ἐπιθυμία) and mind (διάνοια) are movements of the animal according to Aristotle (*De motu an.* 5, 700b17–18), but he refers them to two distinct categories, viz., of ὄρεξις and νοῦς respectively (700b18–19). The concept of κίνησις recurs in the context of sexual desire in *Pr.* 3.11, 872b18–19; 3.33, 876a2–3; 7.2, 886a33.

43 See *De an.* 3.10, 433b16–20; *Gen. an.* 5.8, 789b8–9. For a synopsis, see Peck 1942, 576–578.

44 This probably happens under the influence of cold and heat in the region of the heart. See *De motu an.* 7, 701b13–8.702a5, where we read (702a3) that sexual affections (ἀφροδισιασμοί), among other types of affections, cause heating in the body.

45 Cf. Nussbaum 1978, 157, n. 23: "The inference goes: the *pneuma* is as inseparable locally from the central *arche* as the moved 'point' in a joint is from the unmoved. Therefore, since the *arche* is in the region of the heart or its analogue, the *pneuma* must be there too."

self during sexual intercourse and leave the body via the semen, as we saw.[46] This may be external pneuma. But Aristotle writes that connate pneuma is also present in the sense organs, which are connected, somehow, to the centre of sensation (the heart), which suggests that it is not (only) cardially located after all.[47] The fact that our author writes that "the desire arises both from food and from mind" (ἡ δ' ἐπιθυμία καὶ ἀπὸ σιτίων καὶ ἀπὸ διανοίας γίνεται), may suggest that the two types of pneuma – both external and connate – somehow collaborate in effectuating desire in the body, the connate (governed by the mind) moving the external (from the food), but this is speculative. Yet, there seems to be a parallel for this in the problem about why we breathe in *Pr.* 34.12 (discussed in the introduction), more precisely in the idea that the mind is the steering principle (964b17: κυβερνωμένης δὲ τῆς διανοίας αὐτοῖς) in the process of pushing out and drawing in (external) pneuma in respiration, so as to cool the heat of nature (identifiable as the heat of the connate pneuma: see n. 7). Whatever may be the case, throughout his writings, Aristotle is not always very clear about the precise working of pneuma in the body. He did not completely resolve the obscurity around the concept, and one can infer that it is precisely by his lack of clarity that enough space was left for interpretation.

In what follows I will return to a topic touched upon only briefly in the introduction, namely the general lack of teleological causality in the Aristotelian *Problemata* in favour of a more restrictive materialistic approach.

### 2.3 Causality

The role of pneuma in the actual process of generation (of the embryo) remains unexplored in the *Problemata*. According to Aristotle (*Gen. an.*), the presence of pneuma in the male seed plays a central role in transmitting sentient soul to the embryo. Even though the pneumatic processes described in *Pr.* 4 concern the male exclusively, things related to embryology and the process of reproduction fall outside its scope. This is presumably by reason of the book's more restrictive interest in sexual intercourse as such (as is suggested by its title: ὅσα περὶ ἀφροδίσια).[48] An explanation for this more restric-

46 For "ventilation" of pneuma (in the context of *Pr.* 30.1), cf. Klibansky, Panowsky and Saxl 1964, 30. Cf. *Hist. an.* 9.7, 586a16–17: "In the discharge (ἐξόδῳ) of the seed, pneuma first leads it (ἡγεῖται)"; cf. also *De motu an.* 11, 703b23–26; Ps.-Arist. *Spirit.* 6, 484a14–15.

47 Cf. *Gen. an.* 2.6, 744a1–5 and *De an.* 2.8, 420a10–12. There is much debate about the question as to whether, according to Aristotle, blood or pneuma transports sensory data in the body. For a summary and standpoint, see van der Eijk 1994, 81–87 – he adds a third option (81), suggesting that it is the (warm) flesh that also functions as medium (i.e. for the sense of touch).

48 For the semantic range of the concept of ἀφροδίσια, see Flashar 1962, 456: "Schon die Überschrift des Buches (*sc.* of *Pr.* 4) läßt sich nicht eindeutig übersetzen, denn das Wort ἀφροδισιασμός bzw. ἀφροδισιάζειν wird, gerade auch in diesem Buch, in mehrfachem Sinne gebraucht: 1. 'den Coitus

tive approach is provided by the fact that the *Problemata*, as a whole, show a particular and predominant interest in the material and efficient causes of natural phenomena, whereas in Aristotle's embryology formal causality is at least equally, if not more, essential. In brief, Aristotle believes that the male supplies the form and the female the matter of the embryo (*Gen. an.* 1.20, 729a9–11). The theory that pneuma is present in the seed is, indeed, acknowledged in the *Problemata*, as we saw, but the idea that it is actually the vehicle of the form, which it transmits to the embryo (*Gen. an.* 1.21, 729b20), is absent.[49]

As Mayhew notes: "The discussion in *Pr.* 4 of sexual intercourse employs material explanation nearly exclusively. This emphasis could be explained by the overall or predominate aim (to the extent that there is one) of this set of problems."[50] This can be generalised for the collection of *Problemata* as a whole (as just noted). Nevertheless, in *Pr.* 4 "there is one chapter that explicitly inquires into the final cause of a central aspect of sexual intercourse."[51] This is *Pr.* 4.15, which inquires into the teleology of sexual pleasure: "Why is having sex the most pleasant activity, and is it so for animals out of necessity or for the sake of something (πότερον ἐξ ἀνάγκης ἢ ἕνεκά τινος)?" (*Pr.* 4.15, 878b1–2). As the author will show, the disjunction (ἤ) suggested in the question is too strict, as necessity does not exclude teleology in this case. Pneuma again plays an important role in the explanation, but it is not (at least explicitly) related to Aristotle's hylomorphic embryology.

vollziehen;' 2. 'Geschlechtsverkehr haben;' 3. 'dem Geschlechtsverkehr (intensiv) frönen;' 4. 'beim Geschlechtsverkehr zu aphrodisischem Genuß kommen.'"

49 One problem comes close, though, to formulating a formal explanation in the context of the generation of animal species, viz., *Pr.* 4.13, 878a27: ἐὰν ἐξ ἵππου, ἵππος, ἐὰν δὲ ἐξ ἀνθρώπου, ἄνθρωπος (the author does not speak of the completion of an animal's "form," but its "nature" more broadly: 878a31). The problem at hand is: "Why, if the animal is born from our seed, is it our offspring, but if it comes from some other part or excretion, it is not ours?" (878a1–4). (The allusion is to spontaneous generation.) This is not to say, moreover, that the importance of the soul in the process of generation is denied. E.g. in *Pr.* 10.10 there is allusion to the theory that the soul contributes to generation (but this may be formulated in light of the traditional encephalomyelogenic seed doctrine: cf. *Gen. an.* 2.7, 747a7–22; cf. also, e.g. Alcmaeon (24A13 DK = Aëtius, *Placita philosophorum* 5.3.3); Hippocrates, *De aere, aquis, locis* 22 (Diller 72,10–76,5 = L. 2.76–82); *De natura hominis* 11 (Jouanna 192,15–196,15 = L. 6.58–60)): "Why in the other animals do the offspring resemble the natures (of their parents) more than in humans? Is it because the human, during intercourse, arranges the soul in many ways, and however the father and the mother arranged (their souls), in that way the offspring are varied, but with the other animals most are focused on the act itself? And further, they do not become pregnant in most cases owing to this desire" (*Pr.* 10.10, 891b32–39).

50 Mayhew 2011, 1, 141.

51 Mayhew 2011, 1142 (see also XXII–XXIII). Flashar 1962, 329–330, speaks of the "Materialismus" and the "materialistische Tendenz" of the *Problemata* (although this is an unlucky word choice according to van der Eijk 1990, 69, n. 89). Another exception is *Pr.* 10.19, 892b33–35: "Why is the tongue of animals never fat? Is it because what is fat is dense, but the tongue is naturally porous, so that it may recognize flavors?" On teleology in *Problemata* 10, see Stoyles 2015.

The author first examines if sex is "pleasant either because the seed comes from the entire body (ἀπὸ παντὸς τοῦ σώματος), as some claim (ὥσπερ τινές φασιν), or indeed it does not come from the entire body, but through that region into which all the passages of the veins extend (sc. presumably the testicles: cf. *Gen. an.* 1.5, 717b23-25)?" (*Pr.* 4.15, 878b2–6). The first part of the argument is probably an allusion to the pangenesis-theory found in some Hippocratic writings, according to which seed is drawn from the entire body.[52] The fact that this possibility is left open here is remarkable, since Aristotle explicitly rejected it at length in *Gen. an.* 1.17, 721b11–1.18, 724a13, where the theory is again introduced with ἐπειδή φασί τινες, and where we read (among other arguments) that people adduce the strength of the pleasure (ἡ σφοδρότης τῆς ἡδονῆς) as proof for it. Aristotle rejects this explanation and argues that the cause of this intense pleasure is not so much the fact that the seed is drawn from the whole body but that the titillation is powerful (*Gen. an.* 1.18, 723b35: κνησμός ἐστιν ἰσχυρός). As noted before, such a procedure, by which the author restores a theory that was previoulsy criticised by Aristotle, occurs more often in the *Problemata*, not only in book 4, and may signal a certain aspect of "conceptual plasticity" on the side of the author/s towards the Aristotelian text/theory (see n. 12). In what follows in *Pr.* 4.15, the author notes that it does not really matter which of the two possibilities is correct "since the pleasure from the titillation (κνησμῷ – the same term as in Aristotle) is similar (in both cases)" (878b6): in fact, "this happens just *as if* (ὥσπερ) it came from the entire body" (878b6–7).[53] This remark is, indeed, apposite in the present context, but it bears witness to a certain explanatory flexibility/openness *vis-à-vis* what Aristotle writes. Then again, the fact that a very specific aspect of Aristotle's theory is questioned does not necessarily imply that the author takes a sceptical stance *vis-à-vis* the "bigger picture" from *Gen. an.* (i.e., the hematogenic seed doctrine, which forms the ultimate point of departure for his view on the generation of animals). Rather, it suggests that the alternative/Hippocratic explanation can solve the problem about sexual pleasure just as well.

In what follows (*Pr.* 4.15, 878b8–13), the author of the problem identifies semen with pneumatic moisture (ὑγροῦ ἔξοδος πνευματώδους) that has been enclosed contrary to its nature (ἐγκατακεκλεισμένον παρὰ φύσιν), and he argues that the discharge of such moisture is in accordance with nature (τὸ κατὰ φύσιν ἔξοδος). Therefore, sex is pleasant from necessity, "because the path that is according to nature is pleasant, if it is perceived" (ἡ εἰς τὸ κατὰ φύσιν ὁδὸς ἡδύ ἐστιν, ἐὰν ᾖ αἰσθητή). The idea that pneuma contributes to sexual pleasure by "ventilating" itself is not new (this is probably an allusion to *Gen*

52 Cf. Hippocrates, *De genitura* 1 (Potter 6–8 = L. 7.470–472); *ibid.* 3 (Potter 10–12 = L. 7.474); *ibid.* 8 (Potter 18–20 = L. 7.480–482); *Aer.* 14 (Diller 58,8–26 = L. 2.58–60). Cf. also *Pr.* 4.21, 879a5–6 and 4.32, 880b12–13 (at the very end of book 4). The theory may be Democritean in origin: see 68A141 DK. See Flashar 1962, 464, and Mayhew 2011, 1, 142.

53 On the use of ὥσπερ and (μὴ) ὡσαύτως in the (third book of the) *Problemata*, see Fortenbaugh 2015, 118–122.

*an.* 1.20, 728a9–17, see above). As a special kind of air (analogous to the astral element, i.e., *aithēr*: see above), pneuma probably has a natural (κατὰ φύσιν) tendency to return to its natural place and, thus, to escape containment. By its discharge (ἔξοδος) via the semen we feel relief/pleasure – much as is the case when we breathe (as we saw in the introduction: this stops pain). The fact that this substance actually conveys the form of the male parent to the embryo and imparts movement to it (*Gen. an.* 1.21, 729b20) is parenthesised and not at issue.[54] Neither does the final cause receive much detail: the author argues that sexual pleasure is "for the sake of something (ἕνεκα δέ τινος), viz., in order that there is a generation of animals – for owing to this pleasure, animals are more roused to copulate" (*Pr.* 4.15, 878b12–13).[55] Clearly, this leaves enough space for further elaboration and discussion.

## 3 Conclusions

An important caveat that sould be kept in mind on drawing conclusions from the above analysis is that the scope of this contribution was mostly restricted to problems on sexual intercourse and their relation to Aristotle's writings, so the results remain preliminary. That being said, we have found clear overlaps between Aristotle's concept of pneuma and the pneumatic processes described in the *Problemata* (esp. on sexual intercourse). At the same time the *Problemata* exclusively focus on the material and efficient side of the matter, generally neglecting formal and teleological causes.[56] Moreover, the explanations at times show some openness/flexibility with respect to Aristotle's texts and views. In fact, there are several instances in the *Problemata* where theories that were previously rejected by Aristotle are restored, as if to leave open the possibility that they are plausible, or at least worth taking into consideration (see n. 12). Aristotle had especially

54 A similar conclusion was drawn, *mutatis mutandis*, for *Pr.* 30.1 (the chapter on melancholy) and its un-Aristotelian view on the formation of human character by Schütrumpf 2015, 378–379: "However, for the formation of human qualities other factors than those that are responsible for nutrition and growth are responsible. The part of the soul that listens to reason has to be formed in order to produce the character a man should have, and Aristotle believes that human nature allows for this additional method of influencing one's personality whereas the author of *Pr.* 30.1 in his mono-causal approach only knows the working of black bile." Cf. also 373: "Aristotle's concept of perception as a capacity of the soul (*Eth. Nic.* 6.2, 1139a18) is ignored – or abandoned – in favor of an exclusively physiological explanation."

55 Reference is made to this problem in *Pr.* 10.52, 896b18 (ἄλλο πρόβλημα): "Why does a horse enjoy and desire a horse, and a human a human …?" (10.52, 896b10–11). In *Gen. an.* 2.1, 731b20–732a25, Aristotle deals with the final cause of the existence of the sexes. A summary of the argument is found in Peck 1942, LXXIV: "They sub-serve generation, the perpetuation of the species, and this is the way by which 'perishable' things are able to partake in eternal 'being'."

56 By this I do not imply, of course, that the *Problemata* do not promote a general underlying world view, but rather that this view is primarily physically/physiologically motivated. Flashar 1962 uses its German equivalent: "Weltbild" (e.g. 318 and 331).

shown the complex explanatory value of the concept of pneuma, as being applicable to a wide range of phenomena, but at the same time he left much room for interpretation. As a matter of fact, he declares that "nature effects almost everything using pneuma as a tool" (*Gen. an.* 5.8, 789b8–9).[57]

Despite their mainly material-efficient approach, the *Problemata* seem to employ the concept in a more liberal way than Aristotle's texts allow, and one can only assume that this procedure was deliberate, in view of re-opening these texts for debate, for testing alternative (often Hippocratic) approaches, for venting criticism, etc. While Aristotle attempted to construct a systematic and coherent "science of things," to which his pneumatic theory was instrumental,[58] the genre of *Problemata* made it one of its hallmarks to focus on specific particularities, without therefore abandoning or (explicitly) questioning the "bigger picture" altogether. If this means that the *Problemata* are a mere by-product of Aristotle's main scientific project, it should be added that their ambition was simply different. Their inquisitive approach clearly indicates that they were primarily intended to attach further particulars to the universals of Aristotelian (natural) science[59] and to add, as it were, some question marks to Aristotle's words.[60] These questions are answered with new questions, always leaving room for further inquiry.[61] As such, it turns out that Schopenhauer's claim of *ignorantia* was perhaps not that unfounded after all.[62]

57 Cf. Nussbaum 1978, 163, who describes Aristotle's pneuma as "a hypothetical gap-filler whose workings cannot be scrutinized too closely."

58 E.g. human behavior could be explained in physiological terms, and biological phenomena were placed in a broader cosmological framework – as indicated by pneuma being "analogous to the element of the stars" (*Gen. an.* 2.3, 736b37–737a1). Cf. Nussbaum 1978, 164. Cf. also Solmsen 1960, 454: "Not even the departmentalization of the subjects, which has left fissures and inconsistencies in Aristotle's system, has blurred the coherence and continuity of this new cosmic order."

59 The wording is by Blair 1999, 175: "*Problemata* are one of the ways of attaching particulars to the universals of *scientia* developed in systematic treatises, through commonsensical but often sophisticated reasoning." Alternatively, one wonders if, at least in some cases, we are dealing with problems that did not make the final edit of Aristotle's main scientific writings, perhaps, indeed, precisely because of their at times heterodoxical nature.

60 903 question marks to be precise in Robert Mayhew's recent Loeb Classical Library edition.

61 With the formal edition of Aristotle's works by Andronicus of Rhodes in the first century BCE the genre of natural problems revived and gained in popularity even beyond the confines of the Lyceum. It became embedded also in the Platonic and especially in the ancient medical tradition, which led to the production of new problem collections transmitted under the names of Ps.-Aristotle, Ps.-Alexander, Cassius the Iatrosophist and Plutarch. The final version of the Aristotelian *Problemata* itself (as we have it today) probably dates from the second century CE. Those interested in conducting research on the concept of pneuma in these new, imperial collections should be aware of the strong interference of later intellectual traditions, also outside of the Lyceum (esp. the Platonic and medical traditions). To give just one example: Plutarch is alluding to Platonic-Academic ἐποχή and εὐλάβεια when he says that "the ingenious organisation of nature's activities is beyond the range of words (οὐκ ἐφικτὸν ἔχει τῷ λόγῳ), and it is impossible to explain adequately the exact working of the agencies it employs – that is pneuma and heat" (*Quaestiones convivales* 699B). For a discussion of this passage in light of Plutarch's science of natural problems more generally, see Meeusen 2016, 267, 363.

62 Though I do hope to have provided a portion of the ἰατρεία he so desperately needs (cf. *Eth. Nic.* 7.14, 1154b11–12; quoted n. 24).

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Orly Lewis and David Leith

# Ideas of Pneuma in Early Hellenistic Medical Writers

## Summary

This paper examines the place of pneuma in medical theories and methods of the late fourth and early third centuries. It focuses on three prominent physicians of the period: Diocles of Carystus, Praxagoras of Cos and Herophilus of Chalcedon. We reconstruct their independent ideas concerning the roles of pneuma in health and disease and its relevance to their clinical methods. We argue that pneuma held a more limited role in Diocles' theories than has traditionally been claimed: it was mostly related to cooling the body. We explain the elaborate ideas of Praxagoras and then Herophilus regarding pneuma in light of their original anatomical observations, in particular their respective views regarding pneuma's contribution to motion, sensation and other bodily functions.

Keywords: vessels; brain; heart; nerves; pulsation; respiration; digestion

Dieser Beitrag untersucht die Bedeutung von Pneuma in den medizinischen Theorien und Methoden des späten 4. und frühen 3. Jh. Er fokussiert die drei herausragenden Mediziner dieser Periode: Diokles von Karystos, Praxagoras von Kos, Herophilus von Chalkedon. Wir rekonstruieren ihre voneinander unabhängigen Ideen bezüglich der Rolle des Pneumas bei Gesundheit und Krankheit und seine Relevanz für ihre klinischen Methoden. Wir argumentieren, dass Pneuma in Diokles' Theorie eine geringere Rolle spielte als traditionell angenommen: Es bezog sich meist auf die Kühlung des Körpers. Wir erklären die elaborierten Pneuma-Vorstellungen des Praxagoras und Herophilus im Lichte ihrer anatomischen Beobachtungen, insbesondere den Pneuma-Beitrag zu Bewegung, Empfindung und anderen Körperfunktionen.

Keywords: Gefäße; Gehirn; Herz; Nerven; Pulsschlag; Atmung; Verdauung

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## 1 Introduction

The century following Aristotle's works saw some of the most important changes in the concept of pneuma. This was due not least to new anatomical observations concerning the nervous and cardiovascular systems. The emergence of first two and then three bodily conduction-systems (veins, arteries and nerves) led to the distinction of different types of pneuma holding different functions in the body and to an elaborate pneuma-based physiology and psychophysiology; and the identification of the pulse as a constant and natural phenomenon provided a means for conducting the pneuma around the body. Our earliest evidence for many of these ideas are medical authors of the period, who also incorporated the new theories into their clinical methods. This chapter focuses on three prominent physicians of this period: Diocles of Carystus, Praxagoras of Cos and Herophilus of Chalcedon. Their ideas shaped contemporary debates concerning the human body, health, disease and treatment, and played a key role in subsequent medical and philosophical theories in the hands of authors such as Chrysippus of Soli and Galen. Although the works of Diocles, Praxagoras and Herophilus are lost, citations and reports in later authors offer substantial evidence for their ideas and methods.

The exact dates in which these physicians worked and wrote are not known. However, there is evidence for their acquaintance with Aristotle's writings and ideas,[1] and various clues assist in estimating their respective periods of activity. Diocles was the earliest of the three and worked during the second half of the fourth century, whereas Praxagoras and Herophilus worked in the final decades of the fourth century and early decades of the third century.[2] Diocles wrote extensively on therapeutic methods, physiology and more. The Athenians deemed him "the Younger Hippocrates" and authors in late antiquity and even the Middle Ages still cite his works and opinions. Some passages couple Diocles together with Praxagoras and depict them as holding the same ideas. This has led some scholars to connect the two physicians (even calling Praxagoras a pupil of Diocles), although their anatomical and physiological ideas were often different.[3] Praxagoras is most renowned for his original distinction between veins and arteries in both anatomical and physiological terms, and his claim that arteries hold only pneuma and no blood. He was also the first, as far as our sources attest, to identify the pulse as a natural motion of the heart and arteries alone and begin to establish a diagnostic method based on changes in this motion. Our sources describe Praxagoras as the teacher of Herophilus, who is best known for his identification of the nervous

1 For Diocles, see Jaeger 1938 and van der Eijk 2001, xxxi, 85, 157, n. *ad* Aristotle, 328–330, 332; for Praxagoras, see Lewis 2017, 234–237, 251, 282–284; for Herophilus, von Staden 1989, 117–124; Frede 2011 and Leith 2015.

2 On the dating, see von Staden 1989, 43–50, van der Eijk 2001, xxxi–iv; Leith 2014; Lewis 2017, 2–3. All dates refer to BCE, unless otherwise stated.

3 Wellmann 1901, 11; Rüsche 1930, 163; Jaeger 1938, 225.

system and his extensive theory of the pulse and its diagnostic use.[4] Given the crucial importance of understanding Herophilus' system against the background of his teacher's, our discussion of both doctors has been included in the present chapter. However, the subsequent Hellenistic medical tradition, represented especially by Erasistratus of Ceos and Asclepiades of Bithynia, is very intimately connected to both Praxagoras and Herophilus, and the next chapter in this volume should also be consulted for the light it casts on the theories and approaches examined here.

In what follows we examine the evidence for Diocles, Praxagoras and Herophilus independently. We follow the course laid by our sources, so that the focus for each author differs slightly in accordance with the evidence available to us. The main themes we consider are the sources of pneuma in the body, the anatomical parts through and in which pneuma is active and the functions of pneuma in the body. We focus on its relation to vital functions such as respiration and pulsation as well as intellectual and cognitive functions such as thought, motion and sensation. We consider, too, its relation to the heart, brain, vascular system(s) and nervous system, and also the question of the relation between pneuma and soul in their theories. In contrast to the traditional interpretations which have stressed such a relation (particularly in the theories of Praxagoras and Herophilus), we argue that the authors probably did not incorporate the concept of soul into their explanations of the body and thus did not use pneuma as a means to explain "soul," or vice versa. Through this evidence we trace the changes in the concept of pneuma in the early Hellenistic medical scene and its application in explanations of the body and medical theory and method. In so doing we shed light also on the early reception of Aristotelian ideas by medical authors in the context of both earlier medical ideas and newly-found medical knowledge.

In the cases of all three physicians considered here, the evidence for their views is fragmentary and its reliability often difficult to evaluate. Certain sources, such as Galen, are themselves relatively well understood, so that their methods, motivations and doxographical strategies can be reconstructed to a certain degree. Others, such as the Anonymus Parisinus, are almost completely obscure to us, and hence more difficult to assess critically.[5] We of course look for corroboration or conflict between apparently independent sources, but this is often not available for the technical details of pneumatic physiology and pathology discussed here. We shall address such issues in relation to specific testimonia as required in the course of our discussion. In general, however, our aim has been to place each of these three doctors' pneumatic theories in their own

4 On Diocles see Wellmann 1901, 65–93; van der Eijk 2000 and van der Eijk 2001; Sharma 2012; for Praxagoras: Steckerl 1958; Nickel 2005; Lewis 2017; for Herophilus: von Staden 1989.

5 For a general discussion and evaluation of our sources for Diocles, Praxagoras and Herophilus, see in particular van der Eijk 1999a; van der Eijk 1999b; Lewis 2017, 25–32; von Staden 1989.

context as far as possible, in order to ground suspicions of anachronism or distortion among our sources. The close relationship of Praxagoras and Herophilus naturally helps in reconstructing the development of their theories. The difficulties in locating Diocles in relation to almost any other authority, however, pose acute problems. We have tried to offer a balanced appraisal of the evidence, and have suggested grounds for questioning some more traditional assumptions and approaches to each doctor. Although there is still much work to be done on their medical systems in general, which should cast further light on the issues discussed here, we believe that a largely coherent picture of their theories in connection with pneuma is for the most part possible.

## 2 Diocles

Scholars traditionally ascribe to Diocles the view that pneuma is a distinct kind of air inside the body, which acts as an agent of functions such as motion, sensation, thought and so forth. Rüsche describes it as "soul-pneuma" (*Seelenpneuma*) and van der Eijk notes that "pneuma, as distinct from respired air, played an important cognitive role" in Diocles' theory.[6] However, a close analysis of the evidence calls for caution on this matter. In the extensive corpus of evidence for Diocles' theories there is relatively little information regarding pneuma: in over 240 fragments, there are only about thirty mentions of pneuma, *spiritus* or air inside the body. It is not just a matter of quantity, though. As we shall see, in these fragments of Diocles, air in the body appears more distinctly with regard either to disrupted digestion, or the ventilation and cooling of the body.

### 2.1 Respiration and transpiration

According to Diocles, air enters the body through the pores of the skin (transpiration) and the mouth and nose (respiration). Transpiration is attested in Diocles' discussion of hygiene of the head, which is cited verbatim by Oribasius, the fourth-century CE encyclopedist. Diocles explains there the importance of massaging, anointing, combing, cleaning and close-shaving the head: while massage strengthens the skin of the scalp and anointing makes it softer, "cleaning makes the pores less clogged and better capable of breathing" (ἡ δὲ σμῆξις τοὺς πόρους καθαρωτέρους καὶ εὐπνοωτέρους).[7] The scalp is

6 Rüsche 1930, 152–155, cf. also 144–145; van der Eijk 2001, xxviii, n. 62. See also Wellmann 1901, 15.

7 Oribasius, *Collectiones medicae*, *libri incerti* 40 (Raeder 4.142,2 = Diocles fr. 182, lines 37–38 vdE, tr. van der Eijk). Cf. Galen, *De simplicium medicamentorum temperamentis ac facultatibus* 2.5 (K. 11.472–473 = Diocles fr. 185,26–27 vdE), in which Diocles cites from Archidamus (and seems to agree with him – see van der Eijk 2001, 364) and refers to pneuma which "flows through the flesh" (διὰ τῆς σαρκὸς ῥεῖν). Translations are our own unless otherwise noted.

particularly poor in flesh and would thus allow a smoother flow of air in and out. We know that Diocles assigned the brain and the pneuma around it some functional importance (see below, 98). However, Diocles believed, presumably, that the same process of transpiration occurs throughout the body and not just in the head; at least, there is no evidence to indicate otherwise.

Air or pneuma enters the body also through the process of respiration, that is, through the inhalation of air through the mouth (and nose),[8] the windpipe (and bronchi) to the chest area – "the breathing of the thorax" (*spiratione thoracis adducti*), as one fragment describes it.[9] It is unclear how far Diocles believed that respired air reaches in the body. According to Galen, Diocles (and Philistion of Locri) believed that the benefit derived from respiration was "some kind of cooling of the innate heat" (τῆς ἐμφύτου θερμότητος ἀνάψυξίς τις). Galen describes this idea as one which focuses (ἀποβλέπειν) on the quality (ἡ ποιότης) rather than substance (ἡ οὐσία) of inhaled air.[10] He opposes this view to others which claim that respiration is required for generating the soul (Asclepiades), nourishing it (Praxagoras) or replenishing the pneuma inside the arteries (Erasistratus).[11] Notably, Galen explicitly opposes Diocles' theory both to the view that respiration contributes only a substance *and* to the one that respiration contributes a substance and quality. Since Diocles is not the only author whom Galen places on this side of the debate, it would seem less likely that he distorted Diocles' view simply in order to have an author in the "quality camp." Galen could have just as simply mentioned Diocles together with Hippocrates in the "both quality and substance camp," or not mentioned him at all. It seems that Galen had good reasons to portray Diocles' theory as he did and Galen's claim should thus be taken seriously.

This implies that, for Diocles, respired air did not necessarily go beyond the chest area, where cooling was most required due to the heat in the heart. In other words, his theory of respiration did not require that inhaled air enter the vascular system and spread throughout the body, as many other authors believed. Another passage in Galen supports this interpretation, since it connects explicitly the view that the function of

**8** The idea that air enters the thorax or chest area through the mouth and/or nose was generally accepted in this period. Some authors thought that air inhaled through the nose goes directly to the brain rather than the thorax (cf. Hippocrates, *De morbo sacro* 7.3 = 10 Jones (Jouanna 15,10–12 = L. 6.372), and below, n. 120 for Galen). Our sources offer no information regarding Diocles' view on the path that inhaled air takes from the nose.

**9** Caelius Aurelianus, *De celeris passionibus* 2.16.100 (Bendz 1.196,18–19 = fr. 88, line 45 vdE).

**10** Galen, *De utilitate respirationis* 1.2–3 (Furley/Wilkie 80–82 = K. 4.471–472 = fr. 31 vdE). Cf. *Scholia in Homeri Iliadem* 19.457 (Dindorf 2.681 = fr. 150 vdE), where a dubious reference to Diocles possibly implies that pneuma contributed a (cooling?) quality which helps blood coagulation.

**11** Some, such as Hippocrates, claims Galen, believed that respiration fulfilled both aims: it nourished the pneuma or soul and cooled the body; Gal. *Ut. Resp.* 1.2 (Furley/Wilkie 80 = K. 4.471). The view ascribed to Hippocrates here by Galen can be extracted from the treatise *On the Sacred Disease* although there is no direct statement to this effect there. On this, see Furley and Wilkie 1984, 11–14, and Lewis 2017, 163–164, n. *ad* Hippocrates.

respiration is to cool the body with the view that inhaled air does not linger in the body:

> **T1** δύναται γὰρ ἅπαν ἀντεκπνεῖσθαι καθάπερ τοῖς πλείστοις τε καὶ ἀκριβεστάτοις ἔδοξεν ἰατροῖς τε ἅμα καὶ φιλοσόφοις, οἳ μὴ τῆς οὐσίας ἀλλὰ τῆς ποιότητος αὐτοῦ δεῖσθαί φασι τὴν καρδίαν ἐμψύχεσθαι ποθοῦσαν καὶ ταύτην εἶναι χρείαν τῆς ἀναπνοῆς.
>
> It is possible that (the air) is wholly breathed out again, as most, and indeed the most accurate of the doctors and also the philosophers believed, who say that it is not the essence of the air but its quality that the heart is in need of, since it wants to be cooled, and this (they say) is what respiration is useful for.
>
> Galen, *An in arteriis natura sanguis contineatur* 6.3
> (Furley/Wilkie 168 = K. 4.724 = Diocles fr. 32 vdE, tr. van der Eijk)

Diocles is not mentioned here by name, but Galen presumably has him in mind when referring to those who thought that the cooling quality of respired air is the benefit gained from respiration. These writers, says Galen, believed that the inhaled air is expelled in its entirety upon exhalation, that is, after it has delivered its cooling effect to the area of the heart and has been warmed up by the heat in the thorax. Since the body does not use the actual substance of this air, according to these authors, there is no need for it to spread beyond the thorax.[12] Transpiration would supply any cooling required for the other parts.

### 2.2 Intellectual and cognitive functions of pneuma

A handful of fragments point to the idea of pneuma contributing to higher mental activities. We are told that Diocles described lethargy, which included not only fatigue but also delirium, as "a cooling of the psychic pneuma around the heart and the brain (τοῦ περὶ τὴν καρδίαν καὶ τὸν ἐγκέφαλον ψυχικοῦ πνεύματος κατάψυξις), and a coagulation of the blood that dwells near the heart (τοῦ ταύτῃ συνοίκου αἵματος πῆξις)."[13] The term "psychic pneuma" appears also in a report on Diocles' explanation of headache. Both passages appear in the anonymous treatise on acute and chronic disease (commonly known as the Anonymous of Paris), which was written several centuries after Diocles' time (ca. first century CE). According to the Anonymous, Diocles believed that headaches were caused by an obstruction (ἔμφραξις) in the area of the vessels of the

12 This would suit the physiological theory of Aristotle, who also held that the function of respiration was cooling the chest area.

13 Anonymous of Paris, *De morbis acutis et chroniis* 2 (Garofalo 10,20–22 = fr. 78 vdE).

head.[14] This local pain can, however, become "dangerous when it also affects the commander of the body, the heart, from which according to him (*sc.* Diocles), the psychic pneuma of the body proceeds" (γίνεσθαι δὲ αὐτὴν ἐπικίνδυνον ἐὰν τὸν ἡγεμόνα τοῦ σώματος συνδιαθῇ τὴν καρδίαν, ἀφ' ἧς τὸ ψυχικὸν πνεῦμα τοῦ σώματος ὥρμηται κατ' αὐτόν).[15]

The term "psychic pneuma" is known from later authors, who distinguished different types of pneumata functionally and linguistically. Psychic pneuma was usually opposed to "vital pneuma" (ζωτικὸν πνεῦμα) – the latter having a role in vital functions such as pulsation, whereas the psychic pneuma actively contributed and facilitated functions such as sensation, motion, thought etc.[16] The terms "vital pneuma" and "psychic pneuma" probably came into use only after the time of Diocles, perhaps with Erasistratus of Ceos in the third century, in response to the need to distinguish between two kinds of pneuma in two different conduction systems.[17]

The Anonymous ascribes to Diocles the idea that changes in the pneuma are the causes for other conditions affecting mental activity. An example is the case of apoplexy. This acute disease entailed motor and sensory paralysis of the entire body, which affected not only the limbs but even the face, so that the person could not speak or move their eyes.[18] According to the Anonymous, Praxagoras and Diocles said that this occurs when "cold and thick phlegm" gathers in the region of the artery, "so that inside it no pneuma whatsoever can blow through and, thus, the entire (pneuma in the body) is in danger of being stifled" (ὡς μηδ' ἐν αὐτῇ οὐχ ὅτι πνεῦμα παραπνεῖσθαι δύνασθαι· καὶ οὕτω κινδυνεύειν τὸ πᾶν ἐγκαταπνιγῆναι).[19] Diocles ascribes also epilepsy to an obstruction (ἔμφραξις) which limits or blocks the passage of the pneuma.[20] In regimen instructions cited verbatim from Diocles' works, he remarks that those sleeping on the back are prone to nocturnal respiratory difficulty (δύσπνοια), chocking (πνιγμοί), epileptic attacks (ἐπιληπτικά) and emissions of seed.[21] This suggests a connection between seizures of the epileptic kind and respiratory problems. It might have been, therefore, the source for the Anonymous' claim that Diocles regarded obstructions of pneuma as the cause of epilepsy. In other words, Diocles himself might have referred to an obstruction of

**14** On the concept of "obstruction" in Diocles see van der Eijk 2001, xvii, xxviii.

**15** Anon. Par. 5 (Garofalo 30,15–19 = fr. 80 vdE, tr. van der Eijk). A passage on the causes of epilepsy also mentions a blockage of "pneuma coming from the heart," although that phrase refers only indirectly to Diocles. See Anon. Par. 3 (Garofalo 18,12–13 and then lines 16–18 = fr. 98 vdE).

**16** On this concept see the chapters by Leith, Rocca and Singer in this volume.

**17** See Lewis 2017, 167, n. *ad* psychic pneuma, 295, 298 and see the chapter by Leith in the present volume.

**18** Anon. Par. 4 (Garofalo 26), Cael. Aur. *CP* 3.5.46–56, (Bendz 1.320–326); Clarke 1963; Karenberg 1994.

**19** Anon. Par. 4 (Garofalo 24–26 = fr. 95 vdE).

**20** Anon. Par. 3 (Garofalo 18,16–20 = fr. 98 vdE).

**21** Orib. *Coll. med.*, *Lib. inc.* 40 (Raeder 4.144,19–21 = fr. 182, lines 152–154 vdE).

respired air on its way to the chest for the sake of cooling, even if the Anonymous' presentation depicts it as related to a pneuma facilitating psychological functions.[22]

The explanation of lethargy refers not only to changes in the pneuma but also in the blood around the heart. This suggests that changes in the blood were related to the characteristic signs of lethargy. Other passages point more explicitly to the importance of blood with regard to mental activity. In *mania*, for example, a qualitative change of the blood appears to be connected more directly with mental derangement:

> **T2** ὁ δὲ Διοκλῆς ζέσιν τοῦ ἐν τῇ καρδίᾳ αἵματός φησιν εἶναι χωρὶς ἐμφράξεως γινομένην, διὰ τοῦτο γὰρ μηδὲ πυρετοὺς ἔπεσθαι· ὅτι δὲ ἐπὶ ζέσει γίνεται τοῦ αἵματος, δηλοῖ ἡ συνήθεια, τοὺς γὰρ μανιώδεις τεθερμάνθαι φαμέν.
>
> Diocles says that (mania) is a boiling of the blood in the heart which occurs without an obstruction and that for this reason it is not accompanied by fevers either. That it occurs during the boiling of the blood is made clear by the manner in which we speak, for we say that those suffering from mania are heated.
>
> Anon. Par. 18 (Garofalo 112,21–114,1 = Diocl. fr. 74 vdE)

Notably, pneuma is not mentioned at all in this explanation of *mania*, an affection clearly related to the overall cognitive and intellectual state of the patient. Nor is it mentioned in Diocles' explanation of phrenitis, another condition characterised by deranged behaviour, such as delirium, laughter and repetitive motions. Even in the case of melancholy, which on the Anonymous' account Diocles considered a mental impairment (although Diocles probably had not),[23] there is no mention of pneuma in the Anonymous' report.[24] In other words, pneuma is absent from the Anonymous' accounts of Diocles' explanations of some of the most prominent mental conditions. It features in the explanations of apoplexy and epilepsy, as well as lethargy and indirectly for headache, but these passages raise some questions regarding the importance that Diocles himself had assigned pneuma in such cases. In the passage on apoplexy, the Anonymous couples him with Praxagoras so that Diocles' independent voice is not heard.[25] In lethargy blood also plays a role, and in headache pneuma is only mentioned indirectly, in the Anonymous' remark (which is probably his own late addition) that Diocles believed the heart to be the source of the psychic pneuma. It is only in the passage on epilepsy that

22 This could also fit well with the emission of seed – presumably the respiratory problems would mean that the cooling of the body was harmed, and the heating could cause a flow of semen. Cf. Orib. *Coll. med.* 6.38,8–9 (Raeder 1.189), on heat and the emission of semen.

23 See Galen, *De locis affectis* 3.10 (K. 8.187–188 = fr. 109, lines 45–63 vdE) and van der Eijk 2001, 221.

24 Anon. Par. 19 (Garofalo 116,23–25 = fr. 108 vdE).

25 The Anonymous also uses distinctively Praxagorean terminology in this passage, e.g. ἀρτηρίαι and "thick artery" – see below, 108–109.

the Anonymous mentions pneuma and not blood when discussing Diocles explicitly and independently of Praxagoras,[26] although he initially connects their views.[27]

All this calls for caution as regards Diocles' ideas concerning the functions of pneuma in the body. The evidence above offers only weak indications for Diocles considering pneuma as the agent of mental activity, and it is blood which receives more attention in this context. Three further passages require some consideration here, since they attest to the significance of pneuma in Diocles' theory of the body. There are, however, substantial reasons to question their reliability.

(i) The first passage includes a claim by Diocles about the importance of pneuma over blood. It appears in an anonymous source which discusses ancient views on the production of semen. The view of Diocles is given considerable attention and the author presents him as arguing against the view that semen is produced from blood. According to the anonymous author, among Diocles' arguments we find the claim that "pneuma seems to be more important in us (*sc.* than blood)" (*in nobis magis summus videatur spiritus*). Indeed, blood, he continues, "cannot even move itself" (*neque per se moveri potest*); unlike pneuma, presumably.[28] But what are the implications of this statement, and how reliable is the ascription of this claim to Diocles?

As van der Eijk has shown, although the author may have based his presentation of Diocles' arguments on ideas he found in Dioclean material, there are good reasons to believe that at least part of the debate is staged by the author in order to achieve his own aims. Moreover, although the author presents this and other claims as direct citations from Diocles, it is more likely that they are renditions by the author (or intermediary sources) of Diocles' view.[29] Van der Eijk rejects, for one, Jaeger's conclusion that with this claim about the pneuma, Diocles wanted to argue for a connection between seed and pneuma.[30] Other sources attest to Diocles' belief that seed originates from the marrow and brain.[31] While this may point to a non-haematic origin of semen in Diocles' theory, it does not appear to point to a connection with pneuma. As van der Eijk suggests, Diocles might have simply tried to say that pneuma is more important than blood (and that hence the argument for an haematic origin of blood based on the supremacy of blood in the body is invalid).[32] This claim about the importance of pneuma over blood and the implied claim that pneuma can move itself might be based on a direct statement by Diocles or rather on a conjecture by the author (or his intermediate source). We should consider, however, that Diocles' claim or ideas on which this report rests, did

**26** Anon. Par. 3 (Garofalo 18,18–20 = fr. 98, lines 10–11 vdE).

**27** *Ibid*. (Garofalo 18,16–17 = fr. 98, lines 8–9 vdE).

**28** Anonymous of Brussels (Wellmann 209,21–23 = fr. 40, lines 39–40 vdE).

**29** See van der Eijk 2001, 79–85.

**30** Jaeger 1938, 209; van der Eijk 2001, 87, n. *ad* 38–40.

**31** Codex Marcianus, Diels 1879, 233, and Ps.-Galen, *Definitiones medicae* 439 (K. 19.449 = frs. 41a–b vdE); cf. Orib. *Coll med.*, *Lib. inc.* 40 (Raeder 4.145,35–37 = fr. 182, lines 221–223 vdE).

**32** See van der Eijk 2001, 87.

not necessarily refer to pneuma in the technical sense, namely as an active agent with a function beyond that of cooling the body. He may have simply referred to respired air with its cooling affect and its ability to move as wind. The terminology was far from set at the time, and was still fluid in later authors: there was no consistent terminological distinction between external air, inspired air and internal air holding defined functions inside body.[33] Hence this fragment too, beyond the questions regarding its broader reliability and credibility, is no strong evidence for Diocles holding a concept of pneuma in the sense known to us from other sources, such as Aristotle and *On the Sacred Disease*.

(ii) A second passage refers to an "innate pneuma" (ἔμφυτον πνεῦμα). This term was associated especially with Aristotelian theory and referred to an inborn pneuma working inside the body from an early stage and independently from the body's interaction with external air.[34] This is the only fragment attesting to this concept for Diocles and its reliability in this respect is questionable. It appears in the Anonymous of Paris' discussion of the cause of *boulimos*, ravenous appetite. It is necessary to cite the fragment in full in order to demonstrate the problems undermining its reliability.

**T3** Ὀνομαστὶ μὲν τοῦ πάθους οἱ ἀρχαῖοι οὐκ ἐμνήσθησαν, κατὰ δὲ τὴν τούτων ἀκολουθίαν φαμὲν αὐτὸν γίνεσθαι κατὰ ψύξιν μὲν τοῦ ἐμφύτου πνεύματος, κατὰ πῆξιν δὲ τοῦ <τῶν> ἐν μεσεντερίῳ φλεβῶν αἵματος· ταῦτα γὰρ αἴτια καὶ τῆς ὀρέξεως. ὁ δὲ Ἱπποκράτης ἐν τῇ Διαιτητικῇ, ὁ δὲ Πραξαγόρας ἐν τῇ Περὶ νούσων, ὁ δὲ Διοκλῆς ἐν τῇ Περὶ πέψεως· εἴπερ οὖν ἡ ἀνειμένη ὄρεξις μικρός ἐστι λιμός, ἡ ἐπιτεταμένη βούλιμος ἂν εἴη. ὅτι δὲ ψῦξις ἐστὶ τοῦ θερμοῦ καὶ πῆξις τοῦ αἵματος, πιστοῦται τὸ ἐπιπολάζειν ἐπὶ γέροντας τὸ πάθος μάλιστα, πολλάκις καὶ ἐν χειμῶνι.

The ancients did not mention this affection by name, but in consequence of their (doctrines) we say that it arises on account of the cooling of the innate pneuma and of the coagulation of the blood in the veins of the mesentery; for these are the causes also of appetite. And Hippocrates in his *On Regimen*, Praxagoras in his *On Diseases* and Diocles in his *On Digestion* (say so). If, then, the mild appetite is a weak hunger, then the increased (appetite) would be a ravenous hunger. That (the causes) are a cooling of the heat and a coagulation of blood is proved by it being common in particular among old people and occurring often in winter as well.

Anon. Par. 11 (Garofalo 80,23–84,10 = Diocl. fr. 34 vdE)

33 E.g. Galen, *De differentiis febrium* 1.2 (K. 7.278).

34 For the concept of innate or connate pneuma, see also the chapters by Gregoric and Repici in this volume.

The Anonymous ascribes here a single common view to different authors, whom he mentions by name together with their relevant treatises. However, the Anonymous also admits explicitly that he is conjecturing from these sources. Diocles, Praxagoras and Hippocrates did not discuss *boulimos* and perhaps not even the phenomenon of ravenous appetite under a different name. The Anonymous' formulation indicates that the he might have only had at his disposal their explanations of the *natural* process of appetite. True, these authors may have explained appetite by the terms used here by the Anonymous, but this is highly uncertain. Indeed, even the Anonymous himself, when repeating the cause of the condition no longer refers to the cooling of the innate pneuma but rather to the "cooling of the heat."[35]

Moreover, in the many Hippocratic treatises which have reached us, the evidence for these ideas is very poor. Not only is there no mention of an innate pneuma or a similar concept, but pneuma is usually considered naturally cold. There is no explicitly relevant passage in the Hippocratic *On Regimen* or in any other extant work in the Hippocratic Corpus, which could stand at the base of the Anonymous' report here. The Anonymous would have had to conjecture based on a collection of passages on digestion and hunger in *On Regimen* and other works.[36] For Diocles (as for Praxagoras) the reference to heat, if anything, would better suit their theories regarding nutrition and digestion.[37] In light of this, there seems to be no clear or reliable evidence to indicate that Diocles held a concept of "innate pneuma" similar to that known from Aristotle.

(iii) A third fragment is also from the Anonymous of Paris, in the discussion of the causes of syncope, a condition involving breathing difficulties, heavy sweating, the feeling of heat and bowel problems. Here the author indirectly ascribes to Diocles the idea that pneuma is the "*hexis*" of the body. This is another case in which the Anonymous collates ideas of different physicians, and presumably his own too, into a single opinion. This time the Anonymous does not mention Diocles, or any other author, by name, but refers simply to "the ancients" (οἱ παλαιοί), a term he repeatedly uses to collectively refer to Diocles, Praxagoras, Hippocrates and Erasistratus.[38] He claims that they thought the condition:

> **T4** γίνεσθαι δὲ αὐτὸ ὑπὸ φλεγμονῆς ἐκτονιζομένου τοῦ πνεύματος καὶ λυομένου καθάπερ λιβανοῦ τῷ πυρὶ ὁμιλήσαντος, ὃ ἦν αὐτὸ καὶ τῷ σώματι ἕξις.

35 For the Anonymous' use of the formula "in consequence of their doctrines," see van der Eijk 1999b, 315–317; van der Eijk 2001, xv–xvi, 69–70; on its implications in this passage, see also Lewis 2017, 182–183.

36 E.g. Hippocrates, *De victu* 60 (Joly/Byl 182,31–184,2 = L. 6.574), *De vetera medicina* 10.4, 11.2 (Jouanna 130–131, 132 = L. 1.592–594); cf. Lewis 2017, 182–186, *nn. ad* lines 2–3, 5.

37 Cf. Galen, *De naturalibus facultatibus* 2.8 (Helmreich 186 = K. 2.117) and van der Eijk 2001, 55, n. *ad* 37–40, 219–220, n. *ad* 24–35, and Lewis 2017, 186, n. *ad* 5.

38 On this see van der Eijk 2001, 16–17, and van der Eijk 1999b, 313–314.

> occurs as a result of an inflammation, when pneuma is losing *tonos* and is loosened, just like incense which has been in contact with fire, which itself was also the *hexis* of the body.
>
> Anon. Par. 10 (Garofalo 72,7–9 = Diocl. fr. 104 vdE, tr. by van der Eijk, slightly modified)

The terminology in this passage reflects the idea of pneuma as a *hexis* and synectic force or cause, which possesses a *tonos* and holds the body together. When it weakens, or "is loosened" (*luesthai*) it causes illness. This idea is first attested in our sources for the Stoics and it was later introduced into medical theory by the Pneumatist physician Athenaeus.[39] Not only the idea itself but also the terminology is characteristic of this later tradition and the Anonymous himself seems to have applied this concept in a clinical context.[40] There is, however, no evidence for its incorporation into Diocles' doctrines (nor into that of Hippocrates, Praxagoras or Erasistratus, for that matter). While this argument from silence does not prove that Diocles *could not* have held this idea, it calls for caution, in particular in light of the terminology in which it is described, which is associated with periods later than Diocles'. It is possible that the ancient authors had mentioned inflammation as a cause and perhaps even some problem with pneuma, but they probably did not describe it in the terms of loss of *tonos* and harm to the body's *hexis*. Nevertheless, the Anonymous' mingling of all their views into one, means that we do not know whether Diocles had mentioned pneuma in describing such pathological conditions, or only some of the other physicians the Anonymous has in mind here.

### 2.3 The heart and brain

As we have seen above, in his discussion of headache the Anonymous of Paris claims that Diocles considered the heart the source of the psychic pneuma.[41] We find a similar claim in the fragment on phrenitis. There the Anonymous is more careful, however, and introduces the report with a qualification: "(Diocles) *seems* to posit reasoning" (ἔοικε ... τὴν φρόνησιν ... ἀπολείπειν) around the heart.[42] Regardless of whether Diocles actually used the term "psychic pneuma," these passages reflect the Anonymous' belief that Diocles held a cardiocentrist view, that considered the heart as the crucial organ for cognitive and intellectual activity. As noted by van der Eijk, it seems that in this passage on phrenitis the Anonymous is making a particular effort to connect the disease to the heart

39 See the chapter by Coughlin and Lewis in the present volume.

40 For example: Anon. Par. 10, 42 (Garofalo 80,12–13, 218,2–4); cf. Lewis 2020, 29–30.

41 See p. 97–98 above.

42 Anon. Par. 1 (Garofalo 2,12–13 = fr. 72, lines 11–12 vdE, tr. van der Eijk).

in Diocles' explanation.[43] The Anonymous might be doing a similar thing in his report of Diocles' views of melancholy. He couples him with Praxagoras as holding the view that the affection is the result of an accumulation of black bile around the heart. However, in an extensive report by Galen on Diocles' view of a disease "some call *melancholia*" neither Galen's discussion, nor the passages he cites verbatim from Diocles' work, mention the heart, or black bile for that matter. It is not at all clear that Diocles connected this affection to mental impairments; Galen actually says explicitly that Diocles did not explain the cause of mental dysfunctions in his discussion of the affection.[44] Almost all of our evidence for Diocles holding a cardiocentrist view is found in the Anonymous. Besides these passages, the description of mania as the boiling of the blood around the heart also implies a cardiocentrist view. But in the other passages from the Anonymous the credibility of the evidence on this point is undermined.

Our sole testimony outside the Anonymous for Diocles assigning the heart a role in mental functions, is a dubious Latin fragment, which cites Diocles as describing the brain, or at least both the brain and heart, as the locations of soul (*anima*).[45] A similar idea is suggested in the reports on Diocles' view of lethargy. The Anonymous of Paris himself says that Diocles explained the condition with reference *both* to the head and heart. Moreover, Diocles explicitly singled out the head as the part in which lethargy arises, according to the fourth-century CE physician Caelius Aurelianus, whose works rest to a great extent on those of the second-century CE physician Soranus. Tellingly, Caelius, who refers to the particular treatise in which Diocles discussed this condition, criticises Diocles for not applying any treatment to the heads of patients suffering from lethargy, although "he himself believes the cause of the affection to be located (in the head)."[46] From the available evidence it thus seems that despite the Anonymous' attempts, Diocles cannot be placed into one of the common pigeon–holes of assigning either the heart or the brain a leading role. He reflects rather a combined view, in which both organs play a role.[47] It might reflect an adoption of different views available at the time, and perhaps conclusions, from his own anatomical investigations, about the utility of both organs for intellectual and cognitive activities.[48]

**43** Cf. van der Eijk 2001, nn. *ad* 11 and 13.

**44** Gal. *Loc. Aff.* 3.10 (K. 8.185–189 = fr. 109 vdE).

**45** Anon. Brux. (Wellmann 211,13–14 = fr. 40, lines 71–72 vdE). See van der Eijk 2001, 79–85, on this source and its credibility as evidence for Diocles' theories.

**46** Cael. Aur. *CP* 2.7.33 (Bendz 150,6–8 = fr. 79, lines 14–15 vdE).

**47** Such a view would not be alien to the period – Plato's theory of the tripartite soul is the most prominent example, although this does not necessarily mean that Diocles was using Plato's views.

**48** Cf. Harris 1973, 105–106.

### 2.4 Pathological pneuma

Regardless of the extent to which air contributed to the body's functioning, Diocles believed that in certain cases air *disrupted* the healthy functioning of the body.[49] Such was the case, for instance, in those suffering from the digestive disturbance called flatulence (φυσῶδες) or *melancholikon* (μελαγχολικόν).[50] A verbatim citation from Diocles' work *Affection, Cause, Treatment* (Πάθος, αἰτία, θεραπεία) describes this condition as follows:

> **T5** (It occurs) after the consumption of food, especially foods that are difficult to digest and that are burning, there are sour eructations, much watery spitting, pneuma, a burning feeling near the abdomen, and a gurgling (which happens) not immediately but to people who wait a while; sometimes also strong pains occur in the stomach, which in some people extend to the broad of the back.[51]
>
> Gal. *Loc. Aff.* 3.10 (K. 8.186 = Diocl. fr. 109, lines 10–14 vdE, tr. van der Eijk)

It appears that Diocles recognised the problem of disruptive air in the digestive system as a chronic condition which begins at a young age[52] and which required particular prophylactic measures and dietetic habits. A long verbatim citation has reached us from a text in which Diocles sets out systematically a daily regimen for maintaining health. In this he repeatedly singles out "flatulent" people (φυσώδεις) as possessing a particular nature which requires particular dietetic behaviour and which he contrasts with the regimen requirements of "others" (οἱ λοιποί, οἱ ἄλλοι).[53] This includes, for instance, waking up late rather than at daybreak and avoiding walks before going to sleep.

According to Galen, Diocles considered the cause of the affection to be the overheating of veins and an obstruction of the veins and stomach due to thick blood.[54] He cites Diocles verbatim on this point:

**49** In addition to the passages discussed in this section, Anon. Par. 15 (Garofalo 102,1–4 = fr. 126 vdE), might be another testimony for Diocles' conception of a non-physiological pneuma (i.e. a pneuma which does not contribute to activity). The fragment refers to "the ancients'" indirect explanation of colic as an inflammation of the colon or "persistence of thick pneumata" (παχέων πνευμάτων μονή) in it; but it is uncertain what, if any, part of the fragment reflects Diocles' opinion.

**50** Gal. *Loc. Aff.* 3.10 (K. 8.186 = fr. 109, lines 9–10 vdE) for the name of the condition, cf. Galen, *In Hippocratis epidemiarum libros* 6.3.12 (Wenkebach 138 = K. 17B.29 = fr. 110 vdE). On the relation between melancholic conditions and pneuma see the references in the chapter by Meeusen, 70–76, in this volume and in van der Eijk 2001, 225, n. *ad* 1.

**51** Gal. *Loc. Aff.* 3.10 (K. 8.186 = fr. 109 vdE).

**52** *Ibid.* (K. 8.186 = fr. 109, lines 18–20 vdE).

**53** Orib. *Coll. med.*, *Lib. inc.* 40, (Raeder 144,12–15, 29–31, 145,31–32 = fr. 182, lines 145–148, 165–167, 216–217 vdE).

**54** Gal. *Loc. Aff.* 3.10 (K. 8.186 –187 = fr. 109, lines 21–35 vdE).

**T6** τοὺς δὲ φυσώδεις καλουμένους ὑπολαμβάνειν δεῖ πλεῖον ἔχειν τὸ θερμὸν τοῦ προσήκοντος ἐν ταῖς φλεψὶ ταῖς ἐκ τῆς γαστρὸς τὴν τροφὴν δεχομέναις, καὶ τὸ αἷμα πεπαχύνθαι τούτων.

One must suppose that those who are called flatulent have more heat than is appropriate in the veins that receive the food from the stomach, and that their blood has thickened.

Gal. *Loc. Aff.* 3.10 (K. 8.186–187 = Diocl fr. 109, lines 23–26 vdE, tr. van der Eijk)

It seems that the overheating is what causes the thickening of the blood which then obstructs the veins.[55] The evidence does not indicate whether this faulty digestive process was what produced the air in the first place, or whether the air had entered during ingestion, but could not be integrated and expelled easily on account of the disrupted digestion. Nor is it clear whether the air is present in the veins or only the stomach. Be that as it may, it does not seem that the air causes any harm or discomfort beyond the digestive system and its parts. Its only effects were related to physical discomfort in the stomach and upper digestive passage, as the list above indicates.[56] Indeed, Galen who considered *melancholia* an affection of the mind, explicitly notes that Diocles "did not describe (the cause) of the actual disturbance of the mind" (αὐτοῦ δὲ τοῦ βλάπτεσθαι τὴν διάνοιαν οὐκ ἔγραψεν).[57]

## 3 Praxagoras

In Praxagoras we find a more direct engagement with the topic of pneuma and its activity in the body. He described pneuma as a "somewhat dense and quite vaporous" substance (παχυμερέστερον καὶ ἱκανῶς ἀτμῶδες)[58] which moves through the arteries. Praxagoras identified arteries (ἀρτηρίαι) as a distinct vascular system, which differ from veins by their structure, continuous pulsating motion, and contents.[59] Under natural conditions the arteries hold only pneuma ("are instruments of pneuma alone," πνεύματος ὄργανα μόνου): they are "clean of humours" (χυμῶν καθαραί) and take no "share in blood", which moves through the venous system.[60] The absence of blood and other humours

55 Cf. van der Eijk 2001, 219–220.

56 Gal. *Loc. Aff.* 3.10 (K. 8.186 = fr. 109, lines 10–20 vdE).

57 *Ibid.* (K. 8.188,9 = fr. 109, line 53 vdE, tr. van der Eijk).

58 Gal. *Art. Sang.* 2.2 (Furley/Wilkie 148 = K. 4.707 = fr. 18, lines 9–10 Lewis).

59 See Lewis 2017, 220–232.

60 Galen, *De dignoscendis pulsibus* 4.3 (K. 8.941–942, 8.950 = frs. 14, 12 Lewis); *De plenitudine* 11 (Otte 72 = K. 7.753–754 = fr. 13 Lewis).

allows the pneuma to move freely through the arterial system and to maintain its natural healthy qualities with respect to temperature and texture.

### 3.1 Pneuma and pulsation

It is not accidental that pneuma flows in the arteries. They are filled with pneuma "because they expand and pulsate": they actively *draw* it into their hollows when expanding.[61] This idea of Praxagoras implies a teleological conception of pneuma: it is intentionally and actively drawn into the arteries. The teleological conception is reflected also in the mechanism by which pneuma is drawn into the arteries, namely by an innate faculty in their walls:

> **T7** τινῶν μὲν ἡγουμένων αὐτὰς (*sc.* τὰς ἀρτηρίας) ἐξ ἑαυτῶν σφύζειν, σύμφυτον ἐχούσας ὁμοίως τῇ καρδίᾳ τὴν τοιαύτην δύναμιν, ὧν ἐστι καὶ ὁ Πραξαγόρας.
>
> Some of them believed that (*sc.* the arteries) pulsate on their own accord, since they possess such an ability innately, as the heart does – Praxagoras, too, was one of these.
>
> Galen, *De differentia pulsuum* 4.2 (K. 8.702 = Praxagoras fr. 9 Lewis, lines 10–11)[62]

The ability to pulsate means an ability to expand and contract and in so doing to draw in pneuma (while expanding) and then push it out (while contracting). The innateness of this ability is emphasised in Praxagoras' claim that an artery will continue to move even if one were to cut it out of the body, so that it becomes disconnected from the heart and other arteries.[63] Praxagoras conceived of the arteries as one connected system stemming from the vessel he called "the thick artery" (ἡ πάχεα ἀρτηρία). This was the name he used for the aorta, the vessel which stems from the left side of the heart and runs down the back.[64] Through the thick artery, therefore, the entire arterial system was ultimately connected to the heart. The connection to the heart allowed pneuma

**61** Galen, *De placitis Platonis et Hippocratis* 6.7.1–2 (De Lacy 404–406 = K. 5.560–562 = fr. 10 Lewis): διότι (*sc.* αἱ ἀρτηρίαι) διαστέλλονταί τε καὶ σφύζουσι, διὰ τοῦτο πληροῦσθαι (πνεύματος) ("because they expand and pulsate, this is why they are filled with pneuma"). Erasistratus later advocated the converse view, namely, that the filling and expansion of the arteries with pneuma is due to the heart pushing it into them upon its contraction – arterial pulsation is a result of pneuma flowing in, rather than the cause for this flow (Gal. *Diff. Puls.* 4.2, K. 8.703 = fr. 110 Garofalo; see further the chapter by Leith in this volume).

**62** Cf. Gal. *PHP* 6.7.1–7 (De Lacy 404–406 = K. 5.560–562 = fr. 10 Lewis).

**63** *Ibid*.

**64** Rufus of Ephesus, *De nominibus humani corporis partium* 209, (Daremberg/Ruelle 163 = fr. 1 Lewis); cf. Lewis 2017, 220–221.

from there to reach the entire body through the arteries extending to the different parts. Praxagoras recognised that arteries become so narrow at their extremities that "their hollows become so small that their walls collapse on one another" (γιγνομένων μικρῶν τῶν κοιλοτήτων ὡς ἐπιπίπτειν ἀλλήλοις τοὺς χιτῶνας). Consequently, the narrow extremities of the arteries "loo[k] like a *neuron*."[65] At the time, the term *neuron* did not yet refer to conduits carrying motor and sensory faculties or impulses between a cognitive centre and the parts. It referred, rather, to solid cords which contributed to motion by mechanically moving muscles and bones, such as ligaments and tendons. Praxagoras, however, probably did not mean that the extremities of the arteries cease to play their role as vessels and become such cords. Rather, he was simply describing their structural character: they look like these cords because they are so narrow and because all arteries are *neura*-like in so far as they are harder and more flexible than veins. Functionally, however, they continue to serve as arteries, i.e. as conduits carrying pneuma to the parts.[66]

### 3.2 The sources of pneuma

The cardiac source of the arterial pneuma is attested directly and indirectly for Praxagoras. Galen lists Praxagoras among those who claim that the pneuma is drawn from the heart "and from everywhere."[67] We should not read this reference to the drawing of pneuma "from everywhere" as evidence for Praxagoras' adoption of the concept of transpiration into his physiological theory. Galen himself is not thinking only of the passage of external air through the skin and arterial walls. For Galen, pneuma was drawn from "everywhere" *inside* the body: not only from the heart but also from veins through the mouths of the arteries at their anastomoses. Moreover, there is some doubt regarding the reliability of Galen's ascription here of this attraction "from everywhere" to Praxagoras.[68] As regards the attraction from the heart – through the "pipeline" or "tree-like" connection of the arterial system – we have further evidence from the Anonymous of Paris, for example in his report on Praxagoras' description of epilepsy:

> **T8** Ἐπιληψίας αἰτία. Πραξαγόρας περὶ τὴν παχεῖαν ἀρτηρίαν φησὶ γίνεσθαι φλεγματικῶν χυμῶν συστάντων ἐν αὐτῇ· οὓς δὴ πομφολυγουμένους ἀποκλείειν τὴν δίοδον τοῦ ἀπὸ καρδίας ψυχικοῦ πνεύματος καὶ οὕτω τοῦτο κραδαίνειν καὶ σπᾶν τὸ σῶμα· πάλιν δὲ κατασταθεισῶν τῶν πομφολύγων παύεσθαι τὸ πάθος.

65 Gal. *PHP* 1.6.18 (De Lacy 82,7–9 = K. 5.188 = fr. 3, lines 23–24 Lewis).

66 For a detailed discussion see Lewis 2017, 220–222, 278–284.

67 Gal. *Art. Sang.* 8.1–2 (Furley/Wilkie 176–178 = K. 4.731–732 = fr. 11 Lewis).

68 See Lewis 2017, 141, 257–259; cf. von Staden 1989, 263–264.

> The cause of epilepsy. Praxagoras says that (epilepsy) arises in the region of the thick artery when phlegmatic humours form inside it. These, (he says), when they bubble, block the passage of the psychic pneuma coming from the heart and this thus shakes the body and causes spasm; and when the bubbles settle down again the affection comes to an end.
>
> Anon. Par. 3 (Garofalo 18,10–15 = Prax. fr. 25,1–5 Lewis)

We have noted in our discussion of Diocles some problems with the Anonymous' report. As in the case of Diocles, Praxagoras probably did not use the term "psychic pneuma." However, the reference above to the thick artery (ἡ παχεῖα ἀρτηρία), a term explicitly associated with Praxagoras by another source (see n. 64 above), strengthens the reliability of this report regarding Praxagoras, as does the additional evidence on Praxagoras' ideas of pneuma moving through arteries. Moreover, the reference to pneuma in this artery implies a cardiac source because of its direct connection to the heart. A problem in this "trunk" of the arterial system brings about an impairment of the entire body. This is the case also in apoplexy:

> **T9** Ἀποπληξίας αἰτία. Πραξαγόρας καὶ Διοκλῆς περὶ τὴν παχεῖαν ἀρτηρίαν γίνεσθαί φασι τὸ πάθος ὑπὸ φλέγματος ψυχροῦ καὶ παχέος ὡς μηδ' ἐν αὐτῇ οὐχ ὅτι πνεῦμα παραπνεῖσθαι δύνασθαι· καὶ οὕτω κινδυνεύειν τὸ πᾶν ἐγκαταπνιγῆναι.
>
> The cause of apoplexy. Praxagoras and Diocles say that the affection is generated in the region of the thick artery by cold and thick phlegm, so that inside it (*sc.* the thick artery) no pneuma whatsoever can blow through and, thus, the entire (pneuma in the body) is in danger of being stifled.
>
> Anon. Par. 4 (Garofalo 24,21–26,3 = Prax. fr. 27,1–5 Lewis)

Here too, the reference to the thick artery points to a Praxagorean source for this information. Epilepsy entailed most notably motor disruptions such as the shaking mentioned in the passage cited above as well as other involuntary and uncontrollable movements of the head and limbs. In epilepsy and apoplexy – diseases in which the entire body is affected – the pneuma is blocked at the main artery, the trunk from which all arteries ultimately stem. In the case of local paralysis, Praxagoras locates the obstruction "around the offshoots of the heart and the thick artery, the (offshoots) through which the voluntary motion is delivered to the body" (περὶ τὰς ἀποφύσεις τὰς ἀπὸ καρδίας καὶ τῆς παχείας ἀρτηρίας γινομένην, δι' ὧνπερ ἡ κατὰ προαίρεσιν κίνησις ἐπιπέμπε-

ται τῷ σώματι).[69] This implies that the arteries throughout the body rely on the flow of pneuma from "the thick artery," rather than a direct, local flow through the skin as in transpiration.

Unlike in the case of Diocles, there is no direct evidence for Praxagoras' adoption of a theory of transpiration. The extant evidence indicates, moreover, that he would not have regarded the air entering through transpiration as essential for maintaining the pneuma and ensuring its activity. The pathological fragments just discussed indicate that it is the pneuma from the heart which is crucial for ensuring a functioning arterial pneuma.[70] Moreover, his physiological theory does not require transpiration, so to speak, since (once more, unlike Diocles) Praxagoras believed that respiration supplied the body with an airy *substance* and not just a quality.[71] Galen reports that Praxagoras claimed that respiration serves as "nourishment" (θρέψις, τρέφεσθαι). There is some uncertainty regarding Praxagoras' exact words, since Galen uses both "nourishment of the soul" and "nourishment of pneuma" when reporting Praxagoras' view. The latter seems, however, more likely. It is far from certain that Praxagoras himself had used the concept of "soul" in his explanation of the body and its workings.[72] Medical authors writing before and around Praxagoras' time hardly made recourse to the concept of soul, but the idea that respiration can offer nourishment is attested in our early sources.[73] Be that as it may, as regards the question of the source of the cardiac pneuma, Praxagoras' view of respiration contributing "nourishment" means there is no particular need for air to enter through the skin. The air entering via the respiratory tract offered a material contribution, and there is no evident reason to assume that it does not continue to the vessels when these draw pneuma into them upon expansion.

It has been claimed that Praxagoras believed that the cardiac/arterial pneuma had an additional source, namely, the air generated during digestion. The sources do not support this claim, however.[74] What they do show is that Phylotimus, one of Praxagoras' pupils, believed that some pneuma was released or generated during the digestive process.[75] As regards the question of an innate pneuma, the problems mentioned with

**69** Anon. Par. 21 (Garofalo 122,24–124,2 = fr. 28, lines 5–8 Lewis).

**70** Cf. Lewis 2017, 256–257.

**71** Gal. *Ut. Resp.* 1.2, 1.3 (Furley/Wilkie 80, 82 = K. 4.471, 4.472 = fr. 16, lines 2–3, 10–11).

**72** There is also no substantial evidence that Praxagoras thought that pneuma is soul, as was claimed by Steckerl (see Lewis 2017, 292–296).

**73** For example: Aristotle, *De respiratione* 6, 473a3–6; see also Ps.-Aristotle, *De spiritu* 1–2, 481a1–482a27, with Gregoric and Lewis 2015, 141–142. See also Manuli and Vegetti 1977; van der Eijk 2005; Bartoš 2006; Thumiger 2017.

**74** See the discussion in Lewis 2017, 264–274, *contra* Steckerl 1958, 19–21, 22–26. The idea that arterial pneuma derived from the digestive system as well was held by Galen and the Stoics: Gal. *Hipp. Epid.* 6.5.5 (Wenkebach 270,26–29 = K. 17B.246–247, *ad Hipp. Epid.* 6.5.2, Manetti/Roselli 106 = L. 5.314 = von Arnim, *Stoicorum Veterum Fragmenta*, 2.782); and see also the debate in Ps.-Aristotle, *On Pneuma* (n. 73 above).

**75** Orib. *Coll. med.* 5.32 (Raeder 151,19–20 = fr. 13 in Steckerl 1958, 53).

respect to Diocles hold here too.[76] To recall, in his report on the cause of *boulimos* the Anonymous suggests that Diocles, Praxagoras and Hippocrates assigned it to the "coagulation of blood and the cooling of the innate pneuma." As noted in the previous section, there are textual and contextual reasons to doubt that this reference to an "innate pneuma" derives from any of the three physicians.[77] It seems, therefore, that respiration is the main, if not only, source of the vascular pneuma in Praxagoras' theory. Presumably not all respired air reaches the vessels, since a portion exits the body through the respiratory tracts upon exhalation, but we do not have any evidence on this part of the process.

### 3.3 The functions of pneuma

The air inhaled during respiration passes through the windpipe to the lungs[78] and from there to the heart, from which it spreads to the arteries by means of these vessels' pulsation.[79] Somewhere along the path it undergoes some change which makes it indispensable for motion and perhaps for sensation too. As we saw above, Praxagoras' explanations of diseases which entail motor dysfunctions (e.g. apoplexy and epilepsy) mark the disruption of the flow of pneuma as the cause. Some of these diseases entail sensory dysfunction as well (particularly apoplexy) and thus it seems that he assigned pneuma a role in sensation too. Unfortunately, the fragments do not tell us in what manner pneuma contributed to these activities: did it actually act in the limbs or sensory organs, or did it only convey some faculty or quality which acted upon these parts?

The fragments imply, however, that pneuma was probably not the primary agent when it came to higher cognitive and intellectual activities – rational thought, decision making and so forth. This is indicated by Praxagoras' explanations of the causes of mania, phrenitis and *melancholia*, which entailed disruption of the cogitative and rational activities and normative behaviour.[80] In all of these cases pneuma is not mentioned at all, but only the heart and qualitative changes in or around it. This could indeed imply that the pneuma in the heart was affected too, and that this led to the pathological activity. However, the absence of pneuma from Praxagoras' accounts of phrenitis and mania seems particularly indicative considering the accounts of other authors. Those refer not simply to the location of the affection, but also to the substance affected – pneuma or

**76** See above, p. 102–103.

**77** See Lewis 2017, 186, with regard to Praxagoras in particular.

**78** For Praxagoras' reference to the passage of air through the lungs, see Cael. Aur. *CP* 2.16.96–97 (Bendz 194, 11–14 = fr. 66 Steckerl).

**79** Presumably the expansion of the heart draws air in from the lungs (cf. Lewis 2017, 259).

**80** We do not know whether Praxagoras considered melancholy solely as a digestive affection, as Diocles did, or whether he connected it with mental or emotional problems as well.

blood.[81] These are all fragments in which the Anonymous reports the views of these physicians separately, lending credibility to the reports and the peculiarities of each. On the whole, the independent description ascribed to Praxagoras and the absence of any reference to pneuma in his case suggests that it is particularly the heart itself, and not the pneuma inside it, which is active in effecting thought and other intellectual activity.[82]

## 4 Herophilus

One of Herophilus' best attested interests, and one of the areas of medical theory that he developed most, was the pulse. He was deeply indebted in this to a number of crucial discoveries and distinctions made by his teacher Praxagoras. Not least, Herophilus was influenced by his various criteria differentiating the veins and arteries, and his conception of the pulse as a capacity, or *dynamis*, that belongs to the heart and arteries alone. To be sure, Herophilus introduced a number of modifications and refinements, observing for example the different respective thicknesses of the venous and arterial walls, offering a more restricted definition of what phenomena were covered by pulsation, and maintaining that the pulsating capacity of the arteries was derived from that of the heart, rather than being independent.[83] The pulse also became a major diagnostic tool in Herophilus' hands, and he developed an extremely sophisticated system for measuring its various differentiae, calibrated according to the stages of life, and for relating it to underlying physiological phenomena.[84] To all of this, the pneuma contained in the heart and arteries was of central importance.

Herophilus also had to incorporate one major new discovery into his physiology, for he was the first to isolate the nerves as a distinct structure within the body, all converging ultimately on the brain, and to realise their function in mediating sensation and voluntary motion.[85] This discovery, along with many others, was thanks to his unprecedented programme of dissection and vivisection of both animals and humans, made possible in Alexandria through the royal sanction of Ptolemy I and perhaps his son Ptolemy II.[86] Hence Praxagoras' anatomical and functional isolation of the veins and arteries was now supplemented by a third major system of vessels. Yet in Herophilus' new theory, pneuma was to remain central, and became the fundamental medium of the

**81** Anon. Par. 1, 18 (Garofalo 2, 112–114); Lewis 2017, 287–292.

**82** Lewis 2017, 287–292.

**83** On these developments, see von Staden 1989, 169–181, 262–272.

**84** For Herophilus' pulse-lore, see von Staden 1989, 272–288, and Berrey 2017, 191–209.

**85** Solmsen 1961; von Staden 1989, 159–160.

**86** Celsus, *De medicina* 1.pref.23–26 = T63a vS is the major source, referring to "criminals received alive from prison from the kings". For discussion, see von Staden 1989, 139–153.

nervous system as well. From this perspective, Herophilus can be seen to be modifying a basic, underlying Praxagorean conception of the vessels in the body, extending this significantly to offer a more precise account of the body's various physiological functions. This section will explore in detail the evidence we have for Herophilus' views on the role of pneuma in the body, its origins, what it is made of, the parts of the body into which it travels, and what functions it discharges when it gets there.

### 4.1 Soul?

One issue that should be emphasised at the beginning, however, is that there is no evidence that Herophilus identified pneuma with the soul:[87] our sources portray it only as an airy substance mediating various physiological processes. Indeed, there are some indications that Herophilus did not believe that the inquiry into the soul was a legitimate concern of medicine at all. The Anonymus Londinensis papyrus cites Herophilus in support of his own view that medicine should not be concerned with the ultimate elements of the body, and in the same context specifies that medicine is not concerned with the soul either.[88] There is every reason to suppose that for Herophilus, as probably also for Praxagoras as we have seen, the study of the soul belonged properly to philosophy and not to medicine.

### 4.2 Nervous system

To judge from the emphases of the surviving evidence, it was within the nervous system that pneuma became most potent in the Herophilean body.[89] As discussed, Herophilus was the first not only to isolate the nervous system anatomically, but also to identify its physiological functions in transmitting sensation and voluntary motion. Pneuma played a central role as the substance present in the nervous system by which these functions were discharged. We have straightforward evidence for the sensory nerves: Galen

87 *Pace* von Staden 2000, 87, citing Gal. *Prop. Plac.* 7.4 (Nutton 80 = T145b vS). The discovery of the Vlatadon 14 manuscript, edited in Boudon-Millot and Pietrobelli 2005 (with the relevant passage at 179), showed conclusively that Galen had mentioned Empedocles at the relevant point in this passage, not Herophilus, and indeed that there was no identification of the soul with pneuma at issue at all.

88 For Herophilus' (and Erasistratus') views on the body's ultimate elements, see Leith 2015. For the Anonymus Londinensis' views in this connection, see Anon. Lond. xxi 13–35 (Manetti 45–46), and esp. xxi 13–18, [σ]υνέστη[κεν δὲ] ὁ ἄνθρωπος | ἐκ [ψυ]χῆ[ς] καὶ σώμ[α]τ[ο]ς ... . [καὶ πε]ρὶ μ(ὲν) ψυχῆς | [ἄλλοι]ς ἀγ[α]βάλλομα[ι, ἡμῖν δὲ] τοῦ σώμα|[τος μ]ελητέον ἐπεὶ [μάλιστα] περὶ τοῦτο [σπου]δ̣άζει ἡ ἰατρικ[ή ("the human being is composed of soul and body ... Regarding the soul, I defer to others, but we must be concerned with the body, since medicine is especially focused on this"). See Leith 2020 for further discussion of Herophilus' (and Erasistratus') approach to the soul.

89 We have no evidence, for example, that pneuma played a key role in digestion, as it did for Erasistratus (see next chapter in this volume).

reports that Herophilus labelled the optic nerves "channels" (πόροι) "because in them alone are the pathways of pneuma perceptible and manifest," with the clear implication that other (sensory) nerves similarly have pathways for pneuma, though not perceptible ones.[90] However, there has been some scholarly debate about whether pneuma was similarly the medium for the motor nerves. Friedrich Solmsen identified no direct testimony on the issue, but, given the broader historical context, regarded it as "practically certain that Herophilus thought of the πνεῦμα as operating also in the motor nerves."[91] But Heinrich von Staden has raised doubts on the basis of the following criticism made by Galen regarding Herophilus' account of tremor:

> **T10** ὁ δὲ Ἡρόφιλος ἠπατήθη τὸ τῆς δυνάμεως πάθος ἀναφέρων τοῖς ὀργάνοις· ὅτι μὲν γὰρ τὸ νευρῶδες γένος, οὐ τὸ ἀρτηριῶδες, ὑπηρετεῖ ταῖς κατὰ προαίρεσιν κινήσεσιν, ὀρθῶς ἐγίνωσκεν· ὅτι δὲ οὐκ αὐτὸ τὸ σῶμα τῶν νεύρων αἴτιον κινήσεως, ἀλλὰ τοῦτο μὲν ὄργανον, ἡ κινοῦσα δ' αἰτία ἡ διήκουσα δύναμις διὰ τῶν νεύρων ἐστίν, ἐνταῦθα μέμφομαι αὐτῷ μὴ διορίσαντι δύναμίν τε καὶ ὄργανον. εἰ γὰρ διώρισεν, εὐθὺς ἂν ἔγνω διότι βλαβήσεται τοὖργον οὐκ ὀργάνων μόνων, ἀλλὰ καὶ δυνάμεων πάθει. ἐπὶ μὲν οὖν τεθνεώτων οὐδὲν οὔτε τὰ νεῦρα πέπονθεν οὔθ' οἱ μύες ὅσα πάθη πάσχειν αὐτὰ νομίζουσιν Ἡρόφιλός τε καὶ Πραξαγόρας. ἀπολέλοιπε δ' αὐτῶν πᾶσα κίνησις εὐθὺς ἅμα τῇ ψυχῇ, μύες δὲ καὶ νεῦρα ταύτης ὄργανα.
>
> Herophilus was mistaken in attributing the affection of the faculty to its instruments. For, while Herophilus recognized correctly that the nerve-like, and not the arterial, class serves the voluntary motions, (he did not recognise that) the body of the nerves is not itself the cause of motion but rather its instrument, whereas its moving cause is the faculty which extends through the nerves. Here I reproach him for not having distinguished faculty from instrument. For, if he had made the distinction, he would have recognised immediately that the function will be impaired by an affection not of the instruments alone, but also of the faculties. Thus, in the case of the dead neither the nerves nor the muscles are in the state of suffering all the affections which Herophilus and Praxagoras think they do: all motion has deserted them instantly with the soul, for muscles and nerves are just the instruments of the soul.
>
> Galen, *De tremore, palpitatione, convulsione et rigore* 5 (K. 7.605–606 = Herophilus T141 vS, tr. von Staden, with minor changes)

**90** Galen, *De usu partium* 10.12 (Helmreich 2.93 = K. 3.813 = T140a vS); see also Calcidius, *In Tim.* 246 (Waszink 256,22–257,9 = T86 vS), with Solmsen 1961, 186–188, and von Staden 1989, 252–255.

**91** Solmsen 1961, 186.

Von Staden felt that this criticism was inconsistent with the conclusion that the motor nerves function in virtue of pneuma. He inferred that "[i]f Galen's criticism is accepted as valid, Herophilus attributed voluntary motion to the motor nerves, ligaments, tendons, and muscles ..., but did not introduce another faculty or medium such as motor pneuma."[92] Hence he appears to take it that the *faculty* Galen is referring to must include such stuff as pneuma, and it is this which Herophilus failed to incorporate into his theory. But this rests on a conflation in what von Staden refers to as the "*faculty or medium* such as motor pneuma": while pneuma can be a medium, it cannot be a faculty. For Galen the faculty must be sharply distinguished from the medium, and indeed this is the very point he is making against Herophilus, who (according to Galen) failed to distinguish faculty from instrument. A medium such as pneuma would no more qualify as a faculty than the body of the nerves would. In Galen's view, pneuma is, if not the soul itself, then the soul's first instrument, which its faculties, including that for voluntary motion, make use of.[93] Galen is here criticising Herophilus for failing to give an account of tremor which directly implicated the faculties of the soul, in particular the motive faculty.[94] So we can be sure that Galen was *not* talking about Herophilus' exclusion of pneuma from his account here, and therefore this passage is irrelevant to the question of whether the nerves contain pneuma.

On the other hand, Solmsen's conclusion seems to be confirmed by a testimonium which he did not refer to, from Aëtius' *Placita*. This important passage additionally indicates that the pneuma in the motor nerves is ultimately just that derived from the outside air, rather than some sort of innate type naturally found in the body:

> **T11** εἰ τὸ ἔμβρυον ζῷον· ... Ἡρόφιλος κίνησιν ἀπολείπει φυσικὴν τοῖς ἐμβρύοις, οὐ πνευματικήν· τῆς δὲ κινήσεως αἴτια νεῦρα· τότε δὲ ζῷα γίνεσθαι, ὅταν προχυθέντα προσλάβῃ τι τοῦ ἀέρος.
>
> If the foetus is an animal. ... Herophilus recognises only natural motion in foetuses, not pneumatic (motion). (He thinks that) the nerves are responsible

92 Von Staden 1989, 257; see also von Staden 2000, 89.

93 E.g. Gal. *PHP* 7.3.21 (De Lacy 444 = K. 5.606, tr. De Lacy): "it is better, then, to assume that the soul dwells in the actual body of the brain, whatever its substance may be – for the inquiry has not yet reached this question –, and that the soul's first instrument (τὸ πρῶτον δ' αὐτῆς ὄργανον) for all the sensations of the animal and for its voluntary motions as well is this pneuma"; see also *Ut. Resp.* 5.1, 5.7 (Furley/Wilkie 120, 130 = K. 4.501–502, 4.509).

94 The Aëtian *Placita*, however, clearly attributes to Herophilus the concept of a basic motive capacity responsible for both voluntary and natural motion (Aët. 4.22.3 = T143 vS). Perhaps Galen's complaint applied only to Herophilus' discussion of tremor, and not to his broader analysis of the working of the nervous system. See also the remarks at Solmsen 1961, 186.

> for motion; and that (foetuses) become animals at the point when, having been brought forth, they take in some air.
>
> Aëtius, *Placita Philosophorum* 5.15.5 = Herophil. T202 vS

The argument here is compressed, but it is evidently premised on the common idea that the capacity for deliberate motion is a criterion for classification as an animal: non-animals may possess natural motion (one might think, for example, of plant growth), but only animals are able to move themselves deliberately through their own volition. This is a standard means of differentiating between animals and non-animals,[95] but Herophilus appears to be elaborating on this basic condition by spelling out its physiological basis and applying it to the case of foetuses in particular. We know from elsewhere that Herophilus made a basic distinction between natural motion and voluntary, *prohaeretic*, motion: the arteries, for example, together with the heart, have a 'natural' motion of pulsation.[96] So it makes sense to identify the pneumatic motion referred to in the testimony above with voluntary, *prohaeretic*, motion, both being opposed to natural motion.[97] This explains why the nerves are then introduced, since they are responsible in Herophilus' physiology for voluntary, but not natural, motion. Foetuses, then, do not count as animals because they have only natural motion (such as pulsation), and not the voluntary kind. But for Herophilus the key point is that this voluntary motion is pneumatic and associated with the nervous system. This offers an additional physiological explanation of the fact that foetuses, even though they are non-animals *in utero*, then *become* animals at the point that they begin to take in air after birth. The idea must be that the nerves are only then activated, through being filled with the pneuma that derives from the air around us. Without any evidence to the contrary, then, we may accept this as confirmation that Herophilus believed that motor function was mediated by pneuma in the nerves, and furthermore that this pneuma was ultimately outside air taken into the body.

95 See e.g. Plato, *Timaeus* 77b–c; Aristotle, *De anima* 2.3, 414a 29–b 2; *ibid*. 3.9, 432b 8–19; Gal. *Nat. Fac.* 1.1 (Helmreich 101 = K. 2.1).

96 The opposition between the natural, involuntary motion of the pulse and voluntary motion is outlined at Ps.-Rufus, *Synopsis de pulsibus* 2 (Daremberg/Ruelle 221 = T149 vS): for Herophilus "the pulse at all times attends us involuntarily (ἀπροαιρέτως), since it also exists naturally (φυσικῶς), whereas the others (*sc.* palpitation, spasm, tremor) obey our volition (προαιρέσει), when the parts are pushed outwards often and depressed." See Leith 2020.

97 Von Staden 1989, 258, takes the testimony to be inconclusive as regards the question of pneuma in the motor nerves, because of an apparent ambiguity in the term "pneumatic motion," which might refer simply to respiration, as Dobson 1925, 24, had assumed. In that case, Herophilus' argument would have to be that only things which respire can be classed as animals, thus excluding foetuses. But this would be invalidated by the obvious fact that not all animals respire, as for example Aristotle had observed (e.g. Arist. *Resp.* 1, 470b 9–10); the interpretation of "pneumatic motion" as voluntary motion, by contrast, makes sense of the argument, and fits perfectly in the context of Herophilus' physiology.

### 4.3 Respiration, heart and arteries

This still leaves unanswered further questions such as how exactly the pneuma gets from the outside air into the nerves, and whether the pneuma undergoes some sort of qualitative alteration or elaboration when inside the body. Our evidence is often suggestive rather than conclusive on these sorts of issues. A long testimonium, significantly again from the Aëtian *Placita*, describes Herophilus' account of respiration.[98] The pneuma is described as passing from the outside air into the lungs, and from there into the thorax, with the lungs and then the thorax undergoing an alternating sequence of dilations and contractions, receiving and then delivering the pneuma on. The process is then reversed as the thorax contracts, sending pneuma back into the simultaneously dilating lungs, which then contract and finally expel the pneuma out into the atmosphere again. But what exactly happens to the pneuma when it reaches the thorax? The testimonium specifies that it is "the remainder" that flows from the thorax back into the lungs: "when (the thorax) has been filled and can no longer draw (the pneuma) in, the remainder (τὸ περιττόν) flows back into the lung in turn." It is difficult to see how this could mean anything other than that not all of the pneuma in the thorax returns to the lungs. The question then is whether this other portion just remains in the thorax, or moves on somewhere else.[99] Given the importance of respiration for voluntary motion in his system, as we have seen, there seems little likelihood that Herophilus thought of the thorax as a kind of dead end.

Along with Praxagoras and Erasistratus, Herophilus certainly thought that pneuma was present in the heart and arteries.[100] The "natural" pulsing motion of dilation and contraction which the heart and arteries possess[101] allowed them to draw in the pneuma in dilation, and then push it on, in contraction, very much as in Praxagoras' theory.[102]

**98** Aët. 4.22.3 = T143 vS.

**99** As noted by von Staden 1989, 261.

**100** Gal. *Art. Sang.* 8.1 (Furley/Wilkie 176 = K. 4.731–732 = T145a vS).

**101** For the "natural" pulsating motion of the heart and arteries, see above n. 96 and text thereto. Von Staden 1989, 260–262, maintained that for Herophilus the lungs have their own natural motion, citing Aët. 4.22.3 = T143a–b vS, but there it seems to be *denied* that the lungs have an innate motion of their own. According to this testimony, the motive capacities in living things are to be found only in the nerves, arteries and muscles: that is, we understand, *not* in the lungs. Rather, the lungs only "*aim at*" or "*grasp at*" (μόνον ὀρέγεσθαι) dilation and contraction, implying that what they do is not *true* dilation and contraction. True dilation and contraction are the motions of the heart and the arterial pulse. Significantly, Aristotle believed that the lungs had no motion of their own, dilating and contracting only as a result of the expansion and contraction of the blood in the heart.

**102** This drawing in of matter by expansion, and the subsequent expulsion of matter by contraction is paralleled in Herophilus' account of respiration discussed above. See e.g. Gal. *Diff. Puls.* 4.6 (K. 8.733 = T144 vS), "Herophilus and his followers hold the opinion that the arteries, being continuous with the heart, have in them a capacity which flows through their coats. Using this capacity they dilate in a manner similar to the heart itself and draw, from everywhere they can, that which will fill their dilation; but when they contract, they squeeze it out. For this reason, all of the arteries are observed to

But it should be noted that Herophilus appears to have believed, unlike Praxagoras, Erasistratus and perhaps Asclepiades, that the arteries also naturally transmit blood as well as pneuma.[103] The pressing issue for our purposes, however, is how the pneuma gets into the heart and arterial system.[104] The lungs are of course a very likely source for at least some of the pneuma in the heart, and Herophilus knew the artery and vein connecting the lungs with the heart – what we call the pulmonary vein and pulmonary artery respectively.[105] Galen also observes, however, that the pneuma in the arteries "is not 'sent' but 'drawn,' and not from the heart alone but from everywhere, as Herophilus thought, and before him Praxagoras, Phylotimus, Diocles, Plistonicus, Hippocrates, and countless others".[106] As he explains elsewhere, Galen means by this that, when they dilate, the arteries are able to draw in small quantities of pneuma through imperceptible pores in their coats and through their anastomoses, from various organs of the body as well as from the surrounding air.[107] However, when Galen marshals a host of authorities as he does in this passage, in order to isolate his chosen target (in this case Erasistratus), it is often at the expense of accuracy regarding their individual theories.[108] It would be rash to accept at face value this testimony that Herophilus had adopted something like Galen's theory of imperceptible pores in the arteries. On the other hand, it is not in itself implausible that Herophilus did think that pneuma could find its way into the arteries

dilate at one and the same time and to contract, preserving the same fixed time for both motions as the heart" (tr. von Staden, with changes). Note that, as this passage makes clear, Herophilus differed from Praxagoras in thinking that the arteries do not possess their natural motion independently, but derive it from the heart: see also Gal. *Diff. Puls.* 4.2 (K. 8.702–703 = T155 vS).

**103** For Herophilus' belief that the arteries contain both blood and pneuma, see von Staden 1986 and von Staden 1989, 264–267.

**104** Described by von Staden 1989, 263, as "one of the more serious gaps in our knowledge of (Herophilus') physiology".

**105** This requires some brief comment. The vessels connecting the lungs and heart were regarded as anomalous by Herophilus and his successors: all vessels connected with the left side of the heart were taken to be arteries, while all those connected with the right were thought to be veins, yet (what we know as) the pulmonary artery and pulmonary vein alone had coats that did not have the expected level of thickness. In fact, Herophilus appears to have been the first to distinguish arteries from veins by the relative thickness of their coats, but the pulmonary artery and pulmonary vein did not fit the pattern (Gal. *UP* 6.10, Helmreich 1.325 = K. 3.445 = T116 vS). Rufus of Ephesus tells us that Herophilus named what we know as the pulmonary artery the "artery-like vein" (ἀρτηριώδη φλέβα), "for, in the lung the situation is the opposite of the other parts, inasmuch as the veins there are strong and very close in nature to arteries, whereas the arteries are weak and very close in nature to veins" – Rufus, *Onom.* 203–204 (Daremberg/Ruelle 162 = T117 vS, tr. von Staden). Although Rufus does not mention the 'vein-like artery' explicitly in connection with Herophilus, this passage makes it clear that the anomalous thickness applied to both the vein and the artery. Herophilus will thus have thought of our pulmonary vein as an artery connecting the lungs and the heart, as did Erasistratus, Asclepiades, Galen, etc.; cf. von Staden 1989, 177–178.

**106** Gal. *Art. Sang.* 8.1–2 (Furley/Wilkie 176 = K. 4.731–732 = T145a vS, tr. von Staden).

**107** See. e.g. Gal. *Us. Puls.* 4–5 (Furley/Wilkie 210–212 = K. 5.164–166); *Art. Sang.* 7.4 (Furley/Wilkie 176 = K. 4.731); cf. above p. 109.

**108** Von Staden 1989, 263–264, is sceptical about this testimony as evidence for Herophilus' view. For difficulties in identifying Praxagoras' doctrine based on Galen's evidence here, see above, p. 109.

from other sources than the heart, and the inhaled air that reaches the thorax, in the account of respiration discussed above, is conceivably a candidate.[109] But whether or not this was the case, there is strong evidence that Herophilus believed (1) that the heart and arteries contain pneuma, and draw matter into themselves by naturally dilating, (2) that there is an artery connecting the heart with the lungs, and (3) that not all the pneuma which passes out of the lungs returns in exhalation. So, it can scarcely be doubted that one of the main sources of the arterial pneuma is respiration, even if none of our sources happen to say so explicitly.

### 4.4 Relationship of arterial and nervous systems

Matters are even less clear when it comes to how pneuma comes to be in the sensory and motor nerves. As we have seen, the testimony regarding the status of the foetus discussed above indicates that respiration, and respiration alone, is the ultimate source of pneuma in the motor nerves. We know that for Erasistratus, similarly, respiration provides the pneuma which makes its way via the lungs and heart into the arterial system: some of the arterial pneuma is accordingly pumped up to the brain via the carotid arteries, and transferred from arteries to nerves via imperceptible anastomoses within the brain's meninges (see next chapter). It seems plausible that Herophilus could have posited some sort of connection between the arterial and nervous systems as the source of at least some of the latter's pneuma, although it would remain unclear how the transfer could take place: without Erasistratus' pumping action of the heart, and since the nerves lack a pulsating motion, Herophilus cannot have believed that the nerves naturally draw pneuma into themselves in the way that the arteries do.[110] And even if he believed that the arteries could, by dilating, draw pneuma from everywhere through imperceptible pores in their coats and mouths, as discussed above, such an explanation would not have been available for the nerves as well.

The only clues our sources offer indicate that the brain's fourth ventricle, in the hindbrain, played a major role. Galen tells us that for Herophilus the ventricle "in the cerebellum is more dominant (τὴν ἐν τῇ παρεγκεφαλίδι κυριωτέραν) (*sc.* than the one

109 Note too that in T144 vS, quoted in n. 102, where Galen is talking about Herophilus alone, he remarks that the arteries draw matter in "from everywhere they can" (ὅθεν ἂν δύνωνται), which clearly suggests a plurality of potential sources of their contents. Nor is it implausible that Herophilus should have incorporated imperceptible entities in his physical theory: although Herophilus has been read as having sceptical tendencies, this has been largely based on over-interpretation of some key testimonia (see Frede 2011; Leith 2014; Leith 2015).

110 Galen tells us that Asclepiades' view that the arteries force pneuma onwards as they contract differed from Herophilus' understanding of arterial contraction: see below, p. 142–143.

in the fornix)".[111] Calcidius offers the further crucial detail that it is from this ventricle in the base of the brain that pneuma is transmitted to the eyes.[112] We may suppose that the pneuma derived from respiration somehow collects in this ventricle and thence passes to at least some parts of the nervous system, but it remains unclear whether we need to identify the arterial system as an intermediary between inhalation and arrival at the brain, as in Erasistratus' physiology, or whether Herophilus also posited a more direct route.[113] Comparisons with Galen's theory, however, are suggestive. Galen believed that the pneuma delivered by the carotid arteries is elaborated on its way to the brain as it passes through the dense network of arteries that make up the *rete mirabile*.[114] This structure, lying at the base of the brain around the pituitary gland outside the dura mater, was named by Herophilus the δικτυοειδὲς πλέγμα, "retiform plexus," as Galen tells us.[115] But the ventricles of the brain themselves, Galen held, acted as another site for the elaboration of pneuma, specifically in the so-called choroid plexuses. These are fine networks of veins and arteries within the brain's ventricles that are interwoven with its pia mater.[116] Once again, Galen goes out of his way to note that these were identified by Herophilus:[117]

> **T12** ὄψει δὲ καὶ τὰ καλούμενα χοροειδῆ πλέγματα κατὰ ταύτας (*sc.* κοιλίας τοῦ ἐγκεφάλου). ὀνομάζουσι δ' οἱ περὶ τὸν Ἡρόφιλον αὐτὰ χοροειδῆ συστρέμματα, παρονομάσαντες δηλονότι τῶν χορίων, ἃ τοῖς κυουμένοις ἔξωθεν ἐν κύκλῳ περιβέβληται, φλεβῶν ὄντα καὶ ἀρτηριῶν πλέγματα, λεπτοῖς ὑμέσι συνεχομένων.
>
> You will also see the so-called choroid plexuses in these (*sc.* ventricles of the brain). Herophilus and his followers call them "choroid weaves", clearly nam-

111 Gal. *UP* 8.11 (Helmreich 1.484 = K. 3.667 = T78 [T138] vS); cf. also the reports that Herophilus identified the location of the *hēgemonikon* as "the ventricle of the brain which is its base" (Aët. 4.5 = T137 vS).

112 Calc. *In Tim.* 246 (Waszink 257,2–4 = T86 vS, tr. von Staden): "there are two narrow ducts containing natural pneuma (*naturalem spiritum*) and … these ducts proceed from the seat of the brain, in which the highest, principal power of the soul is located, to the cavities of the eyes." For this testimony as providing reliable evidence for Herophilus in particular (Alcmaeon and Callisthenes are also mentioned), see von Staden 1989, 253.

113 The author of *On the Sacred Disease*, for example, thought that some inhaled air was transmitted straight to the brain in respiration (cf. Hippocrates, *On the Sacred Disease* 7.3 = 10 Jones, Jouanna 15,10–12 = L. 6.372), though there is no reason to think that Herophilus was familiar with this treatise, let alone that he accepted its particular anatomical views. It should also be remembered that the Herophilean testimony on respiration, Aët. 4.22.3 = T143 vS, focuses exclusively on the passage of air into the lungs and thorax.

114 On Galen's theory of pneumatic elaboration in the structures of the brain, see Rocca 1998 and the chapter by Singer in this volume.

115 Gal. *Us. Puls.* 2 (Furley/Wilkie 200 = K. 5.155 = T121 vS). See von Staden 1989, 179. Note that the *rete mirabile* does not in fact exist in humans, and that Herophilus' anatomy in this respect must have been based on his dissections of an ungulate: see von Staden 1989, 158–159, 179.

116 Cf. Gal. *UP* 16.12 (Helmreich 2.429 = K. 4.334–335).

117 See von Staden 1989, 180.

ing them after the chorion which surrounds the foetus externally in a circle, as a plexus of veins and arteries held together by fine membranes.

Gal. *De anatomicis administrationibus* 9.3 (Garofalo 565,20–25 = K. 2.719–720 = Herophil. T124 vS)

Galen obviously focuses only on Herophilus' nomenclature in these cases, telling us nothing about his views on the functions of these structures. But given the functional importance of these structures for Galen, his repeated association of them with Herophilus' anatomy, together with Herophilus' attested emphasis on the importance of the brain's fourth ventricle, it is perhaps not implausible that Herophilus' own theory bore some resemblances to Galen's.[118] It should also be noted that while Galen was in broad agreement with Erasistratus in believing that the arterial system delivers pneuma to the area of the brain, they differed principally in that Erasistratus focused on the brain's meninges, and the imperceptible connections between the arteries and nerves within them, as the site of transfer (see next chapter), while Galen focused on the brain's ventricles. Herophilus' emphasis on the functional importance of the fourth ventricle would appear to place him more in line with Galen.

Another significant difference between Galen and Erasistratus on these issues was that, for Galen, the arterial system was not the only source of the pneuma in the brain.[119] He maintained that pneuma was also delivered directly to the brain's ventricles from the nostrils via the olfactory tracts, and via transpiration through the pores in the skin.[120] As far as I can see, the evidence offers no clues as to Herophilus' position on this point, but it should be borne in mind that Galen thought that various sources for the pneuma in the nervous system were consistent with the anatomical phenomena.

We are left in the dark about what qualitative changes the pneuma may have undergone as it made its way from the outside air into the arterial and nervous systems, if indeed Herophilus posited any. Another major hole in our evidence concerns the pathological role of pneuma. This is in marked contrast to Herophilus' attested belief in the pathological importance of blood.[121] Yet the physiological importance of pneuma in

**118** Tieleman 1995 argues that Galen's approach to the question of the functions of the brain and heart in *PHP* books 2–3 may have been substantially influenced by Herophilus.

**119** For Erasistratus' belief that the arterial system alone provides the brain with pneuma, see next chapter.

**120** On this alternative route of pneuma to the brain, see e.g. *Ut. Resp.* 5.1–2 (Furley/Wilkie 120–124 = K. 4.501–505); for discussion, see Rocca 2003, 219–237. Dean-Jones 2006 argues that in Galen's view the choroid plexuses acted as the structures which elaborated the pneuma issuing from the olfactory tracts, while the *rete mirabile* dealt only with the pneuma coming from the arterial system.

**121** See Aët. 5.30.1 (general cause of disease) and Sextus Empiricus, *Adversus mathematicos* 8.219–220 = T225 vS (cause of fever). For further discussion of Herophilus' pathology, see von Staden 1989, 301–305; Leith 2014, 603–606; Leith 2015, 483–487.

transmitting sensation and voluntary motion, as well as its significance for the pulse, so fundamental as a diagnostic tool for Herophilus, will have made it an obvious candidate as contributor to aetiologies of various pathological conditions. It certainly had been for Praxagoras, as we have seen above, and it would be for Erasistratus (see next chapter). We are not told, however, exactly how it could be affected to produce disorders in Herophilus' system. Obstruction or blockage of fluid substances was implicated by most Greek physicians before and after Herophilus in explaining disease, but qualitative alteration of bodily fluids, especially through heating and cooling, was central to Herophilus' pathology in general. Overall, it seems prudent to suspend judgement on the pathological role of pneuma in Herophilus' system.

## 5 Conclusion

The close analysis of the evidence for the early Hellenistic medical authors reveals the changes in ideas concerning pneuma as regards physiology, pathology and diagnostics. It has shed light on their common interest in certain questions, while emphasising the nuances and differences between the individual authors. For Diocles pneuma was not necessarily a functional agent working in the heart (as in Aristotle) or brain or moving through vessels in order to reach organs which require its substance or capacities (as in *On the Sacred Disease*). Taken as a whole, the evidence seems to suggest that Diocles did not think that the air which entered the body became "pneuma" in the sense of a distinct airy substance facilitating the activity of the body in any direct way beyond cooling it and thus preventing it from overheating. Cooling and ventilation of the body appear to be the main (and perhaps only) functions of air/pneuma in the body. These effects are achieved by external air brought into the body through the processes of respiration and transpiration. The air related to digestion, on Diocles' account, had only pathological effects, which harm the regular activity of the body rather than contribute to it.

On the whole, Diocles' interest in pneuma as an agent contributing directly to human activity seems fairly narrow, particularly in comparison to other physicians who were active around or shortly after his time. For Praxagoras and Herophilus (and Erasistratus) there is substantial concrete and independent evidence for their interest in and discussion of pneuma, and for their incorporation of this concept into their respective explanations of the human body and their medical theories and methods. Although these physicians did not connect pneuma with "soul" as such, in their theories it acquired crucial significance in motion and sensation, and perhaps in cognition and other intellectual activities as well. The growing significance of pneuma was evidently linked to developments in understanding the body's vessel systems. It seems unlikely to be coincidental that with the separate identification of the arteries and isolation of their

pulsating motion, Praxagoras suggested that it was pneuma alone passing through these vessels that discharged their functions, while Herophilus made the same claim for the nervous system upon its discovery. With the physiological systems of Erasistratus and Asclepiades, addressed in the next chapter, pneuma will acquire even more potency and will be analysed in more intricate ways, drawing on contemporary philosophical theory as well as medical.

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# The Pneumatic Theories of Erasistratus and Asclepiades

## Summary

The two physicians examined here, Erasistratus of Iulis on Ceos and Asclepiades of Bithynia, were working against the background of the anatomical and physiological innovations of Praxagoras and Herophilus. Erasistratus made full use of Herophilus' understanding of the nervous system, but in some ways seems to have restored aspects of the Praxagorean system, especially in maintaining that the arteries normally contain only pneuma. Asclepiades adopted the general outlines of Erasistratus' physiology, but his medical system was grounded in a more ambitious framework that was derived from Epicurean atomism. He also went further than Erasistratus in developing a fully fledged theory of soul. This chapter analyses in detail the various roles of pneuma in both doctors' theories.

Keywords: *Triplokia*; respiration; motion; sensation; soul; Epicureanism; atomism

Die beiden hier betrachteten Ärzte, Erasistratus von Iulis auf Ceos und Asclepiades von Bithynien, praktizierten vor dem Hintergrund der anatomischen und physiologischen Innovationen von Praxagoras und Herophilus. Erasistratus wendete Herophilus' Auffassung des Nervensystems an, aber scheint in mancher Hinsicht Aspekte in Praxagoras' System erneuert zu haben, insbesondere dahingehend, dass Arterien normalerweise nur Pneuma enthielten. Asclepiades übernahm die Physiologie des Erasistratus, aber sein medizinisches System basierte auf einem ehrgeizigeren Modell, das sich vom epikureischen Atomismus ableitete. Auch ging er weiter als Erasistratus, indem er eine ausgereifte Theorie der Seele entwickelte. Dieser Beitrag analysiert en detail die verschiedenen Rollen des Pneuma in den Theorien beider Ärzte.

Keywords: *Triplokia*; Atmung; Bewegung; Empfindung; Seele; Epikureismus; Atomismus

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The two physicians examined in this chapter, Erasistratus of Iulis on Ceos and Asclepiades of Bithynia, were working consciously against the background of the anatomical and physiological innovations of Praxagoras and Herophilus. Asclepiades' direct, though far from uncritical, use of Erasistratus' physiology may help to justify the juxtaposition of both doctors here, but their separation from Praxagoras and Herophilus is rather arbitrary, and the previous chapter should be read closely with this one. The overall impression of the pneumatic theories discussed in both chapters is very much one of underlying continuity, with progressive modification, updating, and incorporation of new data. The increasing relevance of contemporary Hellenistic philosophy to their medical theories is also a notable phenomenon.[1]

## 1 Erasistratus of Ceos

Erasistratus, from Iulis on the island of Ceos, is hard to locate both chronologically and geographically. Given his evidently close familiarity with the dissections and theories of Herophilus (and Praxagoras), it has been assumed by many that he must have been working in Alexandria, but there is no direct evidence to confirm this.[2] Like Herophilus, he was dissecting and vivisecting human beings, as Celsus tells us, under royal sanction: but whether the 'kings' in question belonged to the Ptolemaic dynasty (as they must have in Herophilus' case) or to another Hellenistic dynasty has not been firmly established.[3] He is generally taken to be a younger contemporary of Herophilus, working perhaps in the mid-third century BCE.[4] There was a strong and long-lived tradition within Erasistratus' own sect that he was closely associated with Aristotle's circle.[5] Whether this means we should infer some contact with Athens remains likewise unclear. Heinrich von Staden has shown that Erasistratus' teleological approach to anatomy and physiology is essentially Aristotelian, and this must be borne in mind when assessing his

1 See also the chapter on the Pneumatists by Coughlin and Lewis in this volume.

2 Lloyd 1975 puts the strongest case for locating him in Alexandria, though acknowledges that it is not beyond doubt.

3 Celsus, Prooemium 23–26 = Herophilus T63a vS = Erasistratus fr. 17A Garofalo. A very dubious anecdote puts Erasistratus at the court of Seleucus I Nicator: e.g. Suda E 2896 = fr. 1 Garofalo. One of Erasistratus' followers, Apollophanes of Seleucia, was court physician to the Seleucid king Antiochus III in the later third century BCE: see Hermann 1970, 94–97, n. 1 = Samama 2003, n. 233; *SEG* 33 (1993), 673 = Samama 2003, n. 133; Caelius Aurelianus, *Celerum passionum libri* 2.33.173 (Bendz 248).

4 See e.g. von Staden 1989, 47, for discussion.

5 Galen, *An in arteriis sanguis contineatur* 7.2 (Furley/Wilkie 174 = K. 4.729) and Diogenes Laërtius 5.57 = fr. 7 Garofalo link him with Theophrastus; Pliny, *Naturalis historia* 29.5 and Sextus Empiricus, *Adversus mathematicos* 1.258 = fr. 5 Garofalo associate him with Aristotle's family. The fact that Galen disputed this tradition should not carry too much weight, being motivated more by professional rivalry against contemporary Erasistrateans than by concern for historical accuracy.

physiology of pneuma.[6] He made full use of Herophilus' understanding of the nervous system, but in some ways seems to have restored aspects of the Praxagorean system, especially in maintaining that the arteries normally contain only pneuma, and the veins only blood. Overall, we are significantly better informed about Erasistratus' system than we are about Praxagoras' or Herophilus', in large part thanks to the contemporary disputes in which Galen was embroiled with Erasistratean rivals, who represented the main Hellenistic sect that still had a significant presence in Rome in the mid- to later second century CE.

### 1.1 The *triplokia* of arteries, veins and nerves

Erasistratus' physiology was grounded in processes involving three fundamental networks in the body, viz. the arterial, venous and nervous systems.[7] Some of our sources refer to these networks collectively as the *triplokia*, or 'triple web'.[8] It was through them primarily that pneuma was active in the body. The veins, arteries and nerves each represented a continuous, unified and independent system extending to every part of the body, while a fleshy, fatty tissue, called a '*parenchyma* of nutriment' forming the matter of the organs, as well as bones, were found in between their ramifications. They each branched out from a unique source – the veins from the heart's right ventricle, the arteries from its left ventricle, and the nerves from the brain's meninges – and at their extremities became invisible to the naked eye.[9] The vessels remained hollow throughout, terminating in imperceptible mouths at their extremities.[10] Both the Anonymus Parisinus and Galen give the name 'psychic pneuma' to the proper content of the nervous system,[11] and Galen the name 'vital pneuma' to that of the arteries, while the veins

6 Von Staden 1997.

7 On the nature of these three networks, see most recently Leith 2015b. For Erasistratus' physiology in general, see e.g. Lonie 1964; Harris 1973, 195–233; Garofalo 1988, 22–58; Vallance 1990, 62–79, 123–130; Vegetti 1995; von Staden 1997 and von Staden 2000, 92–96.

8 Or else *triplekeia*, as shown by Petit 2009, 130, n. 7. See Ps.-Galen, *Introductio seu medicus* 9.3–4 (Petit 21 = K. 14.697–98 = fr. 86 Garofalo): καὶ Ἐρασίστρατος δὲ ὡς ἀρχὰς καὶ στοιχεῖα τοῦ ὅλου σώματος ὑποτιθέμενος τὴν τριπλοκίαν (or τριπλέκειαν) τῶν ἀγγείων, νεῦρα καὶ φλέβας καὶ ἀρτηρίας ... . πολλὰ δὲ καὶ ἄλλα σωμάτων εἴδη εὑρίσκεται, οὐκ ἐκ τῆς τριπλοκίας (or τριπλεκείας) συγκείμενα, οἷον εὐθὺς ὁ ἐγκέφαλος καὶ ὁ μυελὸς καὶ πάντα τὰ ὀστᾶ. τὸν μὲν οὖν ἐγκέφαλον ἢ τὸν μυελὸν παρέγχυμα τροφῆς τολμᾷ λέγειν, ὡς τὴν πιμελὴν, καὶ τοῦ ἥπατος καὶ σπληνὸς καὶ πνεύμονος τὴν σύστασιν ("Erasistratus posited as principles and elements of the whole body the triple web of vessels, that is the nerves, veins and arteries ... And many other kinds of bodies are found which are not composed of the triple web, such as, for example, the brain, the marrow, and all the bones. So he dared to call the brain and marrow a *parenchyma* of nutriment, just like fat and the substance of the liver, spleen and lungs"); cf. Soranus, *Gynaecia.* 3.4 = fr. 60 Garofalo.

9 E.g. Galen, *De locis affectis* 5.3 (K. 8.311 = fr. 229 Garofalo).

10 Galen, *De venae sectione adversus Erasistratum* 3 (K. 11.153 = fr. 198 Garofalo).

11 Anonymus Parisinus, *De morbis acutis et chroniis* 4.1.2 (Garofalo 26,6–7 = fr. 174 Garofalo); e.g. Galen, *De naturalibus facultatibus* 2.6 (K. 2.97.1–5 = fr. 147 Garofalo).

normally contain only blood. Erasistratus thus took up again Praxagoras' belief that the arteries properly contain only pneuma, and the veins only blood, which Herophilus appears to have rejected.

Each system was also assigned distinct functions. Erasistratus accepted the standard view that the blood, which for him was restricted to the venous system, was the medium by which the body was nourished and its material losses replenished through the digestive process. He also adopted Herophilus' view that the (psychic) pneuma in the nervous system was responsible for mediating sensation and voluntary motion. He introduced innovations, however, in regard to the motion of the (vital) pneuma through the arterial system: having properly understood the function of the heart's valves in preventing backflow, he was the first to posit that the heart acts as a pump, thrusting the pneuma forcefully from the left ventricle out into arteries as it contracts. Hence the pulse was for him not due to an innate natural capacity of the heart or arteries to contract or dilate as it was for Praxagoras and Herophilus, but merely the mechanical filling of the arteries with pneuma due to the heart's contraction. As we shall see below, the considerable force involved in this pumping action suggested to Erasistratus novel roles for the arterial pneuma, such as its function in breaking down food in the stomach.

### 1.2 Respiration

For Erasistratus, the source of both vital and psychic pneuma was respiration, as in Herophilus' system.[12] While our evidence for Herophilus' conception of the precise means of its transference from the lungs to the arterial and nervous systems is patchy at best, for Erasistratus we are on much firmer ground. In his theory, the lungs draw in air thanks to the voluntary engagement of the muscles of the thorax.[13] From the lungs it reaches the heart via the 'vein-like artery' (pulmonary vein), and is then pumped by the heart from its left ventricle into the aorta and thence into the arterial system as a whole.[14] As noted above, this arterial pneuma is referred to by Galen as 'vital pneuma' (πνεῦμα ζωτικόν). The vital pneuma which is pumped into the carotid arteries is duly forced up into the meninges of the brain, which are the location of the origin of the nerves. Somehow, presumably through miniscule anastomoses, the vital pneuma is transferred from the arterial extremities within the meninges to the roots of the nerves, and thereby becomes the 'psychic pneuma' (πνεῦμα ψυχικόν) which fills the nervous system. Galen elsewhere tells us that Erasistratus late in life changed his mind, and located the origins

12 For respiration in Herophilus' physiology, see the previous chapter in this volume, sections 4.2-4.

13 See Galen, *De utilitate respirationis* 2.6 (Furley/Wilkie 88 = K. 4.477–478 = fr. 97 Garofalo); and Galen, *De anatomicis administrationibus* 8.2 (K. 2.660 = fr. 98 Garofalo).

14 Gal. *Art. Sang.* 2.2 (Furley/Wilkie 148 = K. 4.706 = fr. 101 Garofalo); Galen, *De usu partium* 6.12 (K. 3.347 = fr. 84 Garofalo). Cf. von Staden 2000, 93–94.

of the nerves within the brain itself, rather than its meninges, but he presents this as a novel reading of Erasistratus' writings.[15]

Galen tells us that Erasistratus rejected a Hippocratic view that air could reach the brain directly via the nostrils too; for Erasistratus, that is, the only route was through the lungs.[16] Erasistratus also attacked Plato's theory of the 'circular thrust' (περίωσις), which forced air once more into the body through its pores during exhalation, and out again in inspiration.[17] His criticism of Plato on this point suggests that he did not appeal to any theory of transpiration through the skin in his account of respiration either. It was thus apparently Erasistratus' view that all of the arterial and nervous pneuma is derived from the air inhaled into the lungs. This is not to say that pneuma could not escape through the arteries and nerves into the outside air though their imperceptible openings, for this is precisely what Erasistratus envisaged.[18] His position appears to have been that it was solely respiration via the lungs that was responsible for supplying the arteries, and derivately the nerves, with pneuma at their *source*. The pumping action of the heart, together with its valves, then guaranteed that the pneuma travelled in only one direction.

Galen chastises Erasistratus for neglecting to specify the degree of thickness that the pneuma had within the body. As discussed in the previous chapter (p. 107), Praxagoras and the pseudo-Aristotelian author of the *De Spiritu* thought that pneuma comes to be thicker inside the body than the ambient air, and Galen criticises Erasistratus, contrasting him unfavourably with Praxagoras, for his failure to state his view on the matter.[19] Elsewhere, however, Galen observes that Erasistratus thought that excessive pneumatic fineness could lead to suffocation (such as in rooms newly plastered with lime) "since

**15** For the meninges as the site of the transference of pneuma, see Gal. *Ut. Resp.* 5.1 (Furley/Wilkie 122 = K. 4.502 = fr. 112 Garofalo). For Erasistratus' switch from the meninges to brain tissue as origin of nerves, see Galen, *De Placitis Hippocratis et Platonis* 7.3.6–12 (De Lacy 440–442 = K. 5.602–604 = fr. 289 Garofalo); Galen, *In Hippocratis Aphorismos* 6.50 (K. 18A.86 = fr. 288 Garofalo); as well as the *Placita* report that he located the soul's *hēgemonikon* in the brain's meninx, at Aëtius, *Placita philosophorum* 4.5.3 (Diels 391 = fr. 40 Garofalo). See Leith 2020 for further discussion.

**16** Gal. *Ut. Resp.* 5.1 (Furley/Wilkie 122 = K. 4.502 = fr. 112 Garofalo). For the Hippocratic view, Galen is probably referring (though not explicitly) to *De Morbo Sacro* 7.3 (Jouanna 15.10–12 = L. 6.372.14–15).

**17** Galen, *In Platonis Timaeum commentarius* (Schröder 25,24 = fr. 113 Garofalo). For Plato's theory, see Pl. *Ti.* 79a–e.

**18** E.g. Gal. *Ven. Sect. Er.* 9 (K. 11.183–185 = fr. 75 Garofalo).

**19** Gal. *Art. Sang.* 2.2 (Furley/Wilkie 148 = K. 4.707 = Praxagoras fr. 18 Lewis = Erasistratus fr. 101 Garofalo): Πραξαγόρας μὲν οὖν καὶ παχυμερέστερον αὐτὸ καὶ ἱκανῶς ἀτμῶδες εἶναί φησιν, Ἐρασίστρατος δέ, ὅπῃ μὲν ἔχει πάχους, οὐ διώρισεν, … ("Hence Praxagoras says that it (*sc.* the pneuma inside the body) is thicker and considerably vaporous, but Erasistratus did not distinguish how much thickness it possesses, ...", tr. mine). See also Lewis 2017, 260–275. For the *De Spiritu*, see the chapter by Gregoric in this volume.

the pneuma cannot be retained in the body because of its fineness".[20] We shall see below that Asclepiades, apparently under Epicurean influence, held a view opposite to Praxagoras', maintaining that pneuma within the body undergoes various processes of elaboration, becoming *finer* than the outside air, and to a great extent. If we take Galen at his word, Erasistratus did not speculate in detail on the qualities of the pneuma when within the body, but we may conclude that pneuma had to have some degree of thickness to remain long enough within the body to discharge its functions, perhaps broadly in line with Praxagoras and the author of the *De Spiritu*.[21]

### 1.3 Functions of pneuma

There is little sign that Erasistratus made any significant modifications to Herophilus' basic conception of the functioning of the nervous system: likewise for him, pneuma was the medium, and it mediated both perception, via sensory nerves, and voluntary motion, via the rest of the peripheral nervous system. We are much better informed, however, about Erasistratus' account of how pneuma could produce voluntary motion, since it interacts directly with the muscles by inflating them, and thus causing contraction. As Galen tells us, the muscle cavities are inflated by pneuma, causing them to contract along their length, while expanding across their width.[22] Unfortunately, we have no detailed accounts of how perception worked, how, that is, the pneuma might transmit stimuli or how these might interact with any of the body's organs. However, the above analysis of his theory coheres well with reports from the Anonymus Parisinus regarding Erasistratus' aetiologies of diseases that involve impaired motor and sensory function.[23] Erasistratus, we are told, believed that phrenitis and lethargy were affections of the psychic capacities or activities in the brain's meninx, and that apoplexy was caused by cold, thick phlegm filling the nerves issuing from the brain and preventing the flow of psychic pneuma into them.[24] This at least indicates that the intrusion of foreign matter into the relevant vessels could impede the natural flow of pneuma, causing blockages which interfered with normal function.

20 Gal. *UP* 7.8 (Helmreich 1.393 = K. 3.540 = fr. 104 Garofalo): ἀδυνατοῦντος ἐν τῷ σώματι στέγεσθαι τοῦ πνεύματος ὑπὸ λεπτότητος. Von Staden 2000, 94, suggests that Erasistratus' psychic pneuma was finer, since "the only quality that Erasistratus explicitly assigns to pneuma of any kind is 'fineness'", but the context shows that it is precisely this fineness which renders the pneuma incapable of sustaining life. See also Harris 1973, 225.

21 Cf. also perhaps Aristotle's contention at *De motu animalium* 10, 703a 19–24, that pneuma must not be too light or too heavy in order to produce motion in the body.

22 Gal. *Loc. Aff.* 6.5 (K. 8.429 = fr. 54 Garofalo); Gal. *Art. Sang.* 2.2 (Furley/Wilkie 148 = K. 4.707 = fr. 101 Garofalo).

23 See the chapter by Lewis and Leith on the Anonymus Parisinus as a problematic source; the secure evidence for Erasistratus' theory of a pneumatic nervous system suggests that the Anonymus' reports may be more reliable, i.e. less anachronistic, in his case than in Diocles', Praxagoras' or Hippocrates'.

24 Anon. Paris. *Morb. Ac. et Chron.* 4.1.2, 1.1.1, 2.1.1 (Garofalo 26, 2, 10 = fr. 174, 176–177 Garofalo).

As for pneuma in the arterial system, Erasistratus appears to have been more innovative. As discussed above, he was the first to have recognised that the function of the heart's valves was to prevent blood or pneuma from flowing back into the heart.[25] This recognition was undoubtedly connected to his novel hypothesis of the heart's pumping action, possibly also under the influence of contemporary technological developments, exemplified by Ctesibius' force pump.[26] Thus for Erasistratus the arteries were the passive recipients of pneuma from the heart's left ventricle upon contraction, rather than themselves having a capacity to dilate, by which they could *draw* material into them, as Praxagoras and Herophilus believed. The considerable force of the heart's propulsion was a key part of Erasistratus' theory. As Galen reports, a single heartbeat propels the pneuma throughout the body's entire arterial system, right to the extremities, and he thought that "the speed of its motion exceeded the most violent winds."[27] This pneumatic force could even break apart food in the stomach as a necessary part of the digestive process. Rather than conceiving of digestion as primarily a result of the body's natural heat, as his predecessors, notably Aristotle, had done,[28] Erasistratus focused on this grinding or triturating process brought about by pneuma delivered via the arteries, likening the stomach to a mortar and the pneuma to its pestle.[29]

### 1.4 Soul?

As with Herophilus, it has been claimed that Erasistratus identified the pneuma in the body with the soul itself.[30] Certainly Galen refers to "psychic pneuma" in Erasistratus' system, as we have seen, but when Galen uses the phrase in the context of his own theory, he often emphasises that this is not meant to imply anything about the *substance* of the soul itself.[31] Moreover, in one pseudo-Galenic testimonium, we are told that in Erasistratus' view the animal is regulated by two materials, blood as nutriment, and pneuma

25 Gal. *PHP* 6.6.4–11 (De Lacy 396 = K. 5.548–550 = fr. 201 Garofalo); Harris 1973, 195–200.

26 Lonie 1973, 138–139; Vegetti 1995; von Staden 1996, 92–95.

27 Gal. *Loc. Aff.* 5.3 (K. 8.316 = fr. 105 Garofalo, tr. mine).

28 See e.g. Aristotle, *De partibus animalium* 2.3, 650a3–15; *De juventute et senectute* 4, 469b5–13; *De respiratione* 8, 474a26; Hippocrates, *Aphorismi* 1.15 (L. 4.466); Anonymus Londinensis, col. v 43–vi 4.

29 See esp. *Scholia in Galeni De naturalibus facultatibus* (Moraux 27 = fr. 144 Garofalo); cf. also e.g. Ps.-Galen, *Definitiones medicae* 99 (K. 19.372–373 = fr. 119 Garofalo); Galen, *De experientia medica* 11 (Walzer 24 = fr. 122 Garofalo); Gal. *Nat. Fac.* 2.8 (K. 2.119–120 = fr. 124 Garofalo).

30 Von Staden 2000, 92, and esp. 94: "[according to Erasistratus,] the arterial system carries some of the vital pneuma to the brain ..., where it becomes still more highly refined, namely into soul-pneuma, which is the soul."

31 See e.g. Gal. *Ut. Resp.* 5.1 (Furley/Wilkie 120 = K. 4.501): "Let us state first the way in which we call a thing 'psychic pneuma,' since we concede that we are ignorant about the substance of the soul", tr. mine; *De propriis placitis* 7 (Boudon-Millot/Pietrobelli 179); *PHP* 7.3.30 (De Lacy 446 = K. 5.609).

as a "tool" for the natural faculties.[32] It is very hard to see how something with the status of the soul could be described in such terms. Although the pneuma in Erasistratean nerves could be termed 'psychic' because of its role in transmitting sensation and voluntary motion, there is no sign that Erasistratus, or indeed Praxagoras and Herophilus, had any interest in developing a theory of the soul at all in their medical theory.[33] This appears to have been a decisive step taken by Asclepiades, as we shall see in the next section.

## 2 Asclepiades of Bithynia

As with all the physicians discussed in this chapter and the previous, Asclepiades' dates have been difficult to pin down with certainty, though he was clearly working in Rome in the late second and early first centuries BCE. He was born in the town of Prusias-ad-mare in Bithynia, and worked in various locations in the area of the Hellespont, notably Parium, as well as Athens and Rome.[34] He was the first major authority in theoretical medicine to be established at Rome, and founded his own medical sect there, as well as decisively influencing the development of Methodism. His medical system is of considerable interest in its own right.

Before examining Asclepiades' conception of pneuma, it is necessary first of all to consider briefly his theory of matter. Unlike his Hellenistic predecessors Herophilus and Erasistratus, Asclepiades held that a fully-fledged theory of matter was necessary for medical practice, devoting a treatise to expounding his theory, entitled *On Elements*.[35] His theory was quasi-atomistic, and owed a great deal to Epicurean physics.[36] The human body, like everything in the universe, is composed of invisible particles which he called *onkoi*, literally 'masses,' 'bits' or 'lumps.'[37] These are in perpetual motion, and have been for eternity past. In their motion, they can become entangled and form complex solid

32 Ps.-Gal. *Int.* 9.3 (Petit 21 = K. 14.697 = fr. 86 Garofalo): δυσὶ γὰρ ὕλαις ταῦτα διοικεῖσθαι λέγει τὸ ζῷον, τῷ μὲν αἵματι ὡς τροφῇ, τῷ δὲ πνεύματι ὡς συνεργῷ εἰς τὰς φυσικὰς ἐνεργείας ("For he says that these (i.e. fluids and pneumas) regulate the animal with two materials: blood as nourishment, and *pneuma as a tool for the natural activities*", tr. mine).

33 My view is that Erasistratus and Herophilus will have regarded the soul as a subject of study that falls outside the proper scope of medicine: see the discussion on Herophilus and the soul in the chapter by Lewis and Leith in this volume, and esp. Leith 2020.

34 Cael. Aur. *Cel. Pass.* 2.22.129 (Bendz 218). For his life and dates, see esp. Rawson 1982; Flemming 2012.

35 Herophilus and Erasistratus, by contrast, believed that it was not necessary for doctors to analyse the body beyond the perceptible level of the uniform parts, and explicitly avoided the inquiry into the elements: see Leith 2015a. For Asclepiades' *On Elements*, see Galen, *De elementis ex Hippocrate* 9.25–26 (De Lacy 134 = K. 1.487).

36 For Asclepiades' theory of matter, see Asmis 1993; Leith 2009 and Leith 2012, differing in key respects from Vallance 1990, not least in emphasising its Epicurean foundations.

37 The most important testimony on Asclepiades' *onkoi* is Cael. Aur. *Cel. Pass.* 1.14.105–107 (Bendz 80–82); see also e.g. Sext. Emp. *M.* 3.3–5.

structures, the human body being a particularly sophisticated example. By themselves, the *onkoi* are characterised only by size and shape, but have no other qualities, such as colour, smell, temperature, and so on. Such 'secondary' phenomenal qualities are only produced at the level of compounds, through certain kinds of complexes of *onkoi*. This is all derived directly from Epicurean atomism, and Asclepiades also borrowed Epicurean arguments to defend it.[38] He also shared Epicurus' firmly anti-teleological perspective, as Galen repeatedly emphasises.[39] For Asclepiades, Nature was nothing more than matter and motion.[40] However, he made certain significant modifications to Epicureanism, most strikingly in his insistence that his particles were not actually atomic, but breakable into fragments.[41] Our sources unfortunately cast little light on his precise motivation for this divergence, and I shall not speculate on the matter here, but we shall see further examples of Asclepiades' modifications of Epicureanism later, especially in relation to his psychology.

As Galen informs us, Asclepiades also followed Epicurus in accepting the existence of void.[42] The eternal motion of the *onkoi* was thus, as in atomistic physics, a natural consequence of the absolute lack of resistance offered by the void space that surrounded them. The presence of 'pores' which were merely void gaps or interstices between the *onkoi* constituting complex structures, was fundamental to Asclepiades' physiological and pathological theories.[43] In his system, while there is a balanced motion of the body's constituent *onkoi*, health is maintained. The principal cause of disease is the occurrence of a blockage or obstruction of *onkoi* in the void pores, and diseases vary according to the location of this blockage within the body. Thus mental diseases such as phrenitis are caused by blockages in the meninges of the brain, while cardiac disease is caused by one in the heart.

Accordingly, pneuma, like everything else in the universe, is a substance made up of *onkoi* separated by void gaps. In the Asclepiadean body, it assumed a prominent role as one of the main fluid substances. This is emphasised by Sextus Empiricus, who attributes to Asclepiades, in a rather longwinded way, the view that "parts of fluid and pneuma are combined together from everywhere out of *onkoi* perceptible by reason that

**38** For example, his appeal to the fact that the parts of white substances, such as silver, are black, and vice versa, can be paralleled in book 2 of Lucretius' *De Rerum Naturae*, in his argument that atoms cannot possess colour. As Lucretius says there, "the reason that leads ... us sometimes to attribute colours to the first-beginnings of things falls to the ground, since white things are not made from white, nor what are black from black, but from diverse colours" (Lucr. 2.788–791, tr. Rouse and Smith).

**39** E.g. Gal. *UP* 1.21 (Helmreich 1.54 = K. 3.74) and 7.14 (Helmreich 1.415 = K. 3.571–572).

**40** Cael. Aur. *Cel. Pass.* 1.14.115 (Bendz 86).

**41** See e.g. Cael. Aur. *Cel. Pass.* 1.14.105 (Bendz 80); Galen, *De constitutione artis medicae* 7 (Fortuna 76 = K. 1.249).

**42** E.g. Gal. *UP* 6.13 (Helmreich 1.346 = K. 3.474); *De simplicium medicamentorum temperamentis ac facultatibus* 1.14 (K. 11.405); Galen, *In Hippocratis Epidemiarum VI* 4.11 (Wenkebach 215 = K. 17B.162).

**43** See Leith 2012.

are perpetually restless".[44] Just as Herophilus and Erasistratus maintained, Asclepiades' pneuma is not innate, but drawn into the body from the outside through respiration, as we shall see. Once inside the body, it was central to various aspects of Asclepiades' physiology. Strikingly, too, as with his inquiry into the elements, Asclepiades diverged from Herophilus and Erasistratus in developing a detailed theory of the soul, which he identified with pneuma. Pneuma also played what appears to be a minor role in disease causation: as Caelius tells us, blockage of the *onkoi* is not the cause of all diseases; certain kinds of minor and easily resolved fevers are caused instead by a disturbance in the body's fluids and pneuma.[45]

### 2.1 Respiration

Aëtius' *Placita* supplies by far the most detailed description we have of the mechanics of respiration in Asclepiades' system:

> **T1** Ἀσκληπιάδης τὸν μὲν πνεύμονα χώνης δίκην συνίστησιν, αἰτίαν δὲ τῆς ἀναπνοῆς τὴν ἐν τῷ θώρακι λεπτομέρειαν ὑποτίθεται, πρὸς ἣν τὸν ἔξωθεν ἀέρα ῥεῖν τε καὶ φέρεσθαι παχυμερῆ ὄντα, πάλιν δ' ἀπωθεῖσθαι μηκέτι τοῦ θώρακος οἵου τ' ὄντος μήτ' ἐπεισδέχεσθαι μήθ' ὑποστέγειν· ὑπολειπομένου δέ τινος ἐν τῷ θώρακι λεπτομεροῦς ἀεὶ βραχέος (οὐ γὰρ ἅπαν ἐκκρίνεται), πρὸς τοῦτο πάλιν τὸ εἴσω ὑπομένον <τὴν> βαρύτητα τοῦ ἐκτὸς ἀντεπεισφέρεσθαι· ταῦτα δὴ ταῖς σικύαις παρεικάζει· τὴν δὲ κατὰ προαίρεσιν ἀναπνοὴν γίνεσθαί φησι συναγομένων τῶν ἐν τῷ πνεύμονι λεπτοτάτων πόρων καὶ τῶν βρογχίων στενουμένων· τῇ γὰρ ἡμετέρᾳ ταῦθ' ὑπακούει προαιρέσει.
>
> Asclepiades maintains that the lungs are like a funnel, and posits that the cause of respiration is the fine-structured stuff (*leptomereia*) in the thorax, towards which the outside air, which is coarse-structured (*pachymeres*), flows and moves; it is driven back again when the thorax is no longer able to admit any more or contain it. Since a little bit of fine-structured stuff (*leptomeres*) is always left behind in the thorax (for not all of it is excreted), the weight of the outside air again travels in turn towards it, as it remains inside. He likens these things to cupping-vessels. He says that voluntary breathing comes about when the finest

44 Sext. Emp. *M*. 3.5: ὅτι πάντοθεν ὑγροῦ μέρη καὶ πνεύματος ἐκ λόγῳ θεωρητῶν ὄγκων συνηράνισται δι' αἰῶνος ἀνηρεμήτων, tr. mine.

45 Cael. Aur. 1.14.107 (Bendz 82): *varias inquit fieri passiones locorum aut viarum differentia, et non omnes statione corpusculorum, sed certas, hoc est phrenitim, lethargiam, pleuritim et febres vehementes, solubiles vero liquidorum atque spiritus turbatione*; cf. Cael. Aur. 1.pref.8 (Bendz 26) and Sor. *Gyn*. 3.4.

> pores in the lungs are drawn together and the bronchial tubes narrowed; for these obey our volition.
>
> Aët. *Plac.* 4.22 = Ps.-Plut. 4.22 (903e–f, tr. mine)

It will be noted first of all that Asclepiades appears to have distinguished between a voluntary and a non-voluntary form of the process. We saw above that Erasistratus thought the lungs were moved voluntarily, through the muscles of the thorax.[46] The voluntary form of respiration in Asclepiades' account is referred to in the final sentence of the passage quoted, where the narrowing of the finest pores in the lung and of the bronchial tubes are held to be responsible, presumably for exhalation specifically. As we shall see later, Asclepiades believed that voluntary motion was mediated by the nerves, which must have been implicated in the overall process referred to here.

Involuntary respiration, by contrast, is governed by a general principle of motion which Asclepiades used to explain a range of physical and pathological processes, often referred to in our sources as ἡ πρὸς τὸ λεπτομερὲς φορά, or literally "motion towards what is fine-structured" (PTLP for short).[47] The entity called both τὸ λεπτομερές and ἡ λεπτομέρεια in our sources is to be understood in terms of Asclepiades' theory of matter, and represents a highly rarefied and low-density substance. It is constituted of *onkoi* that are very small and fine, as well as widely separated by void gaps. As Caelius Aurelianus tells us, what is *leptomeres* is so fine that it "has no quality of hot or cold, nor any other tangible sensation".[48] An area of *leptomeres* could be generated by movement, since vehement motion causes substances to be rarefied – a principle that is also attested in Epicurean explanations of physical processes – as well as by heat.[49] So the *leptomeres* is basically a substance constituted by a comparatively high proportion of void space. The *leptomeres* causes motion towards itself, not through attraction, but through a process which can be thought of as a kind of 'drift,' as Sylvia Berryman has helpfully termed it with reference to atomist physics.[50] As discussed, like Epicurean atoms, Asclepiades' *onkoi* are in perpetual motion. Hence nothing in the body can actually be at rest, and accordingly there was no need for Asclepiades to explain how the motion of bodily fluids

46 See above n. 13.

47 Abbreviation borrowed from Vallance 1990, 50.

48 Cael. Aur. *Cel. Pass.* 1.14.113 (Bendz 84–86): *et neque ullam digestionem in nobis esse, sed solutionem ciborum in ventre fieri crudam et per singulas particulas corporis ire, ut per omnes tenuis vias penetrare videatur, quod appellavit leptomeres, sed nos intelligimus spiritum; et neque inquit ferventis qualitatis neque frigidae esse nimiae suae tenuitatis causa neque alium quemlibet sensum tactus habere*.

49 For motion and heat as cause of rarefaction, see e.g. Cael. Aur. *Cel. Pass.* 2.40.233 (Bendz 286); Cassius Iatrosophista, *Problemata* 61, 64 (Garzya 60–61 = §§ 60, 63 Ideler). For the corresponding Epicurean view, see e.g. Lucr. 4.860–866.

50 Berryman 1997, 151–157, esp. 154: "The presence of void is a necessary but not a sufficient condition: the 'drift' into an empty space requires that bodies be discrete and already in motion. Attraction is thus reducible to action by contact."

gets initiated, but only the direction and regularity of their motion. Whenever an area of *leptomeres* is created, then, the adjacent *onkoi* (i.e. those belonging to a *pachymeres*, coarse-structured, substance) will just naturally move, or 'drift' into the available void space. Within a solid structure such as the human body, the *onkoi* are closely entangled, and constantly rebounding off one another in a more or less restricted way. Hence areas of extended void space within such a solid structure will tend to have particles straying into them, since all of the *onkoi* in the vicinity which happen to be moving freely in the right direction will necessarily pass in.[51] Respiration and, as we shall see, pulsation are accounted for by the motion of pneuma towards areas of *leptomeres* within the body. Incidentally, this shows that pneuma, although similarly a very fine and rarefied substance, should not be conflated with the *leptomeres* itself.

The fundamentals of Asclepiades' account of respiration thus seem clear enough. The thorax contains some *leptomeres*. The outside air, which is thick by comparison, travels towards this *leptomeres* in the thorax via the lungs, which thus act as a funnel. This influx of air expands the thorax until it fills up and a critical volume is reached, at which point the inflowing matter is repelled, and the air flows back out through the lungs into the outside air again. The fact that some of the *leptomeres* always remains inside the thorax guarantees that the process is repeated. We learn from Calcidius, in a passage discussed in more detail below, that the inhaled air is made finer (*attenuatus*) in its passage through the lungs, and some of this pneuma makes its way from the lungs to the heart. We may suppose that this process of rarefaction is what transforms the coarse outside air into the pneuma which is physiologically active within the human body. As we shall see, pneuma is made up of the smallest, smoothest and roundest particles, so presumably a sorting process is envisaged in the lungs, whereby only the smallest *onkoi* of the air are able to pass through the fine vessels therein. The larger particles remaining in the lungs would then be evacuated once more through exhalation.

### 2.2 Pulsation

The next stage is reached when a quantity of pneuma makes it to the heart, bringing us to Asclepiades' account of pulsation. Asclepiades apparently gave a unified account of the connected processes of respiration and pulsation in his treatise entitled *On Respiration and Pulses*.[52] According to Galen, it was in this work that Asclepiades gave the following definition of the pulse: "the pulse is a dilation and contraction of the heart and the

51 Lucr. 6.1017–1021 gives a broadly similar account, for example: "The same thing happens in all directions: wherever an empty space is formed, whether on the sides or above, the neighbouring bodies at once are carried into the void", tr. Rouse and Smith.

52 Galen, *De differentiis pulsuum* 4.15–16 (K. 8.757–758).

arteries."[53] In Asclepiades' view, it is the flow of pneuma through the heart and arteries that makes them dilate and then contract, and not some faculty that they possess of themselves (as Praxagoras and Herophilus believed; see the chapter above by Lewis and Leith). Once again, the principle of motion towards the *leptomeres* (PTLP) is what causes the pneuma to enter the arteries:

> **T2** ὁ δ' Ἀσκληπιάδης κίνησιν ἀρτηριῶν κατὰ διαστολὴν καὶ συστολήν, πληρουμένων μὲν πνεύματος τῇ πρὸς τὸ λεπτομερὲς φορᾷ, κενουμένων δὲ τῇ καταπτώσει τοῦ χιτῶνος αὐτῶν.
>
> But Asclepiades (will say) that (*sc.* the pulse) is a motion, through dilation and contraction, of the arteries, which are filled with pneuma by (its) movement towards what is fine-structured (*to leptomeres*), and emptied by the collapse of their wall.
>
> Gal. *Diff. Puls.* 4.2 (K. 8.714, tr. mine)

Just as the thorax contains some *leptomeres* towards which the outside air 'drifts' in respiration, so too the arteries contain some *leptomeres* towards which the pneuma travels in pulsation. By this means, the pneuma is distributed from the heart to the whole arterial system. From there, it ultimately passes out into the open air again, through the invisible void gaps permeating the body's structure. We also learn that Asclepiades attributed variation in the vehemence of the pulse to the quantity and fineness of the pneuma travelling through the arteries – this must have been dependent again upon the quality of the external air, and the effectiveness of the rarefying or sorting process that takes place in each individual's lungs.[54]

It follows from Asclepiades' view of pulsation that the natural state of the arteries is one of contraction: the pneuma dilates and distends the artery as it enters, while the artery collapses once more to its default condition after the pneuma has passed on. Galen explicitly contrasts this with Herophilus' view, according to which the arteries are naturally dilated, but contract because of a faculty possessed by the heart.[55] However, in the passage just quoted above, Galen also suggests that, in Asclepiades' view, the arteries themselves also contribute to the movement of the pneuma through them. As he states, the arteries "are filled with pneuma by (its) motion towards the *leptomeres*, and *emptied by the collapse of their wall*." Taken at face value, this implies that the arterial walls exert their own force upon the pneuma, in that the collapse of the arterial wall itself causes the arteries to be emptied by squeezing the pneuma forward. Hence there would be a

53 *Ibid*., tr. mine; cf. also Marcellinus, *De pulsibus* 12 (Schöne 457–458).

54 Gal. *Diff. Puls.* 3.2 (K. 8.645–646 = Herophilus T164 vS = Erasistratus fr. 111 Garofalo).

55 Gal. *Diff. Puls.* 4.10 (K. 8.747–748 = T157 vS).

combination of factors in pulsation, with motion towards the *leptomeres* responsible for the entry of the pneuma *into* the heart and arteries, and the elasticity of the arterial walls responsible for pushing it onwards and ultimately into the outside air once more.

It is striking that in Asclepiades' theory of pulsation it seems to be pneuma which does all the work. There is no reference to blood in the surviving testimonia on pulsation. It may be, then, that Asclepiades was another adherent of the infamous theory of Praxagoras and Erasistratus that the arteries naturally contain only pneuma, and not blood. However, this argument from silence can be matched by another that points in the opposite direction, since Galen never accuses Asclepiades of holding the same misguided view as Erasistratus, despite the fact that pointing out Asclepiades' mistakes was one of his major preoccupations. There are various considerations which might be thought relevant to the matter, though I have found no evidence that appears to settle it. The possibility very much remains open that Asclepiades followed Erasistratus and Praxagoras in this regard.

### 2.3 Soul

The most important role played by pneuma in the Asclepiadean body, however, was as the material substance of the soul.[56] As Galen puts it at one point, he believed respiration to be "for the sake of the generation of the soul."[57] Asclepiades will not have identified its function teleologically in this way, but there is no doubt that the soul in his view was a corporeal body and that its matter was derived directly from the processes associated with respiration. Calcidius offers the most detailed account in the following long testimonium, from his commentary on Plato's *Timaeus*:

> **T3** [214] (1) *sed quoniam de hoc diversae opiniones philosophorum tam veterum quam novorum extiterunt, recensendae nobis singulae sunt, ut habita comparatione quanto ceteris ad veritatem praestet Platonis fiat palam.* (2) *qui dividuam fore silvae substantiam censuerunt interponentes immenso inani modo expertia modo partes quidem, sed indifferentes, sui similes, tum atomos vel solidas moles, nullum locum certum definitumque principali animae parti dederunt.* (3) *spiritus quippe, ut ipsi asseverant, per fauces ad pulmonem commeans in respiratione attenuatus ad cordis sedem facit transitum, deinde per arterias quae sunt a corde porrectae pervenit ad caroticas ita appellatas venas, quod eaedem vulneratae mortem afferant soporiferam; per quas idem spiritus ad caput fertur per tenues nervorum et angustos meatus, atque ibi primum nasci dicunt*

56 For Asclepiades' psychology, see esp. Polito 2006; Leith 2009, 300–305.

57 Gal. *Hipp. Epid.* 6.6.3 (Wenkebach 327.12–19 = K. 17B.320).

*initium sentiendi et intermanare ad ceterum corpus. (4) isque communis sensus est tactus, sed fit proprius ob diversitatem membrorum quibus sentimus. qualia enim fuerint organa sentiendi, talis sensus existit, ut per oculos visus, auditus per aures, atque in eundem modum ceteri; unus tamen est spiritus, qui in multis deformatur.*

[215] (5) *aut enim moles quaedam sunt leves et globosae eaedemque admodum delicatae, ex quibus anima subsistit, quod totum spiritus est, ut Asclepiades putat, aut ignitae atomi iuxta Democritum, qui ex isdem corporibus et ignem et animam censet excudi, vel †id ipsum† atomi casu quodam et sine ratione concurrentes in unum et animam creantes, ut Epicuro placet, (6) ob similitudinem atomorum, quarum una commota omnem spiritum, id est animam, moveri simul. unde plerumque audita nive candorem simul et frigus homines recordari, vel, cum quis edit acerba quaedam, qui hoc vident assidue spuunt incremento salivae et cum oscitantibus simul oscitant alii, inque consonis rhythmis moveri nos iuxta sonos.*

[214] (1) But since there have been various opinions on this matter (*sc.* on the location of the ruling part of the soul) among philosophers both old and new, we must consider each of them, so that by carrying out a comparison it may become clear how far Plato's opinion is superior to the rest as regards truth. (2) Those who thought that the substance of matter is discontinuous, interspersing in the immense void now partless bodies, now bodies which are parts but uniform and similar to themselves, then atoms, or solid masses, assigned no certain or defined place to the ruling part of the soul. (3) The reason is that pneuma, they assert, travels through the mouth to the lungs, and having been rarefied in respiration makes its way to the location of the heart, then through the arteries which extend from the heart, and arrives at the carotid vessels, so called because when they are wounded they cause sleep-bringing death; through these the same pneuma is brought to the head through the fine and narrow passages of the nerves, and they say that there the origin of sensation is first generated and spreads throughout the rest of the body. (4) The common sense is touch, but it becomes particular because of differences in the parts by which we sense. For the sensation is of the same kind as the sense organs, so that sight occurs through the eyes, hearing through the ears, and the rest in the same way. But the pneuma is one and the same which is altered in several ways.

[215] (5) For there are either certain masses which are smooth and round and at the same time very fine of which the soul is composed, which is entirely pneuma, as Asclepiades thinks, or fire atoms according to Democritus, who believes that both fire and the soul are forged from the same bodies, or †*id ipsum*† atoms which run together by a kind of chance and without cause to cre-

> ate the soul, as Epicurus thinks, (6) and because of the similarity of the atoms, when one of them is moved the pneuma as a whole, i.e. the soul, is moved at the same time. For this reason (he thinks) it often happens that people sense brightness and cold as soon as they hear the word 'snow,' or, when someone eats something bitter, those who see it spit repeatedly from the increase in saliva, and people yawn when they see others yawn, and we move rhythmically in time with music.
>
> Calcidius, *In Platonis Timaeum commentarius* 214–215 (Waszink 229,1–230,7, tr. mine)

Before addressing Asclepiades' psychology, some comment is needed regarding the attributions of the various views outlined in the passage. In a way that is closely reminiscent of Galen's polemic, Calcidius lumps together the atomists and Asclepiades, along with some other unnamed authorities who are identifiable as Diodorus Cronus and Anaxagoras, as representing a loose group who are all portrayed as having more or less the same fundamental commitments.[58] They are all said to adhere to a conception of matter as discontinuous, espousing various kinds of particulate theories which incorporate void (obviously with varying degrees of accuracy). Much of the passage describes views that Calcidius does not attribute to individual thinkers; rather, they are presented as being held by the group in general. Hence there are questions about just how many of the unattributed views mentioned can reasonably be linked to individual authorities. However, it has long been recognised that most of these unattributed views in fact match doctrines that are distinctively Asclepiadean, and are incompatible with the attested doctrines of the remaining authorities.[59] A particularly striking example is the view that there is no localised ruling part of the soul, for which, as we shall see, Asclepiades was well known.[60] On the other hand, none of these generally attributed views conflict with the other evidence we have for Asclepiades. Accordingly, interpreters have taken this passage as reliable evidence for him, except where views are explicitly attributed to others.

As for Asclepiades' theory of the soul, then, one of the first things to observe is that not all of the pneuma in the body constitutes the soul, but only a certain portion of it. As we saw, the inhaled pneuma is rarefied in the lungs and transferred to the heart,

**58** For Galen's polemic against this group, see e.g. *Nat. Fac.* 1.12 (Helmreich 119–122 = K. 2.26–29); *Hipp. Elem.* 2.9–11 (De Lacy 60 = K. 1.416–417).

**59** See esp. Switalski 1902, 51–53; Polito 2006, 291–292; Polito 2007; cf. also Leith 2009, 304–305.

**60** Even clearer examples come at Calc. *In Tim.* 216 (Waszink 230), in which arguments are given for the non-localisation of the ruling-part-of-the-soul, appealing to the behaviour of various animals and insects: the arguments are directly assigned to Asclepiades at Tertullian, *De anima* 15.1–3 (Waszink 18–19), for which see below.

and from there is delivered throughout the entire arterial system. Therefore, as section 3 from the Calcidius passage notes, some of this pneuma is necessarily also delivered to the so-called carotid arteries, and thence to the crucial area of the brain. At this stage, a second process of rarefaction takes place as the pneuma passes into the head, through what Calcidius calls "the fine and narrow passages of the nerves." We seem to have here a process parallel to what occurs in the lungs: just as the pneuma is refined (*attenuatus*) in the lungs, so at this stage there is also a sorting process, with only the smallest particles permitted to pass through the narrow passages. This apparently leads to the production of pneuma of an even higher degree of fineness, and it is precisely at this point that, as Calcidius says, the beginning of perception comes to be, and is able to pass throughout the rest of the body.

The pneuma is responsible, then, for transmitting sensation: all perception acts through contact from external sense-objects which impinge on the pneuma in some way. The kind of sensation which is produced then depends on the nature of the sense-organ which the pneuma inhabits – so the pneuma in the eyes is acted upon in a certain way, while that in the ears is affected in a different one, and this is responsible for sight and hearing respectively. One of the *Problemata* of Cassius the Iatrosophist, who shows various signs of direct Asclepiadean influence, offers a neat example of some of the processes we have been considering:

**T4** Διὰ τί οἱ κεφαλαίαν ἔχοντες ἀμβλυωποῦσι καὶ δακρύουσι συνεχῶς; ὅτι ἐπὶ τὴν κεφαλὴν συνδιδομένης ὕλης (ἀεὶ γὰρ ἐπὶ τὰ πεπονθότα αἱ ὕλαι φέρονται), πολὺ μέρος φέρεται ἐπὶ τοὺς ὀφθαλμούς, καὶ τοῦτ' εἰκότως, διὰ τὸ ἀνεῷχθαι διὰ τὸ πλῆθος τῆς λεπτομερείας, ὃ γίνεται διὰ τὴν συνεχῆ κίνησιν αὐτῶν. καὶ πῇ μὲν δακρύουσι διὰ τὸ πλῆθος τῆς ἐπιφορτιζούσης τὰ μέρη ὕλης· πῇ δὲ ἀμβλυωποῦσι διὰ τὸ ἐπιθολοῦσθαι τὸ κατὰ φύσιν πνεῦμα, τὸ διοδεῦον διὰ τῶν ὁρατικῶν πόρων τῇ ἐπιμιξίᾳ τῆς συνδοθείσης ὕλης.

Why do those with chronic headache have blurred vision and weep constantly? Because when matter is distributed to the head (for matter always moves to the affected parts), a large part of it moves to the eyes, and reasonably so, because they are open because of the large amount of *leptomereia*, which is caused by their continual movement. On the one hand they weep because of the large amount of matter which overloads the parts; on the other, they have blurred vision because the pneuma in a natural state is disturbed as it travels through the pores of sight by being mixed with the matter which is distributed.

Cassius Iatrosophista, *Problemata* 76 (Garzya 65 = Ideler § 75, tr. mine)

We see first of all that the eyes, because of their continual movement, have a consider-

able amount of *leptomeres*. This necessarily causes the motion of matter towards it, augmented by the matter already moving towards the affected part. Thus an excess of matter accounts for the weeping, as it escapes through the available openings. The blurred vision, on the other hand, is caused by the excess of matter as it interferes with and disturbs the pneuma which ordinarily transmits perception. The pneuma under normal conditions passes through the void gaps within the eyes, but in chronic headache this is disrupted by the matter flowing in because of the *leptomeres*.

It is clear from the Calcidius passage sections 5 and 6 that this pneuma responsible for perception just is the soul. Asclepiades specified that the soul was made of a particular kind of particle, namely *onkoi* that were extremely fine, smooth and round, just like Epicurus' soul atoms.[61] This accords well with the two successive stages of refinement that we have identified in the process of respiration and the transmission of pneuma into the head. It also explains just how the soul is capable of spreading throughout the entire body, in contrast to the pneuma that exits the heart, which appears to be largely confined to the arterial system. The fact that the constituent particles of the soul are so fine, smooth and round entails that it will pass easily through the body's void interstices, without getting entangled or jammed up.

We know from other sources that Asclepiades maintained that the soul is spread everywhere in the body.[62] Interestingly, however, it was not by being distributed through the *nervous* system that the soul permeated the body. Rather, the soul-pneuma literally travelled everywhere. We have seen how the soul-pneuma is responsible for mediating perception, but Asclepiades introduced a significant modification to Herophilus and Erasistratus' work on the nervous system, in that he did not hold the nerves responsible for transmitting this perception.[63] Nevertheless, as we noted in connection with his views on respiration, he did allow that the nerves were responsible for transmitting voluntary motion, following Herophilus and Erasistratus at least in this respect. I shall return to the question of why he should have denied the nerves a role in mediating perception.

Another major innovation, and one for which he was perhaps most famous in philosophical milieux, was his denial that there is a ruling part of the soul, or *hēgemonikon*, confined to a certain location in the body. This is certainly a controversial aspect of Asclepiades' doctrine, and there is much that is unclear in our sources.[64] Without wanting to get embroiled in the debate here, however, it seems plausible that Asclepiades' view was simply that the functions which others assigned to the *hēgemonikon* could in

**61** See esp. Leith 2009, 300–305, for this interpretation of Calcidius' testimony.

**62** Ps.-Galen, *De historia philosopha* 24 (DG 613).

**63** Ps.-Rufus, *De anatomia partium hominis* 71–74 (Daremberg-Ruelle 184–185 = Herophilus T81 vS = Erasistratus fr. 39 Garofalo); Gal. *Prop. Plac.* 6.6 (Boudon-Millot/Pietrobelli 178.12–21); Gal. *Loc. Aff.* 2.8 (K. 8.90).

**64** Polito 2006 offers one line of interpretation.

some sense be discharged by the soul as a whole. Hence there was no need to posit a specific part of the soul, confined to a particular part of the body, that was responsible for rational activity or for registering perceptions and so on. In support of his thesis, we know that Asclepiades pointed to a number of animal species which can be observed to discharge certain psychic functions even when their hearts or their heads are removed.[65] Thus bees and wasps and the like, following decapitation, not only live on for some time, but even, to quote, "perceive no less" and "fly around and defend themselves with their stings."[66] Likewise crocodiles and tortoises, for example, upon removal of their hearts, survive for a time and "fight back against the injury." Calcidius, in the passage quoted above, explicitly connects Asclepiades' rejection of the *hēgemonikon* with the pneumatic nature of the soul itself. He emphasises, in section 4, the unity of the pneuma which forms the soul, and in section 6, the way in which the whole pneumatic soul is moved together as a single unity. We have already seen how the extreme fineness of the soul's pneuma enables it to permeate the entire body. It seems possible that, even though the pneumatic soul is first generated in the head, it functions as a complete unity that is spread throughout the body. There are no meaningful boundaries within its overall structure that would enable us to delineate certain parts of it as governing particular processes or as functionally independent.

Galen was troubled, among other things, by the psychic discontinuity that this account implies.[67]

**T5** Ἀσκληπιάδῃ δὲ οὐ ταῦτα μόνον, ἀλλὰ καὶ τὰ δι' ἑτέρων ἡμῖν εἰρημένα πρὸς τοὺς περὶ ψυχῆς αὐτοῦ λόγους μάχεται. δείκνυται γὰρ ἐν ἐκείνοις, ὡς ἡ τῆς ψυχῆς οὐσία, κἂν μὴ μία ᾖ διὰ παντὸς τοῦ βίου, μέχρι χρόνου συχνοῦ διαμένει. κατὰ δὲ τὸν Ἀσκληπιάδην οὐδὲ ἀριθμῆσαι δυνατὸν ὅσας ἔχει· ἡ μὲν γὰρ ὀλίγον πρόσθεν οὖσα νῦν οἴχεται τελέως, ἄλλη δέ ἐστιν ἡ νῦν οὖσα, μικρὸν δ' ὕστερον οἰχήσεται μὲν αὕτη, γενήσεται δ' ἑτέρα. <ὅπερ> ὡς ἔστιν ἀδύνατον καὶ ἄτοπον, δι' ἐκείνων ἀποδέδεικται.

As far as Asclepiades is concerned, not only does this oppose him, but also what we have said in another work against his arguments concerning the soul. For it is revealed there that the substance of the soul, even if it is not one and the same throughout life, endures for a long period of time. But according to Asclepiades it is impossible to count how many (souls) one has: the one that existed shortly before is now completely gone, and what exists now is different,

**65** Calc. *In Tim.* 216 (Waszink 230); Tert. *De an.* 15.1–3 (Waszink 18–19).

**66** *Ibid*.

**67** See likewise Calc. *In Tim.* 217 (Waszink 231).

> but this one will shortly afterwards be gone, and another will come to be. That this is impossible and absurd has been demonstrated there.
>
> Gal. *Ut. Resp.* 2.11 (Furley/Wilkie 96–98 = K. 4.483–484, tr. mine)

As he emphasises, Asclepiades' theory seems to entail that our soul is continually being replaced by another, made of an entirely new set of particles. It would be hard to see, then, how the theory could yield any kind of account of identity of the self over time. But his view need not have been that with each new breath the soul is entirely replaced. There could have been only a partial replenishment with each inhalation, even if any given portion of soul-pneuma remained in the body for only a relatively short time.

However such details are to be interpreted, it is clear that Asclepiades' theory of the soul was fully integrated with his general physiology. The generation of the corporeal soul was the result of a unified process that began with respiration and accounted for pulsation and a range of perceptual and motor functions, as well as offering explanations of certain kinds of pathological conditions. This process was underpinned by a theory of matter, driven by a single principle of motion, and all based around the multifunctional and adaptable substance of pneuma.

But Asclepiades' general psychology itself was primarily indebted to Epicurus, and had no apparent connections with the earlier Hellenistic medical tradition. Unsurprisingly given the connections between their particulate theories of matter, Asclepiades' soul shared a number of central features with its Epicurean counterpart: (1) it was a fine-structured (λεπτομερές), corporeal entity; (2) it was constituted by elemental particles which were very small, smooth and round; and (3) it was diffused throughout the body with which it interacted. Yet as in his theory of matter Asclepiades introduced a number of significant revisions to Epicurus' theory and brought it in line with his own understanding of the body's functioning. Epicurus had differentiated between various constituents of the soul, which were in practice thoroughly blended with each other, but nevertheless distinguishable in their qualities.[68] There are four of these constituents, one fire-like (πυρῶδες), one air-like (ἀερῶδες), one pneumatic (πνευματικόν) and one so fine that it is quite unlike anything else and hence remains 'nameless'. Asclepiades seems to have simplified this background, reducing the soul to a single substance, namely pneuma, which of course was the basic Stoic position (see further the chapters by Tieleman and Hensley in this volume).

On the other hand, despite certain differences in the details, it is clear that many of the *physiological* aspects of Asclepiades' account were derived in their essentials from Erasistratus. As discussed in the first section of this chapter, Erasistratean pneuma was

68 For general accounts of Epicurus' psychology, see Everson 1999; von Staden 2000; Gill 2009.

likewise derived from the external air: inhaled first of all into the lungs, then moving into the heart, and from the heart's left ventricle to the aorta and the rest of the arteries in the body, including those that lead to the brain. Furthermore, Erasistratus distinguished between two forms of pneuma in the body: vital pneuma, responsible for maintaining the body's basic physiological processes, and psychic pneuma, responsible for sensation and motion. Asclepiades retained this idea of a two-stage process of pneuma-elaboration, occurring firstly in the lungs and heart, then afterwards in the area of the brain. On the other hand, Erasistratus had a more complex explanation of *why* the pneuma moved through the body as it did. He believed that respiration was a voluntary process, caused by the contraction and relaxation of muscles in the thorax, which obey our will. The pneuma is then drawn into the left ventricle of the heart as this expands after expelling its previous contents, and from there is forced into the arterial system by the heart's pumping action. Backflow into the heart is prevented by its valves. By contrast, Asclepiades' principle of motion towards the *leptomeres* left no role for any kind of pumping force in the heart. Hence it is no coincidence that Asclepiades also explicitly rejected the existence of the heart's valves.[69] So Asclepiades' anatomical and physiological account of what happens to pneuma in the body was parallel to Erasistratus', but Asclepiades came up with an alternative of explanation of the underlying fluid dynamics, and the whole was conceived in fundamentally atomistic terms.

At the psychological level, Asclepiades' pneumatic soul in many ways represented a combination of Hellenistic, especially Erasistratean, physiology and Epicurean atomism. This is well exemplified by Asclepiades' account of the mechanics of sensation: while he adopted the Herophilean-Erasistratean account of motor function mediated by pneuma in the nerves, he denied that sense-perception was similarly mediated. This was presumably because he took over Epicurus' theory that sense-impressions impinged directly on a soul which was spread throughout the body at an atomic (or quasi-atomic) level, not just within the nerves: hence the sensory function which Herophilus and Erasistratus had attributed to the nerves was superfluous in Asclepiades' system.

**69** Ps.-Galen, *De optima secta* 2 (K. 1.108–109 = Herophilus T54 vS).

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Teun Tieleman

# Cleanthes' Pneumatology. Two Testimonies from Tertullian

## Summary

In *Adversus Praxean* 5.5–7 and *Apologeticum* 21.10–13 the Christian author Tertullian (c. 160–240 CE) draws on Stoic sources, in particular texts associated with the second Stoic scholarch Cleanthes (c. 330–230 BCE). These passages not only throw light on Tertullian's aims but also bear witness to Cleanthes' development of the concept of πνεῦμα as the creative and life-sustaining warmth and his interest in it as the vehicle of discourse, i.e. of voice and *personae*. This opened up new ways of accounting for psychological phenomena within the framework of Stoic psychological monism. Given the Stoic whole-and-parts scheme, it also served to explain forms of our communion with the divine, conceptualized as a divine voice within us – supported by an analogy to the cosmic role of the sun.

Keywords: dialogue; intellect; God; person; pneuma; Stoicism; sun; trinity; voice

In *Adversus Praxean* 5.5–7 and *Apologeticum* 21.10–13 bezieht sich der christliche Autor Tertullian (160–240 n. Chr.) auf stoische Quellen, insbesondere auf Texte, die mit dem Scholarch Kleanthes (um 330–230 v. Chr.) verbunden sind. Diese Passagen werfen nicht nur ein Licht auf Tertullians Absichten, sondern bezeugen auch Kleanthes' Entwicklung des πνεῦμα-Konzepts als kreative und lebenserhaltende Wärme sowie sein Interesse daran als Vehikel des Diskurses, d.h. von Stimme und *personae*. Dieser Ansatz eröffnete neue Wege, psychologische Phänomene innerhalb des psychologischen Monismus der Stoa auszumachen. Im Hinblick auf das Ganze-und-Teile-Schema diente es auch dazu, Formen unserer Teilhabe am Göttlichen zu erklären, konzeptualisiert als göttliche Stimme in uns – unterstützt durch die Analogie der kosmischen Rolle der Sonne.

Keywords: Dialog; Intellekt; Gott; Person; Pneuma; Stoizismus; Sonne; Trinität; Stimme

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## 1 Introduction[1]

A great deal has been written on the Stoic concept of pneuma, which may count as the lynchpin of Stoic cosmology and anthropology alike.[2] Even so, some hitherto neglected evidence permits us to improve our understanding of the role played by this concept. In this paper, I shall be arguing that Cleanthes of Assos, the second head of the school (probably ?331/330–230/229 BCE) made a decisive and original contribution based on various ideas he had inherited from his predecessors in and outside the Stoic school. This enriched pneumatology served to explain the communion between individual and universal nature, i.e. between human intellects and the divine realm. In so doing Cleanthes further implemented two schemas fundamental to Stoic thought: (1) the macrocosm-microcosm analogy; (2) the whole-parts-schema. These, then, we should keep in mind in studying the relevant evidence, most notably two passages from the Christian author Tertullian (c. 160–c. 240 CE), which I believe have been underused. The first of these, from the twenty-first chapter of Tertullian's *Apologeticum* found its way into the still standard collection of Stoic fragments, von Arnim's *Stoicorum Veterum Fragmenta*,[3] but the context in which it is embedded regrettably did not. I will discuss the whole passage in § 2. The second passage comes from the fifth chapter of *Adversus Praxean*, an altogether different context, though like the testimony from the *Apologeticum* dealing with Trinitarian theology also. It does not mention Cleanthes (or any other Stoic) and has been almost completely neglected in Stoic studies and will be subjected to a thorough analysis in § 3. Together these passages show how Tertullian pressed Stoic pneumatology into the service of his Trinitarian theology, availing himself of a *persona*-theory which we have good reason to believe derives from Cleanthes as well. In fact, the conception of mental life in terms of discourse and role-playing may constitute an original contribution to Stoic philosophy on Cleanthes' part.

## 2 *Apologeticum* ch. 21.10–13: God and Sun

Chapter 21.10–13 of Tertullian's *Apologeticum* constitutes an at times ponderous passage, which, at least in large part, appears to derive from an account of Stoic theology as based on the macrocosm/microcosm analogy.[4] Tertullian uses this account to make the

1 The present article further develops some ideas stated earlier in a companion study: Tieleman 2014, where the evidence from Tertullian was noted but not discussed (at 40, n. 2).

2 Verbeke 1945, though inevitably outdated in certain ways, remains a useful presentation of the evidence. See also Hahm 1977; Tieleman 2014. Of more general scope but still worth reading are Rüsche 1930 and Rüsche 1933, with repr.

3 Three vols. Leipzig 1903–1905. Vol. 4 offers indexes compiled by Maximilian Adler.

4 For what follows cf. Spanneut 1957, 306–309.

Holy Trinity more palatable to his pagan readership by pointing to parallels with Greek philosophy and in particular Stoicism. This passage is central to our argument and worth quoting in full:

**T1** (10) *iam ediximus deum universitatem hanc mundi verbo et ratione et virtute molitum, apud vestros quoque sapientes* λόγον, *id est sermonem atque rationem, constat artificem videri universitatis. hunc enim Zeno determinat factitatorem, qui cuncta in dispositione formaverit; eundem et fatum vocari et deum et animum Iovis et necessitatem omnium rerum. haec Cleanthes in spiritum congerit, quem permeatorem universitatis affirmat.* (11) *et nos autem sermoni atque rationi itemque virtuti per quam omnia molitum deum ediximus, propriam substantiam spiritum inscribimus, cui et sermo insit pronuntianti et ratio adsit disponenti et virtus praesit perficienti. hunc* (*sc. spiritum*) *ex deo prolatum didicimus et prolatione generatum et idcirco filium dei et deum dictum ex unitate substantiae; nam est et deus spiritus.* (12) *et cum radius ex sole porrigitur, portio ex summa; sed sol erit in radio, quia solis est radius, nec separatur substantia sed extenditur ...*

We have already stated that God created this universe through his word, his reason and his virtue.[5] Your philosophers, too, are convinced that the λόγος, that is to say speech and reason, is the artificer of the universe. For Zeno (*SVF* 1.160) designates him as the maker, who has created and ordered everything; (Zeno has also determined that) he is also called Fate and God and Juppiter's soul and ineluctable Necessity. Cleanthes (*SVF* 1.533) brings all these things together in the breath (or 'spirit') which, he declares, permeates the universe. So, too, we describe the substance to which speech and reason as well as virtue – by which, as we have said, God created all things – belong, as breath, in which speech inheres when it speaks out and reason is present when it organizes[6] and virtue presides when it perfects (or 'brings about'). We have learned that this (*sc.* breath) has been put forward from God and has been generated through being put forward and therefore is called Son of God and God from the unity of their substance; for God too is breath. And when a ray stretches itself from the sun, it does so as a portion from the whole; but the sun will be in the ray, because it is a ray of the sun, and the substance will not be separated but extends itself ...

Tertullian, *Apologeticum* (Becker 21.10–13, tr. mine)

5 I.e. excellence, but the term also connotes "strength" or "power," as it is sometimes translated here, not inappositely. See on the relation between virtue and strength forged by Cleanthes, *infra* p. 160.

6 For the Stoic view on the will and conation of God cf. Cicero, *De natura deorum* 2.58 (= *SVF* 1.172).

Tertullian adds "virtue," i.e. excellence, to reason and discourse as inhering in the divine πνεῦμα or *spiritus*. But the Latin word *virtus* also conveys the sense of strength or power. The emphasis on psychic power or strength (Greek δύναμις) based on the soul's tension (τόνος) is typical of Cleanthes and implied by his notion of ἀρετή – i.e. excellence or virtue. This he applied both on the microcosmic[7] and on the macrocosmic level.[8] For God's perfection in terms of virtue or excellence (ἀρετή), too, we have a Cleanthean parallel: God is "completely filled with the excellences" (Sextus Empiricus, *Adversus Mathematicos* 9.91 = *SVF* 1 Cleanthes 529).[9] The context of the idea as given by Sextus (*ibid*. 88–91) is relevant as well. This is the argument in favour of God's existence traditionally known as the *argumentum e gradibus entium* ("argument from the levels of beings"): if certain natures are better than others, Cleanthes argued, there must also be a best or perfect being, which is God. Humans, being rational and moral, are better than animals; but since humans are imperfect, this points to there being a perfect being, or God. The testimony in Sextus runs in large part parallel to Cicero's *On the Nature of Gods* 2.33–36 (to which von Arnim aptly refers), i.e. from the book in which Stoic theology is expounded. There is no explicit attribution to Cleanthes in this passage from Cicero, but his influence may be inferred from Sextus and other passages in the second book of Cicero's work, in which Cleanthes does receive mention (cf. *Nat. D.* 2.13,23–24). In *Nat. D.* Cicero does not speak of God's perfection in terms of virtue (*virtus*) but we do have references to God presiding (*praesit, ibid*. 36) and bringing about (*perficere*, *ibid*. 35) such as we have seen in Tertullian (*Apol*. 21.11). The latter verb is linked by Cicero (or his source) to God's being perfect: God's creative activity expressed by the Latin verb *perficere* is a process towards completeness and perfection. But lower natures cannot be brought to perfect realization owing to the obstacles they encounter. Yet this does not prevent nature as a whole (i.e. God) from achieving full realization (*ibid*. 35).[10]

The reference to the sun also points to Cleanthes, who located the governing part (ἡγεμονικόν, i.e. the intellect, διάνοια) of the world-soul in the sun, which then occupies a position corresponding to the heart in the individual living being – another instance of

7 See Plutarch, *De Stoicorum repugnantiis* 7, 1034d (= *SVF* 1 Cleanthes 563), with Tieleman 2003, 272, with further references.

8 Cornutus c. 31 (= *SVF* 1.514): Ἡρακλῆς δ' ἐστὶν ὁ ἐν τοῖς ὅλοις τόνος, καθ' ὃν ἡ φύσις ἰσχυρὰ καὶ κραταιά ἐστιν, ἀνίκητος καὶ ἀπεριγένητος οὖσα ... Τοὺς δὲ δώδεκα ἄθλους ἐνδέχεται μὲν ἀναγαγεῖν οὐκ ἀλλοτρίως ἐπὶ τὸν θεόν, ὡς καὶ Κλεάνθης ἐποίησεν· "Heraclitus is the tension in the universe through which nature is strong and mighty, being invincible and insuperable .. it is possible to refer the twelve labours to the god (*sc.* Heraclitus) not inappropriately, as indeed Cleanthes has done."

9 For further Stoic references to God's virtue and strength see *SVF* 3.149, 215, 246, 248, 250, 251 (where however it is stated that human and divine virtue are the same).

10 There is some Ciceronian wordplay with *perfectum/perficere here*. In Sextus we only have a reference to God as perfect or completed (τέλειον) without the cognate verb τελειόω (for a cognate noun in a relevant context cf. *SVF* 1.566, 3.197: ἀρετή defined as τελείωσις).

the macrocosm-microcosm analogy.[11] This makes the sun the main centre of the divine. Our sources link the Stoic view on the sun to Cleanthes in particular, which is quite in line with his general role in the development of Stoic physics including theology, which was considerable.[12] In addition to the macrocosm-microcosm analogy, the Stoic whole-parts schema is applied: the image of the sun is used to explain how it is possible to take part in God's substance without its being diminished or divided. Tertullian applies this image to explain the relation of the Son to the Father in particular, but in Stoic cosmo-theology it had a wider application: all human intellects are particles of divine reason. Plato in his *Republic* had used the sun as a metaphor to explain the Idea of the Good as the source of being and knowledge in the intelligible realm (*Resp*. 6.508a1–509b9). But he does not say or imply that we receive and indeed are particles of the sun as Tertullian does in keeping with Stoic physics and theology. Cleanthes is on record as having pointed to the sun's rays as reaching out to every part of the cosmos and bringing harmony and order to it – a point which further bears out the Stoic and Cleanthean backdrop of this passage.[13] A parallel from a very similar context is provided by another Stoic author, Seneca, who in *Moral Letter* 41 explains the communion between the "sacred spirit within us" and the divine by using the sun as an image:

> **T2** Even as the sun's rays touch the earth and yet have their existence at their point of origin, so that great and sacred mind (*animus*), that mind sent down to bring us nearer knowledge of the divine, dwells indeed with us and yet inheres within its source. Its reliance is there, and there are its aim and its objective: though it mingles in our affairs, it does so as our better.
>
> Seneca, *Epistulae* 41.5 (tr. Long-Graver)

Tertullian of course cannot follow Cleanthes in identifying the sun as the divine centre or as God's intellect. Neither does Cleanthes' fellow-Stoic Seneca go beyond drawing a comparison between the divine mind and the sun. Tertullian, too, uses the sun as a

**11** Eusebius, *Praeparatio evangelica* 15.7 (Ar. Did. fr. 29, Diels 465 = *SVF* 1.499): ἡγεμονικὸν δὲ τοῦ κόσμου Κλεάνθει μὲν ἥρεσε τὸν ἥλιον εἶναι διὰ τὸ μέγιστον τῶν ἄστρων ὑπάρχειν καὶ πλεῖστα συμβάλλεσθαι πρὸς τὴν τῶν ὅλων διοίκησιν, ἡμέραν καὶ ἐνιαυτὸν ποιοῦντα καὶ τὰς ἄλλας ὥρας – "Cleanthes held that the sun the ruling part of the cosmos is because it is the biggest of the heavenly bodies and contributes most to the government of the universe, producing day and the year and the other periods." (Tr. mine.) Ps.-Censorinus 1.4 (Jahn 75,14); Diogenes Laërtius 7.139. Aëtius, *Placita philosophorum* 2.4.16 (DG 332b); Cicero, *Academica priora* 2.126; Aët 2.20.4 (DG 349b = *SVF* 1.501); Cic. *Nat. D.* 3.37; Aët. 2.23.5 (DG 353a = *SVF* 1.501, third text).

**12** As is clear from Christian as well as non-Christian sources collected as *SVF* 1.499–502; see also next n.

**13** See *SVF* 1 Cleanthes 502–504: the cosmos is struck by the sun's light as by a plectrum. Here Cleanthes appears to have been inspired by the figure of Apollo, the lyre-playing god, who is associated, among other things, with harmony and with the sun. For Apollo interpreted as the sun see also Philodemus, *De pietate* 15 (= *SVF* 3 Diog. Bab. 33, 217,12).

metaphor or analogue to explain the relation between Son and Father for which God's breath acts as the physical vehicle. But God's breath is to be taken as a literal, physical truth, given Tertullian's corporealism, which he shares with the Stoics.[14] The Stoics often assimilated the sun's fire to the πνεῦμα as a special, creative kind of fire.[15] As we have noticed, it was Cleanthes who developed a "cosmobiology" (to use David Hahm's apt term) to which the sun was central on the cosmic level and the heart on the individual level. Here he employed medical ideas on the function of the heart as the seat of the innate warmth, which he linked to the intellect as residing in the heart and being sustained by the exhalations from the blood in the heart.[16] In sum, if we make due allowance for the Christian twist given by Tertullian to his Stoic source, *Apol.* 21.10–13 may stand as a further testimony (alongside a few other bits of evidence from Seneca and other Stoic sources) of the Stoic and in particular Cleanthean theory of mind, both human and divine.

## 3 *Against Praxeas* ch. 5.5–7: an *interpretatio christiana* of the Cleanthean persona theory

A neglected piece of evidence for the Stoic, and in particular Cleanthean, view of deliberation as internal discourse is ch. 5 of *Against Praxeas* written by Tertullian around 213 CE. Tertullian explains the unity of the Trinity in terms of two senses borne by the Greek word λόγος, viz. "reason" (*ratio*) and "word" or "discourse" (*sermo*). So too, Tertullian argues, God, being rational, comprised the Son as his Word even before sending him into the world (cf. John 1.1–2). He then continues:

> **T3** *Idque quo facilius intellegas, ex te ipso, homo, recognosce ut ex imagine et similitudine Dei, quod habeas et tu in temetipso rationem qui es animal rationale, a rationali scilicet artifice non tantum factus sed etiam ex substantia ipsius animatus. Vide, cum tacitus tecum ipse congrederis ratione, hoc ipsum agi intra te, occurrente ea tibi cum sermone ad omnem cogitatus tui motum, ad omnem sensus tui pulsum. Quodcumque cogitaveris sermo est, quodcumque senseris, ratio est. Loquaris illud necesse est in animo,*

14 See further Kitzler 2009; but see already Seyr 1937, 52–62; Spanneut 1957, 150–151.

15 The Stoics from the beginning identify creative, sustaining fire (cf. Heraclitus) with the pneuma and later on with the innate heat from medical theories. θερμασίαν δὲ καὶ πνεῦμα Ζήνων μὲν τὸ αὐτὸ εἶναί φησιν – "Zeno says that heat and pneuma are the same thing". Cicero, *Academica posteriora* 1.39 (*SVF* 1.134); *Fin.*; *Tusc.*; Diog. Laërt. 7.157 (*SVF* 1.135). Censorinus, *De die natali* 4.10 (*SVF* 1.124); Varro, *De lingua latina* 5.59 (*SVF* 1.126).

16 Euseb. *Praep. evang.* 15.20.2 (Ar. Did. fr. 39 Diels = *SVF* 1.519, 141), Cic. *Nat. D.* 2.41 (*SVF* 1.504), Galen, *De placitis Hippocratis et Platonis* 2.8.48 (De Lacy 166 = K. 5.283) (=*SVF* 1 Cleanthes 521); cf. *ibid.* 2.8.44 (= *SVF* 3 Diog. Bab. 30). On these passages see further Tieleman 1996, 87–101.

*et dum loqueris conlocutorem pateris sermonem in quo inest haec ipsa ratio qua cum eo cogitans loquaris per quem loquens cogitas. Ita secundus quodammodo in te est sermo per quem loqueris cogitando et per quem cogitas loquendo, ipse sermo alius est.*

And that you may understand this[17] the more easily observe first[18] from yourself, as made in the image and likeness of God,[19] that you too have reason within yourself, who are a rational animal not only as having been made by a rational Creator but also as out of his substance having been made a living soul.[20] See how when you argue by reason silently with yourself, this same action takes place within you, while reason accompanied by discourse meets you at every movement of your thought,[21] at every impression of your consciousness:[22] your every thought is discourse, your every consciousness is reason; you must perforce speak it in your mind, and while you speak it, you experience as a partner in conversation that discourse which has in it this very reason by which you speak when you think in company of that (discourse) in speaking by means of which you think. So in a sort of way you have in you as a second (*secundus*, *sc.* person) discourse by means of which you speak by thinking and by means of which you think by speaking: discourse itself is another (*alius*, *sc.* than you).

Tertullian, *Adversus Praxean* 5.5–7 (Scarpat ll. 26–39, Kroymann 233.24–234.11, CSEL 47, tr. Evans)

Tertullian was saturated in Stoic philosophy, taking a particular interest in the Stoic conception of the soul – as can be quickly established by taking a look at the texts from his *On the soul* (*De anima*) and other works listed in the index of sources in von Arnim's collection of Stoic fragments.[23] But this does not include the above passage. No individual Stoic, or for that matter the Stoics in general, are mentioned but this did not prevent von Arnim from including texts as 'fragments' in many other cases. Already Spanneut in his 1957 study of Tertullian's use of Stoicism pointed to the Stoic colouring of this passage.[24] And for good reason. It is a fair assumption that Tertullian presents us with

17 I.e. the intimate relationship between divine reason (*ratio*) and word, or discourse (*sermo*).

18 Reading *ante recognosce* with Ursinus and Evans.

19 Cf. *Gen*. 1.26.

20 Cf. *Gen*. 2.7.

21 Typical Stoic language Sext. Emp. *M.* 8.409 (*SVF* 2.85), Sen. *Ep*. 117.13. Cf. also Tieleman 1996, 161–164.

22 Cf. Tert. *Adv. Prax*. 5.2, (Scarpat ll. 12–13): *ratio sensus ipsius est* – "reason is his (*sc*. God's) consciousness" (tr. mine).

23 See Osborn 1997, 3–4, 7–8 and *passim*, Spanneut 1957, 150–165; cf. Seyr 1937.

24 Spanneut 1957, 312–316, who also points out that Tertullian's explanation of the Son in terms of internal (ἐνδιάθετος) and external (προφορικός) reason was anticipated by such Christian authors as Theophilus (cf. *Ad Autolycum* 2.22); cf. Hippolytus, *Contra Noetum* 10 (Nautin 251,15–18). Here the idea of an internal dialogue seems to be implied by the reference to God's deliberation before issuing his Word in Creation. Cf. Moingt 1966, 1041–1050, esp. 1043, who refers to the same distinction in the

the fairly technical doctrine from a Stoic source. In what follows I will further shore up this assumption in the light of more recent research on the relevant parts of Stoicism.

Tertullian may not have taken this directly from a treatise by Cleanthes or Chrysippus (although this is by no means impossible) but may have used a work summarizing or based upon the original exposition of the doctrines concerned. That he does not acknowledge his Stoic source need not surprise us: it would have defeated his purpose if he had appealed to pagan philosophy in a dispute on a point of Christian orthodoxy, whereas in the *Apologeticum* it made perfect sense with a view to selling Christian Trinitarian theology to a pagan audience. Here Tertullian starts from *Gen.* 1.26–27 saying that God created mankind in his own image. When he goes on to say that God created us out of his own substance (*substantia*) this may have resonated with Christian readers in view of *Gen*. 2.7: "Then the Lord God formed a man from the dust of the ground and breathed into his nostrils the breath of life, and the man became a living being" (tr. New International Version).

Substance (*substantia*), however, is a philosophical term referring to corporeal reality. In fact, the passage can also be read in terms of Stoic pneumatology and the Stoic parts-and-whole schema, a point which to my knowledge has been overlooked by Patristic scholars: we have been formed out of God's breath and so, in a sense, we still are a part of God.[25] This in turn can be expanded with the Greek notion of λόγος as referring to discourse and thought[26] and the Stoic articulation of this notion, viz. the theme of internal and external λόγος and of λόγος as discourse.[27] In *Apol*. 21.10–13 we see Tertullian using a Stoic source for these ideas. Tertullian may have found further support for his Stoicizing exegesis in the first chapter of Genesis, according to which God creates the world and the first humans through a series of speech acts (*Gen*. 1.3, 9, 14, 26, 27). Thus, he was in a position to reconcile the text of Genesis with Stoic doctrines, or, put differently, to press Stoic notions in the service of scriptural exegesis. Even the idea that human nature has been in part formed out of the soil (alongside the divine pneumatic spark) can be paralleled from Stoicism starting with Zeno (who of course in his turn availed himself of traditional ideas and myths about our being earth-born).[28]

same authors, but without reference to Stoicism or Spanneut's study.

25 For the parts-and-whole schema see esp. Diog. Laërt. 7.87 (*SVF* 3.4).

26 Cf. in the preceding context *Adv. Prax.* 5.3 (Scarpat 27,14–15). Here Tertullian also avails himself of the Gospel of John: 'Discourse (*sermonem* rendering Greek λόγος) was in the beginning with God' – John 1.1–2, cited *Adv. Prax*. 5.3 (Scarpat 27,16–17).

27 In addition to the Cleanthean material see *SVF* 1.135, 137.

28 Censorinus, *De die natali* 4.10 (= *SVF* 1.124): *Zenon Citieus, Stoicae sectae conditor, principium humano generi ex novo mundo constitutum putavit, primosque homines ex solo, adminiculo divini ignis id est dei providentia, genitos* – "Zeno of Citium, the founder of the Stoic sect, held that the beginning for the human race has been set at the beginning of each new world and that the first humans were born from the soil with the aid of divine fire, that is, through God's providence." Tr. mine.

What we have here is the Stoic version of the idea – anticipated by Plato and Aristotle as well as Homer and the tragedians[29] – of thought as linguistic and, more specifically, dialogic in character. Indeed Tertullian refers directly to an interlocutor within us – an idea that is also implied by Cleanthes' versified dialogue between Reason and Anger.[30] Another salient feature is Tertullian's statement that the substance of our souls is derived from God's substance, which clearly states the Stoic doctrine given e.g. at Tert. *Apol.* 21.10–13 that the human soul and more specifically intellect is a particle of the divine breath (*spiritus*, i.e. πνεῦμα).[31] Hence the intellect is called "the god within each"[32] or, as Seneca puts it, "the sacred spirit within us," acting as an "observer and guardian of all our goods and evils."[33] We should also note the Stoic macrocosm/microcosm analogy, whereby God assumes various functions of the human soul.[34]

The Stoic 'monistic' model of the intellect suited Tertullian's purposes, enabling him to account for the threefold aspect of God while at the same time leaving His essential unity intact. The Stoic doctrine moreover seemed to cohere with the numerous biblical passages where God speaks and with the passage in which man is said to have been created in his image (*Gen.* 1.26). It is noteworthy that Tertullian speaks, as he often does, of *two* persons only, viz. the Father and the Son, quite in line with the Stoic doctrine which, as noted above, typically involves no more than two interlocutors.[35] Interestingly, Tertullian at *Adv. Prax.* 12.3 makes the Trinity complete by ascribing personhood also to God's substance, viz. the *spiritus* (πνεῦμα), thus aligning what in Stoic psychology really are two different aspects, viz. the soul's (or, more specifically, the intellect's) corporeal *substance* on the one hand and its rational-cum-linguistic *activity*, on the other:

> **T4** … the Son is connected with him as a second person (*persona*), viz. his word (*sermo*) and the third (*sc.* person), the Spirit, (*sc.* is connected with him) in the word.
>
> Tert. *Adv. Prax.* 12.3 (tr. Evans)

29 Plato, *Theaetetus* 189e–190a; *Sophista* 263e3–5; Aristotle, *Ethica Nicomachea* 7.6, 1149b9; *De motu animalium* 7, 701a31; *De anima* 3.11, 434a16–21; cf. *Analytica posteriora* 1.10, 76b24–25. See the pioneering study by Gill 1996 for this idea in relation to the development of the notion of personhood.

30 Gal. *PHP* 5.6.35 (De Lacy 332 = K. 5.476 = *SVF* 1 Cleanthes 570). For a full interpretation see Tieleman 2003, 264–277.

31 Epictetus, *Dissertationes* 1.14.5–6.

32 Diog. Laërt. 7.88 (not in *SVF*). Diog. Laërt. 7.85–89 largely derives from Chrysippus' *On Ends* (Περὶ τελῶν).

33 Sen. *Ep.* 41.3 (*sacer intra nos spiritus*). Similarly, Epict. *Diss.* 1.14.

34 See esp. the account of Stoic theology, Cic. *Nat. D.* 2.58 (= *SVF* 1.172). On the properties of the Stoic God see Algra 2003, esp. 166–167.

35 The same holds good for his contemporary Hippolytus, e.g. *Noet.* 7 (Nautin 247,10, 14; 253,30), *On the Blessings of Jacob*, 32.19, ed. Bonwetsch with Andresen 1961, 8–9, 22–23 (repr. in Andresen 2009).

The provenance of Tertullian's concept of *persona* has always been a riddle. This need no longer be the case once it is recognized that this concept played a central part in the Stoic model of mental life.[36] The notion of persona (πρόσωπον) can be traced back to Cleanthes so he may very well be the source for Tertullian's use of this concept too.[37] Admittedly, Tertullian in *Adv. Prax.* ch. 5 does not *mention* the concept of *persona*, but it may be taken to be implied by the terms *alius* and *secundus*.[38] In fact, in a later passage Tertullian explicitly says that the Father and the Son are one substance with two *personae*.[39] In addition, we must note that the very meaning of the concept is defined by reference to speech (*sermo*).[40] Here it has clearly preserved its theatrical connotation of "mask," or "personage."[41] The exegetical underpinning of the Stoic position is strikingly paralleled by Tertullian's reading of a number of psalms and other biblical passages as representing a *dialogue* between the Son and the Father.[42]

## 4 Conclusion

The two passages from Tertullian we have been discussing, *Adv. Prax.* 5.5–7 and *Apol.* 21.10–13, both cohere with each other and with Stoic sources and in particular texts associated with the name of Cleanthes. By studying the use made by Tertullian of his Stoic source, or sources, and comparing what he writes with other, indisputably Stoic material, it becomes possible not only to learn more about Tertullian's aims and methods but also to supplement the Stoic evidence itself. Particularly notable are Cleanthes' development of the idea of the pneuma as the creative and life-sustaining warmth and

36 Cf. Andresen 1961, esp. 2–9 (repr. in Andresen 2009). On the development of the Stoic notion see Tieleman 2007, 130–140, with further references.

37 See Sen. *Ep.* 94.1 (*SVF* 1 Cleanthes 582) with Tieleman 2007, 132–133.

38 See the useful study by Rankin 2001 on Tertullian's vocabulary in referring to the three divine Persons.

39 E.g. *Adv. Prax.* 12.6–7 (Scarpat 34–5): the son is *alium ... personae non substantiae nomine, ad distinctionem non ad divisionem ... una substantia in tribus cohaerentibus* – "another in the sense of person, not of substance, for distinctiveness, not for division ... one substance in three who cohere." Tr. Evans.

40 E.g. *Adv. Prax.* 7.9 (Scarpat 48–50): *quaecumque ergo substantia sermonis fuit, illam dico personam et illi nomen Filii vindico et, dum Filium agnosco, secundum a Patre defendo* – "Whatever therefore the substance of the Word was, that I call a person, and for it I claim the name of Son; and while I acknowledge him as Son I maintain he is another beside the Father." Tr. Evans.

41 Instances listed by Evans 1948, 46.

42 Eg. Ps. 2 treated, alongside others, in *Adv. Prax.* 5 and 7 in particular; cf. 11.7 *omnes paene psalmi qui Christi personam sustinent, Filium ad Patrem verba facientem repraesentant* – "Almost all the psalms which perform the role of Christ represent the Son as speaking to the Father." Tr. mine. Cf. *ibid.* 12 and Rondeau 1985, 30–34, 322–325, 414–416. On the linkage between the concept of *persona* and that of dialogue between two voices cf. also Origenes, *Contra Celsum* 1.55; *ibid.* 7.36; Justin, *Apologia* 1.36.1f.; Philo, *De specialibus legibus* 4.7.39; *De fuga et inventione* 25.137. These passages depend on an exegetical tradition which used formulas like ὡς ἀπὸ προσώπου and τὸ πρόσωπον τὸ λέγον to differentiate between voices or persons so as to explain seeming contradictions. See Andresen 1961, 14–18 (repr. in Andresen 2009).

his interest in it as the vehicle of discourse, i.e. of voices connected with particular roles (*personae*). This opened up new ways of accounting for psychological phenomena such as mental conflict (or weakness of will, ἀκρασία) within the framework of Stoic psychological monism.[43] One can see how Tertullian could find here ways of explaining and justifying the unity of the Holy Trinity. But, given the Stoic whole-and-parts scheme, this pneumatology also served to explain forms of communion between the human intellect and the divine realm, of conversing with a divine voice within us – an idea supported by cosmic ideas on the role of the sun. Cleanthes' contribution survived not only in the pages of the Christian author Tertullian but, as we have seen, also influenced later Stoics such as Seneca and Epictetus.

43 As is illustrated by Cleanthes' versified dialogue between reason and anger; see *supra*, n. 30 with text thereto.

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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

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## 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 Topicorum 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, 1.163–164.

6 See the striking report by Aëtius that "all causes … are pneumata" (Aët. 1.11.5, *SVF* 2.340 = LS 55G).

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:

> **T1** 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 Categorias 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 natura 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. *Apologia* 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 Hahm 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 (Daremberg/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 Hahm 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:

> **T3** ἔτι τὸν ἀέρα φύσει ζοφερὸν εἶναι λέγει, καὶ τούτῳ τεκμηρίῳ χρῆται τοῦ καὶ ψυχρὸν εἶναι πρώτως· ἀντικεῖσθαι 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 Ἕξεων οὐδὲν ἄλλο τὰς ἕξεις πλὴν ἀέρας εἶναί φησιν· 'ὑπὸ τούτων γὰρ συνέχεται τὰ σώματα· καὶ τοῦ ποιὸν ἕκαστον εἶναι τῶν ἕξει συνεχομένων αἴτιος ὁ συνέχων ἀήρ ἐστιν, ὃν σκληρότητα μὲν ἐν σιδήρῳ πυκνότητα δ' ἐν λίθῳ λευκότητα δ' ἐν ἀργύρῳ καλοῦσι.'
>
> 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 paraphrase "States are nothing but volumes of air" (οὐδὲν ἄλλο τὰς ἕξεις πλὴν ἀέρας εἶναί 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 Hahm 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 47I); *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 every 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 ταὐτῷ δὲ γένει τῆς οὐσίας καὶ ἡ τῶν Στωϊκῶν περιέχεται δόξα· πνεῦμα μὲν γάρ 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 μέν τις οἰκεία τῆς ψυχῆς ἐστι τὸ πνεῦμα, τὸ δὲ τῆς ὕλης εἶδος ἡ ποιὰ κρᾶσις ἐν συμμετρίᾳ γιγνομένη τῆς ἀερώδους τε καὶ πυρώδους οὐσίας· οὔτε γὰρ ἀέρα μόνον οἷόν τε φάναι τὴν ψυχὴν οὔτε πῦρ, ὅτι μήτε ψυχρὸν ἄκρως ἐγχωρεῖ γίγνεσθαι ζῴου σῶμα μήτ' ἄκρως θερμὸν ἀλλὰ μηδ' ἐπικρατούμενον ὑπὸ θατέρου κατὰ μεγάλην ὑπεροχήν, ὅπουγε κἂν βραχεῖ πλεῖον γένηται τοῦ συμμέτρου, πυρέττει μὲν τὸ ζῷον ἐν ταῖς τοῦ πυρὸς ἀμέτροις ὑπεροχαῖς, καταψύχεται δὲ καὶ πελιδνοῦται καὶ δυσαίσθητον ἢ παντελῶς ἀναίσθητον γίγνεται κατὰ τὰς τοῦ ἀέρος ἐπικρατήσεις· οὗτος γὰρ αὐτός, ὅσον μὲν ἐφ' ἑαυτῷ, ψυχρός ἐστιν, ἐκ δὲ τῆς πρὸς τὸ πυρῶδες στοιχεῖον ἐπιμιξίας εὔκρατος γίνεται. δῆλον οὖν ἤδη σοι γέγονεν, ὡς ἡ τῆς ψυχῆς οὐσία κατὰ ποιὰν κρᾶσιν ἀέρος τε καὶ πυρὸς γίγνεται κατὰ τοὺς Στωϊκούς.

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 46I).

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 47I)

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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Sean Coughlin and Orly Lewis

# Pneuma and the Pneumatist School of Medicine

## Summary

The Pneumatist school of medicine has the distinction of being the only medical school in antiquity named for a belief in a part of a human being. Unlike the Herophileans or the Asclepiadeans, their name does not pick out the founder of the school. Unlike the Dogmatists, Empiricists, or Methodists, their name does not pick out a specific approach to medicine. Instead, the name picks out a belief: the fact that pneuma is of paramount importance, both for explaining health and disease, and for determining treatments for the healthy and sick. In this paper, we re-examine what our sources say about the pneuma of the Pneumatists in order to understand what these physicians thought it was and how it shaped their views on physiology, diagnosis and treatment.

Keywords: Pneumatist; pneuma; heat; soul; pathology; diagnosis; therapy

Die Pneumatische Schule der Medizin hat das Alleinstellungsmerkmal, die einzige medizinische Schule der Antike zu sein, die nach dem Glauben an einen Bestandteil des menschlichen Körpers benannt ist. Anders als die Herophileer oder die Anhänger des Asklepiades orientiert sich deren Name nicht am Gründer der Schule, und anders als bei den Dogmatikern, Empirikern oder Methodikern kommt der Name nicht vom jeweiligen medizinischen Ansatz. Stattdessen beruht der Name auf einer Überzeugung: der Tatsache, dass Pneuma von höchster Wichtigkeit ist, um Gesundheit wie Krankheit zu erklären und über Behandlungsweisen zu entscheiden. In diesem Beitrag untersuchen wir, was die Quellen über Pneuma und die Pneumatische Schule sagen, um zu verstehen, wie diese Mediziner Pneuma verstanden, und wie das ihre Ansichten zu Physiologie, Diagnostik und Therapie formte.

Keywords: Pneumatische Schule; Pneuma; Hitze; Seele; Pathologie; Diagnose; Therapie

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## 1 Introduction

> People ask, why does Hippocrates everywhere throughout the work (*sc. The Nature of the Child*) credit the pneuma with the creation of the child … ? Was he a Pneumatist? We say he was not a Pneumatist.[1]
>
> John of Alexandria

The Pneumatists (οἱ Πνευματικοί) have the distinction of being the only medical school in antiquity named for a belief about a part of a human being. Unlike the Herophileans (οἱ Ἡροφίλειοι), Erasistrateans (οἱ Ἐρασιστράτειοι) and Asclepiadeans (οἱ Ἀσκληπιάδειοι), their name does not pick out the founder of the school. Unlike the Dogmatists (οἱ Δογματικοί) or Rationalists (οἱ Λογικοί), the Empiricists (οἱ Ἐμπειρικοί) or Methodists (οἱ Μεθοδικοί), their name does not refer to a method of practicing medicine. Instead, they are called "Pneumatists" because they appealed to pneuma in their explanations of human physiology, health and disease, and they did so distinctively, since at the time of the school – roughly between the first and second centuries CE – it was no less common to talk about pneuma in medicine than it was to talk about blood or bones. What, then, is distinctive about the pneuma of the Pneumatist school? Call this this question, 'the Pneumatist question.' In this chapter, we set out to answer it.

Ever since Max Wellmann's original study on the topic, *Die pneumatische Schule bis auf Archigenes* (1895), most scholars have taken the same kind of approach to answering the Pneumatist question. The approach goes something like this. Since the writings of the Pneumatist doctors are lost and all we have are fragments and testimonies, one first

1 John of Alexandria, *In Hippocratis De natura pueri commentarium* 49, (174,11–14 Bell et al.): ζητοῦσιν ὅτι πῶς ὁ Ἱπποκράτης πανταχοῦ ἐν ὅλῳ τῷ συγράμματι αἰτιᾶται τὸ πνεῦμα τῆς δημιουργίας τοῦ παιδός (...); πότερον πνευματικὸς ὑπῆρχε; φαμέν, ὅτι οὐκ ἦν πνευματικός. Translations are ours for the most part, and those which are not are noted.

has to increase the available evidence. One starts with the fragments and testimonies of physicians our sources call Pneumatist, determines, often speculatively, a set of doctrines that belong to this group, and then based on perceived similarities, classifies material from other medical and philosophical writings as "sources for the Pneumatist school" or as "hidden Pneumatist works." The Pneumatist question is then answered using this expanded corpus.[2]

We think this approach involves serious problems, which we will discuss in more detail in a moment. Fortunately, we think, this approach is also unnecessary. As we will show, we can say a lot about the Pneumatists' views on pneuma by closely examining the extant fragments and testimonies, without relying on speculative evidence. And so before we discuss problems with the more common approach, we want to make the case for our approach and say something about our aims for this study.

First, concerning the scope of the study: we are only including fragments and testimonies in which the Pneumatists are explicitly mentioned (the "Pneumatic school," as it used to be called: οἱ πνευματικοί, ἡ πνευματικὴ αἵρεσις, and related phrases). We include fragments and testimonies of physicians explicitly called "Pneumatist" by our sources (a short list): Athenaeus of Attalia (whom Galen calls the founder of the school), Claudius Agathinus of Sparta, Herodotus, Magnus and Archigenes of Apamea.[3] We exclude several physicians: some from Wellmann's original list (Theodorus, Leonides, Apollonius of Pergamum, and Heliodorus), and others (Aretaeus, Antyllus and Philumenus) who are not so called by any ancient sources.[4] We also include fragments and testimonies of the school's anonymous adherents, usually designated by phrases like "followers of X" (οἱ ἀπ' X or οἱ περὶ X), where the context makes clear that "followers of X" is synonymous with "Pneumatists".[5] By including these sources, we are not suggesting that they offer *reliable* evidence for the Pneumatist school; we are, however, claiming

2 This is roughly the approach adopted by (explicitly or not, and usually following Wellmann): Allbutt 1921, 90, 224–287, esp. 247, 265–268; Verbeke 1945, 191–206, esp.196–201; Kudlien 1962, 427 and Kudlien 1968; von Staden 1989, 107; Oberhelman 1994; Kupreeva 2014, 176. Nutton 2013, 211 is reluctant to include the Anonymus Londinensis and Aretaeus into the school; however, his suggestion that the Pneumatist school could be "an ahistorical, classificatory term" (Nutton 2013, 386, n. 30) is unlikely. Galen reports that the Pneumatist physician, Herodotus thought all medical schools were less respectable than the Pneumatist (Galen, *De simplicium medicamentorum facultatibus* 1.29, K. 11.432); Galen also reports that Magnus professed to be a Pneumatist (Galen, *De differentiis pulsuum* 3.2, K. 8.646). Kollesch 1973 is sceptical that Ps.-Galen, *Definitiones medicae,* is, as is often claimed, a work of the Pneumatist school (this is compatible with the claim that certain definitions come from Pneumatist doctors).

3 We are currently preparing editions, translations and commentaries of the fragments and testimonies of members of this school. Sean Coughlin is preparing the complete fragments of Athenaeus of Attalia; Orly Lewis is preparing a selection of fragments of Archigenes of Apamea.

4 On the first set (before and including Archigenes), see Wellmann 1895, 13–18; on Antyllus, see Grant 1960, 158–161.

5 On these phrases, see von Staden 1989, xx–xxi.

that these passages *count as* evidence for the Pneumatist school. Concerning the Pneumatist school itself: we do not start from the assumption that everyone our sources call "Pneumatist" shares a consistent theory about pneuma (or anything else). Our approach is rather to collect and present (i) all the evidence from our sources concerning why these doctors were called Pneumatist; and (ii) passages from the fragments where these physicians appeal to pneuma in physiology, pathology, diagnosis and therapy. Our hope is that this parsimonious approach avoids some of the difficulties inherited from Wellmann.

As we mentioned, we think there are serious difficulties inherent in Wellman's approach. One of these is the reliance on speculative connections between the Pneumatist school and contemporary intellectual movements to determine what the Pneumatists' views were. Of the several attempts to reconstruct the Pneumatists' views on pneuma, most follow Wellmann by connecting them to the Stoics. The Pneumatists, Wellmann claims, can be distinguished from other doctors because they adopted a Stoic conception of pneuma, especially a three-fold division of pneuma into hectic, natural, and psychic pneuma, which they then adapted to Hippocratic physiology and Hippocratic medicine more generally.[6] Wellmann goes on to reconstruct the role of (Stoic) pneuma in all aspects of Pneumatist medical theory, from fever to pulse diagnosis.[7] Scholars since Wellmann have remained faithful to this reconstruction, modifying it here and there depending on their aims. Verbeke, for instance, adds that the Pneumatists wanted to use pneuma to explain something missed by both the Stoics and Hippocratics: the origin of vital heat. According to Verbeke, the Pneumatists answer this question by appealing to pneuma's oscillation (its "dynamic tension"), which causes friction, in turn heating the body.[8] Vivian Nutton, who is more sceptical of Wellmann's approach than Verbeke, nevertheless claims that, like the Stoics, Athenaeus explored parallels between the cohesive role of pneuma in the macrocosm and the microcosm.[9] Nearly every reconstruction we have encountered accepts something like Wellmann's general Stoic/Pneumatist picture, with minor additions or clarifications.

For scholars who have worked on or around the Pneumatist school, Wellmann's approach is tempting, since it allows one to read the Stoics' beliefs about pneuma into

6 Wellmann 1895, 148. Wellmann distinguishes between older Stoics and post-Antiochean Stoics, claiming Stoics after Antiochus tried to approximate a Platonic-Aristotelian philosophy. One might make finer distinctions. See, e.g., Lapidge 1973, 276–278. Wellmann 1895, 104–110, also appeals to similarities, first noted by Valentin Rose, between extracts from the Pneumatists in Oribasius and the passages in the Ps.-Galenic Commentary on Hippocrates' *Humours*. Mattern 2008, 208, n. 32, citing Schubring 1965, xlvii–xlix, says the text was proven to be a renaissance forgery in 1915 by Kalbfleisch as he set to edit the text. Garofalo 2005, 446, says this happened in 1918.

7 Wellmann 1895, 131–231.

8 Verbeke 1945, 194 (based on a fragment of Antyllus preserved in Oribasius, who is not called a Pneumatist by any ancient source).

9 Nutton 2013, 208.

the comparatively obscure sources we have for the Pneumatists. We think, however, that the approach is problematic for the following reasons: (1) very few fragments of the Pneumatist doctors discuss pneuma; (2) it is unclear what kind of school the Pneumatists were and how they understood their relation to one another; and finally, (3) our sources for the Pneumatists are almost always hostile.

The first and perhaps most puzzling problem is that pneuma is almost never mentioned in the verbatim fragments of the physicians called Pneumatist. This was already noted by Robert James' in his medical dictionary of 1743, when he wrote "of all (Athenaeus) wrote we have nothing remaining, except two or three chapters in the collections of Oribasius, from which we learn nothing that can explain this opinion relating to the spirit, much less anything that can discover its use with regard to the practice of physic."[10] We need not adopt James' extreme pessimism, but the fact remains that any reconstruction will depend largely on second-hand reports from sources whose reliability cannot be independently verified. Many scholars have followed Wellmann's somewhat desperate solution by trying to fill the void with sources like Antyllus, Aretaeus and the author(s) of the Ps.-Galenic *Medical Definitions*. These figures never refer to themselves as Pneumatists, and they are never called Pneumatist by our sources; but, after Wellmann, the scholarly consensus has been that their views are similar enough to justify the appropriation. This solution obviously increases the amount of material we have to work with. In Aretaeus' case, it even adds a relatively complete treatise to the otherwise fragmentary Pneumatist corpus. The fact remains, however, that our sources never call them Pneumatist, and it seems to us methodologically unsound to claim that they are. The motivation to christen them Pneumatists in the first place was precisely our lack of evidence about the school's doctrines. We avoid such circularity and stick with authors named Pneumatist in our sources.

The second problem concerns the agreement of opinions among individual Pneumatist physicians. In his study, Wellmann began from the assumption that the Pneumatists share common views concerning physiology and pathology in virtue of the fact that they are members of the same school; however, we ought to be cautious. Some physicians called Pneumatist by one source are said to belong to other schools by other sources. Agathinus, for instance, is called a Pneumatist by Galen, while the author of the *Medical Definitions* says that he founded a school called *episynthetic*.[11] Magnus is called a Pneumatist by Galen, and Archigenes by both Galen and the Ps.-Galenic *Introduction*.

10 James 1743, vol. 1, s.v. "Athenaeus."

11 Wellmann attempts to deal with this evidence by claiming that Agathinus, whom he takes to be a student of Athenaeus, combined orthodox Pneumatism with Empiricist and Methodist ideas (Wellmann 1895, 12), to create yet another school, the *episynthetic*. There is no evidence for this in our sources, beyond one remark in Ps.-Gal. *Def. Med.* 14 (K. 19.353): "Agathinus of Lacedaemon seems to have invented a fourth school, which is called episynthetic (ἐπισυνθετική), but some call eclectic (ἐκλεκτική), others hectic (ἑκτική)."

However, the Methodist Caelius Aurelianus says Magnus is "from our school" ("*ex nostris*"), and seems to also include Agathinus and Archigenes in this category.[12] Furthermore, even if an affiliation gives us reason to think they shared some views in common (and this is not an implausible claim), it is not clear what those views are. Heinrich von Staden and more recently David Leith have both pointed out that "school" (*hairesis*) at this time covers a range of meanings, but none of them imply anything as monolithic and cohesive as is often assumed. The Pneumatists seem to have been a loose-knit group who sometimes refined and sometimes rejected the explanations and therapies of other members of their school. Eclecticism seems to have been the rule among them.[13]

The third problem concerns the hostile nature of our sources. The Pneumatists' views are often presented in rhetorical and didactic contexts and it is tricky to untangle them from their presentation. One of our most important sources is Galen, and he can be either apologetic or hostile to the Pneumatists, depending on the views he is discussing and his dialectical aim. Sometimes he presents members of the Pneumatist school as part of a consensus on questions about human physiology, and places them among the greatest ancient physicians and philosophers. Other times, particularly when he places the Pneumatists among the Stoics, he goes to great lengths to show how they were mistaken. The same kind of thing also occurs in the Ps.-Galenic *Introduction*. The author is more straightforwardly hostile to the Pneumatists, but he is also apparently hostile to just about everyone who is not a "true follower" of Hippocrates. The presentation is artificial and constrained by a set of didactic standards in much the same way that Galen's discussion of the various medical sects is constrained in his *On Sects for Beginners*. Both authors also portray the Pneumatists as followers of the Stoics, but their reason for doing so may just as well be to discredit them as it is to state the doctrines they hold. As historians, we should be cautious about continuing ancient polemics. Certainly, we get glimpses of the Pneumatists' views from these sources, but we must also keep in mind that they may not be free from distortion, selective emphasis, and contradiction.

For all these reasons, what we want to do in this paper is examine the evidence concerning the medical context in which Pneumatism arose, focusing on physiology, diagnosis and treatment. The first part of the paper deals with the extant sources that

12 Caelius Aurelianus, *Celeres passiones* 2.10.58 (Bendz 166,11–13); for Ps.-Galen, see T3, 213 below. Galen refers to the same list of people along with Athenaeus as πνευματικοί (Gal. *Diff. Puls.* 3.6, K. 8.674). John of Alexandria (sixth/seventh century CE) mentions Empiricists and Methodists who follow Agathinus (*In Hippocratis Epidemiarum librum VI commentarii*, fr.12, Duffy 52,6–7). The case of Magnus is curious. Galen reports he *professed himself* (προσποιούμενος) to be from the Pneumatist school at Gal. *Diff. Puls.* 3.2 (K. 8.646), the only such report we have. As Glenn Most has suggested to us, Galen seems to be implying that, on his view, Magnus is not a Pneumatist, but merely pretending.

13 Von Staden 1982; Leith 2016. See, for instance, Galen's report of Archigenes' arguments against Magnus on the causes of a swift pulse at Gal. *Caus. Puls.* 1.7 (K. 9.18–22).

discuss the Pneumatists' views regarding pneuma's roles in physiology – the functioning of the living body and its parts. The second part looks at the pathological and clinical aspects of pneuma in Pneumatism. We conclude with some remarks on the relation between the Pneumatists and the Stoics.

## 2 Physiology

### 2.1 Compositional pneuma

A key piece of evidence comes from Galen's commentary on the Hippocratic *Airs Waters Places*.[14] The passage was not considered by Wellmann, and it is, we think, the clearest report of the Pneumatists' view on pneuma which we have.

Galen's aim in this passage is to distinguish those physicians who accept the central claim of *Airs Water Places*, namely that medicine requires knowledge of the seasons and climate, from those who do not. He says many doctors reject this belief, naming Erasistratus, Herophilus, the Methodists, Praxagoras and Phylotimus. He singles out Athenaeus and his followers as doctors who accept the central claim, but he says they differ from Hippocrates in how they describe the elements. First, Galen says Athenaeus thinks the elements are hot, cold, moist and dry, rather than fire, air, water and earth, something attributed to Athenaeus by the author of the Ps.-Galenic *Introduction* (see T2 below) as well as by Galen himself in *On the Elements according to Hippocrates*.[15] Second, he says Athenaeus believed two of these elements, the hot and the cold, "are those through which effects are achieved," a claim attributed to Athenaeus in the *Introduction* (cited in T2 below).[16]

Galen goes on to say that some doctors claim that pneuma is the cause of things and believe that, in saying this, they are following Hippocrates:

**T1**

وزعم أثينايوس أنّه وأصحابه اتّبعوا بقراط في هذا القول وأنّ الريح هي مركّبة من الأخلاط الأولى الحارّ والبارد وأنّ الريح إذا كانت معتدلة ربّت أبدان الحيوان وبقراط

14 Galen's commentary on the Hippocratic *De aere, aquis, locis* survives only in Arabic. The citations are from the forthcoming edition by Gotthard Strohmaier at the *Corpus Medicorum Graecorum* at the Berlin-Brandenburg Academy of Sciences and Humanities. The English translations are based on German translations produced by Strohmaier and were made in consultation with Strohmaier through an examination of his Arabic text. We are grateful for his assistance and for granting us permission to cite his forthcoming edition. Our thanks to Oliver Overwien, Or Hasson and Donna Shalev for help with the Arabic.

15 Ps.-Galen, *Introductio seu medicus* 9 (Petit 21,14–21 = K. 14.698); Galen, *De elementis ex Hippocratis sententia* 6.27 (De Lacy 110,10–15 = K. 1.465).

16 Ps.-Gal. *Intro.* 9 (Petit 21,14–21 = K. 14.698).

يسمّيها الحرارة الغريزيّة.

> Athenaeus claimed that he and his adherents followed Hippocrates with this statement and that the pneuma is composed of the primary basic components, the hot and the cold, and that the pneuma, when balanced, makes the bodies of living creatures grow, and that Hippocrates calls it "the innate heat."
>
> Galen, *In Hippocratis de aere aquis locis librum commentarii* (ed. Strohmaier), *ad* Hipp. *Aer.* 10.1 (Jouanna 211,12–212,2 = L. 2.42)

In this text, Galen tells us two things about Athenaeus' understanding of pneuma: its composition and its role in the body. First, Athenaeus is reported to believe pneuma is composed of the hot and the cold. Shortly before this passage, Galen remarks that Athenaeus considers the hot and the cold to be those elements which "act and through which effects are achieved" (يفعلان ويفعل بهما, reading *bi* as "by means of"). So, we can also infer that Athenaeus believed pneuma is composed of those elements that are active. Second, pneuma's role in the body is to be an agent or active cause, particularly of growth. Pneuma is, therefore, something different from the passive matter of the body. It is something present in that matter, but it is not itself a part of it. Instead, it is a cause acting on it.

How exactly pneuma facilitates growth is not explained. The ambiguity allows for a broad understanding of the role of pneuma here: from facilitating digestion required for the body's development to determining the process of this development (e.g. shape, size, timing, etc.). Its role in disease shows that the presence and activity of pneuma is not restricted to the periods of infancy and adolescence in which the body grows, but it continues throughout the person's life.[17] All this depends, however, on the hot and cold being balanced – if the pneuma is too cold or too hot the process is hindered. From a later passage in this work, we learn that pneuma can also be affected by the wet and the dry, causing diverse malfunctions.[18] It is possible that the wet and the dry are also (passive) constituents of the pneuma and simply come out of balance in certain conditions, but our sources do not say so explicitly.

Be that as it may, Athenaeus presumably thought that the disruptive imbalance in pneuma's qualities causes not only a deficient process of growth or activity, but in extreme cases no activity whatsoever and death. Pneuma thus emerges as the principle maintaining life. This is corroborated by Galen's later statement in the course of discussing the role of pneuma in disease that: "some call these doctors who claim that things (الأشياء) are governed by pneuma 'Pneumatists.'"[19] The "things" seem to be life

17 On this see section 3.1 below.

18 Gal. *Hipp. Aer.* (ed. Strohmaier), *ad* Hipp. *Aer.* 10.1 (Jouanna 211,12–212,2 = L. 2.42), and see below, n. 53.

19 *Ibid*.

and the functions pertaining to animal life as well as disease, i.e. malfunctioning of the body.

The conflation of pneuma with the notion of "innate heat" (T1) also points to the idea that life depends on the pneuma in the body. The fact that the term "innate heat" (ἔμφυτον θερμόν and similar phrases) is not common in the writings attributed to Hippocrates need not trouble us. We are dealing here with Athenaeus' interpretation of Hippocratic ideas, probably influenced by centuries of scholarship and reception, which often altered and distorted the original ideas.[20] Moreover, the core idea that heat is essential for life and body functioning is not alien to the Hippocratic works. With this comparison between pneuma and "innate heat" in Hippocrates, Athenaeus might be trying to justify a claim that he is not straying from the Hippocratic theory – they differ only in terminology.

A passage from the Ps.-Galenic *Introduction* echoes the views reported by Galen with some additional information.

**T2** κατὰ δὲ τὸν Ἀθήναιον στοιχεῖα ἀνθρώπου οὐ τὰ τέσσαρα πρῶτα σώματα, πῦρ καὶ ἀὴρ καὶ ὕδωρ καὶ γῆ, ἀλλ' αἱ ποιότητες αὐτῶν, τὸ θερμὸν καὶ τὸ ψυχρὸν καὶ τὸ ξηρὸν καὶ τὸ ὑγρόν, ὧν δύο μὲν τὰ ποιητικὰ αἴτια ὑποτίθεται, τὸ θερμὸν καὶ τὸ ψυχρόν, δύο δὲ τὰ ὑλικά, τὸ ξηρὸν καὶ τὸ ὑγρόν, καὶ πέμπτον παρεισάγει κατὰ τοὺς Στωϊκοὺς τὸ διῆκον διὰ πάντων πνεῦμα, ὑφ' οὗ τὰ πάντα συνέχεσθαι καὶ διοικεῖσθαι.

According to Athenaeus the elements of a human being are not the four primary bodies, fire, air, water and earth, but their qualities, hot, cold, dry and wet, of which he posits that two, the hot and cold, are productive causes, and two, the dry and wet, are material. And he introduces a fifth in accordance with the Stoics: the pneuma which permeates everything, by which all things are held together and regulated.

Ps.-Gal. *Intro.* 9 (Petit 21,14–21 = K. 14.698)

According to this passage, Athenaeus considered pneuma to be a fifth element (στοιχεῖον) in addition to the four qualities. Calling pneuma an "element" is perhaps a non-standard use of the term, which usually is reserved for the simplest parts out of which something is composed and which are not themselves composed of anything else. Nevertheless,

20 The phrase ἔμφυτον θερμόν appears at Hippocrates, *Aphorisms* 1.14 and 15 (L. 4.466) and it seems to have been discussed widely in the first and second centuries CE. Hipp. *Aph.* 1.14 is first cited in Galen, *Adversus Lycum* 1 (Wenkebach 4,14–15 = K. 18A.198). The subject of the work is the correct interpretation of the phrase ἔμφυτον θερμόν in the aphorism. See also Galen, *De temperamentis* 1.7 (Helmreich 28,20 = K. 1.554).

there is no reason to think the author is confused: thinking of pneuma as something analogous to the fifth or celestial element but present within a living thing goes back at least to Aristotle's *De generatione animalium*.[21]

Setting aside the question of terminology for the moment, this passage, along with Galen's commentary on Hippocrates' *Airs Water Places* (T1) suggests that Athenaeus believed pneuma is present and working at the compositional level of the body. By "compositional", we mean that it is responsible for regulating the composition of the other elements. It is that "by which they all are held together and regulated." The compositional pneuma is not akin to the pneuma, familiar to us from other medical sources, which flows through vessels and other passages in the body.[22] Neither is it on a par with the other four elements. The author of the *Introduction* does not tell us whether Athenaeus thought this pneuma has its own mixture and composition. From Galen's testimony (T1), we learn that Athenaeus thought a person's pneuma is composed of hot and cold. But pneuma is nevertheless presented here (T2) as distinct from these four qualities. In other words, the hot and cold here (and dry and wet) are part of the body's constitution and mixture. Inside this mixture and its material product (i.e. the body) the pneuma is present too – it "permeates" this body and is itself composed of the hot and cold.

This passage (T2), therefore, establishes pneuma's causal role in the body. It is something different from the other four elements, insofar as it is that "by which all things (i.e., all the parts of the body) are held together and regulated." Athenaeus is thinking about pneuma in a way similar not just to the Stoics, but also to other entities posited by Aristotle and Galen. "Pneuma" is whatever it is that gives coherence and regularity to the human body, just as "nature" or "soul" is the name given to the cause of the same thing in an Aristotelian or Galenic framework.[23] Pneuma, which permeates "through everything" (διὰ πάντων), is presented as something distinct from the (mixture of) the qualities. In fact, it seems pneuma *must be* distinct if it is to have the causal role it does. If bodies are the kinds of things that require something to hold them together and regulate them – something suggested by the fact that living bodies differ from dead ones – then whatever it is that does this will be distinct, in the same way that whatever acts on something is distinct from that on which it acts.[24] The compositional pneuma, therefore, is

21 The *locus classicus* of the idea that pneuma in animal bodies is like the astral or fifth element is Aristotle, *De generatione animalium* 2.3, 736b35–38. Galen also often says Athenaeus has the same view about the elements as Aristotle and the Stoics, suggesting the relevant disagreement is not about the causal role of soul or nature, as opposed to the body, but about whether the soul or nature is equivalent to pneuma or not. See T9 below, 227, and references there. On the Stoics on pneuma as a fifth element, see Jannone 1964, 284–285, and Lapidge 1973, 277–278.

22 See the chapters by Lewis and Leith, Leith, Singer and Rocca in the present volume.

23 On analogies between Aristotelian formal causes and Stoic cohesive causes, see Frede 1980, 243; Hankinson 1998, 241; on Aristotle and Stoics on soul as cohesive cause see Coughlin 2020, 254–261.

24 As Galen claims it is in the case of the Stoics. See Galen, *De causis contentivis* 1.3 (Lyons 53,15–18).

not simply a part or component of the body. A person's body and the same person's pneuma are two distinct "entities," each with its own independent composition.

From the testimony of the author of the *Introduction*, therefore, we learn that pneuma for Athenaeus is acting on and inside a human being, and furthermore that the human body depends on the pneuma for its cohesion and regulation, i.e., for its existence as a living body. It is noteworthy that Galen refers to pneuma in Athenaeus' sense (the sense we are calling compositional) as "connate" (σύμφυτον) and "vital" (ζωτικόν) pneuma. When Galen and other medical authors refer to "vital pneuma," they are usually talking about a kind of pneuma that moves through the arteries. The compositional pneuma, however, is not identical with this arterial pneuma, even though it shares the name. In one passage where Galen speaks about the compositional pneuma, he distinguishes "vital pneuma" in the Pneumatist's sense from "vital pneuma" in the sense of a bodily part which flows through the arteries. In these contexts, he calls the arterial pneuma, "material (ὑλικόν) pneuma" and reserves "vital" for the compositional pneuma. We think this corroborates the author of the *Introduction's* report and adds evidence that the compositional pneuma of the Pneumatists is not something that exists simply at the level of a bodily part, but that on which life and a living body depend.

The author adds further information on this point a few lines later, where he also broadens the range of people who hold this belief from Athenaeus to other Pneumatists:

**T3** Ἱπποκράτης μὲν οὖν διὰ τριῶν κεχώρηκεν, εἰπὼν στοιχεῖα ἀνθρώπου ἴσχοντα, ἰσχόμενα, ἐνορμῶντα, δι' ὧν τὰ πάντα τῶν μετ' αὐτὸν περιείληφε στοιχεῖα καὶ τὴν κατὰ στοιχείων φυσιολογίαν τε καὶ αἰτιολογίαν τῶν παρὰ φύσιν· οἱ δὲ μετ' αὐτὸν οὐκ οἶδ' ὅπως μίαν οὖσαν τὴν θείαν ταύτην καὶ ἀληθῶς Ἀσκληπιοῦ ἰατρικὴν τριχῇ διανειμάμενοι καὶ διασπάσαντες τὰ ἐν αὐτῇ συμφυῆ μέρη, οἱ μὲν μόνοις τοῖς χυμοῖς τῶν τε κατὰ φύσιν τὴν σύστασιν καὶ τῶν παρὰ φύσιν τὴν αἰτίαν ἀνέθεσαν, ὡς Πραξαγόρας καὶ Ἡρόφιλος. οἱ δὲ τὰ στερεὰ σώματα τὰ ἀρχικὰ καὶ στοιχειώδη ὑποθέμενοι, τά τε φύσει συνεστῶτα ἐκ τούτων καὶ τῶν νόσων τὰς αἰτίας ἐντεῦθεν λαμβάνουσιν, ὡς Ἐρασίστρατος καὶ Ἀσκληπιάδης· οἱ δὲ περὶ Ἀθήναιον καὶ Ἀρχιγένην μόνῳ τῷ διήκοντι δι' αὐτῶν πνεύματι καὶ τὰ φυσικὰ συνεστάναι τε καὶ διοικεῖσθαι καὶ τὰ νοσήματα πάντα, τούτου πρωτοπαθοῦντος γίνεσθαι ἀπεφήναντο, ὅθεν καὶ πνευματικοὶ χρηματίζουσι.

Hippocrates, then, put forward three (components), saying the elements of a human being are things contained, things containing and things imparting impulse, by means of which he embraced all the elements of those who came after him, as well as elemental physiology and aetiology of things contrary to nature. But those who came after him – I do not know why – divided this divine and

> truly Asclepeian medicine, which is really one, into three and dispersed the parts that make it up. (i) Some people assigned exclusively to the humours the composition of things in accordance with nature and the cause of things contrary to nature, like Praxagoras and Herophilus. (ii) Others posited the solid bodies as the primary and elemental things, and believed that things are composed out of these and the causes of diseases are from them, as Erasistratus and Asclepiades. (iii) And those around Athenaeus and Archigenes claim that all the natural things are composed and governed by means of the pneuma alone which pervades through them, and all diseases are generated when it (*sc.* the pneuma) is first-affected, for which reason they are called Pneumatists.
>
> Ps.-Gal. *Intro.* 9 (Petit 21,21–22,17 = K. 14.698–699).

The author returns here to a reference he made earlier in the chapter to an obscure passage in *Epidemics* 6. In the *Epidemics* 6 passage, the Hippocratic author mentions that one should observe "things that are containing, impelling, or contained (τὰ ἴσχοντα, ἢ ὁρμῶντα, ἢ ἐνισχόμενα)."[25] What the author of *Epidemics* 6 means by these three terms is unclear; however, by the time of the *Introduction*, our sources show that these three terms were associated with three types of homoiomerous parts of the human body: solids (τὰ στερεά) are containing parts; liquids (τὰ ὑγρά), like the humours mentioned in T3, "contained"; and pneumata (πνεύματα), the "impelling." This three-fold division is taken to be a genuine Hippocratic belief about the composition of the body above the level of the elements.

There is no evidence that any of the Pneumatists appealed to this passage from *Epidemics* 6.[26] It confirms, nonetheless, several points made by Galen in his commentary on *Airs, Waters, Places*. First, it confirms that the Pneumatists think pneuma forms and governs natural things, i.e., that pneuma is responsible for the generation of offspring and the continued order and functioning of the body. Second, it states they believed that pneuma accomplishes its functions by pervading the body. Third, it states they believed diseases are generated when the pneuma is first-affected (πρωτοπαθοῦντος), a technical term, which refers to the first part of a sympathetic pathological relation.[27] Finally, fourth, it shows that it is specifically because they believe pneuma is a certain type of cause whose disruption brings about disease that "they" (i.e. Athenaeus, Archigenes and those who adopted their teachings) are called Pneumatists.

25 Hippocrates, *Epidemics* 6.8.7 (L. 5.346.5–6).

26 Galen also opposes the focus on pneuma to the focus on solid parts with regards to disease, but he makes no reference to the threefold division mentioned in the Ps.-Gal. *Int.* 9 (see below, p. 220–221).

27 Galen, *De locis affectis* 1.3.2, 1.6.1 (Gärtner 260,18, 282,5 = K. 8.31, 8.48) and Gärtner 2015, 543, n. ad 260, 17–20.

The passages discussed above allow us to begin to answer the question raised at the beginning of this chapter: what is distinctive about the pneuma of the Pneumatist school? As noted at the outset, the idea that pneuma is essential for life and the functioning of the body was not in itself unique. However, the Pneumatists appear to have differed from other medical authors on two points. First, they seem to have focused their theory of the causes of health and disease on pneuma rather than on other components of the body. The claims of later authors regarding pneuma governing everything may or may not reflect original Pneumatist ways of speaking, but something in their original words led others to interpret their ideas in this way. As we shall see in Section 2, their clinical methods corroborate this interpretation. The contrast which the author of the *Introduction* makes between the Pneumatists and those who focus on fluid or solid parts emphasizes the uniqueness of their approach. The fact that we do not find names like "Solidists" (Στερεωτικοί) or "Liquidists" (Ὑγροτικοί) for the other groups suggests the emphasis was part of their approach rather than an evaluation imposed on them by an interpreter.[28] Second, as far as our sources attest, no other medical authors explain the living body with the notion of "compositional pneuma" attributed to the Pneumatist physicians. In other medical authors, pneuma was something moving through hollow channels and parts. Such a pneuma, however, was also part of the theory of Pneumatist physicians, and it is to it which we now turn.

### 2.2 Cardio-arterial pneuma

From as early as the fifth century BCE we find concrete evidence for the idea that air, often called pneuma, flows through vascular passages in the body. Following the identification of two distinct vascular systems – arteries and veins – the arteries were generally considered pneumatic vessels, in charge of transmitting pneuma through the body. The main source of this arterial pneuma was the heart, to which they were connected via the aorta stemming from the left artery.[29] Some authors went so far as to claim that the arteries contain *only* pneuma and that blood is confined to the veins, at least under natural healthy circumstances.[30] From Galen we learn that Archigenes and his followers took part in the ensuing debate concerning whether or not the arteries naturally contain blood. In fact, Galen tells us that they had "much" to say on the matter, arguing against

28 On these other groups, see Leith 2015, 485, n. 50.

29 On the cardio-arterial system and the motion of air, see Harris 1973; Debru 1996; Lewis 2017 and the chapters by Lewis and Leith, Leith, Singer and Rocca in this volume.

30 Particularly Praxagoras and Erasistratus: Galen, *De dignoscendibus pulsibus* 4.2, 4.3 (K. 8.941–942, 8.950); *De plenitudine* 11.11 (Otte 72,6–10 = K. 7.573–574 = frs. 12–14 Lewis = frs. 9, 85, 84 Steckerl); *De venae sectione adversus Erasistratum* 3 (K. 11.153 = fr. 198 Garofalo). For Praxagoras, see the chapter by Lewis and Leith, for Erasistratus, the chapter by Leith, both in this volume.

the view of a solely pneumatic arterial content held by physicians such as Praxagoras of Cos and Erasistratus of Ceos (both of the late fourth and early third centuries BCE).[31]

The pulse theories of the Pneumatists' offer further indications for their belief that arteries hold some pneuma in their cavities. The Pneumatists engaged extensively with ongoing debates regarding the definition, physiology, taxonomy and diagnostic significance of the pulse.[32] Their views on these matters offer several indications for their consideration of pulsation as related to a flow of air in and out of the heart and arteries, as was common in antiquity. Athenaeus referred to it specifically as a "transpiration" (διαπνοή) of the heart and arteries, a term which referred to the flow of air in and out of the body.[33] Like other physicians, the Pneumatists referred to the pulse as a "motion" and an "expansion and contraction" of both heart and arteries.[34] Galen tells us explicitly that they believed that during their contraction (systole), the arteries draw in pneuma and that they expel it when expanding (diastole), which was opposite to the view held by physicians such as Galen, Herophilus and Praxagoras.[35] Another passage from Galen is suggestive. Galen complains that when Agathinus refers to the δύναμις of the pneuma in his discussion of pulsation, he does not explain to which of the pneumata he is referring – the connate (σύμφυτον), compositional one, or the one found inside the perforations (εὐρυχωρίαι) of the arteries.[36] Such a statement, the exasperation it conveys and the contents of the ensuing discussion, strongly imply that Pneumatist physiology identified these two kinds of pneuma (the one inside the arterial *walls* and the one inside the *perforations* of the arteries). Had they thought that there was pneuma only inside the walls of the arteries, no clarification would have been necessary.

The source of the pneuma moving through the hollow cavities of the heart and arteries was probably external air, which entered through respiration and transpiration. Our sources are surprisingly sketchy on the Pneumatists' ideas concerning these processes. Athenaeus' definitions of the pulse and regimen instructions offer some clues, however. He defined the pulse as a "visible transpiration (διαπνοή) of the heart on its own and of the arteries, which is apparent to the senses," or alternatively, as the "diastole and systole in accordance with the transpiration (διάπνοια) of the heart and arteries."[37] The terms διανπνοή and διάπνοια referred to the flow of air in and out of the body. In the narrower, technical sense, it referred particularly to the process of transpiration:

31 Gal. *Dig. Puls* 4.2, 4.3 (K. 8.940, 8.950).

32 Much of Galen's *Diff. Puls.* and *Dig. Puls* engage with the ideas of Pneumatist physicians, in particular Archigenes; (see also Lewis [forthcoming] on Archigenes and Gal. *Diff. Puls*. 1.3 (K. 8.786) where Galen states that Agathinus contributed much to the art of the pulse).

33 See below on this page and the next.

34 Gal. *Diff. Puls.* 4.11–14 (K. 8.750–757).

35 *Ibid*. 4.2 (K. 8.712–713). For Herophilus' and Praxagoras' views, see the chapter by Lewis and Leith, for Erasistratus, see the chapter by Leith – both in this volume.

36 Gal. *Dig. Puls*. 4.2 (K. 8.936–937), and see below, p. 222.

37 Gal. *Diff. Puls.* 4.14 (K. 8.756–757).

the entering and exiting of air through pores in the skin and arterial walls.[38] Athenaeus uses διάπνοια and its cognates not only with regards to the pulse. He uses the term also for the ventilation of places, that is, for flow of air in and out of settlements. Cities, for instance, are more congested than the countryside, and are thus not well-ventilated (ἀδιάπνευστον).[39] These climate conditions affect the bodies surrounded by this air, whether the air is standing and stifling, or blowing and ventilating. He refers to the moistening of bodies through both paths: "through respiration and transpiration" (διά τε τῆς ἀναπνοῆς καὶ τῆς διαπνοῆς) that is, through respired air entering via the mouth and nose to the windpipe, and transpired air entering through the pores.[40] Athenaeus' description of the motion of the heart and arteries as a διαπνοή probably does not mean that he thought that the pulse was not related to air deriving from *respiration*, i.e. entering through the vascular pathways of the windpipe, bronchi and pulmonary vessels. By using διαπνοή he was emphasising not the direction of the breath (i.e. as opposed to ἀναπνοή), but the function, namely, ventilation – the cooling and balancing of the heat in the heart and arteries.[41]

Another matter on which our sources are particularly sketchy, is the function of this cardio-arterial pneuma. The evidence refers almost solely to vital functions of pneuma and appears to concern rather the compositional, connate pneuma in the substance of the parts, which Galen actually once calls "vital" (ζωτικόν) pneuma with reference to the Pneumatist theory.[42] Did the Pneumatists physicians believe that the "flowing" pneuma nourishes the compositional, connate pneuma by providing it with pneumatic substance which seeped into the matter of the parts?[43] Did they believe it somehow reaches the muscles and nerves so as to facilitate motion, as Herophilus and Erasistratus thought? The extant evidence offers no clear answers. A few points are worth noting, however. First, at this point in time the nerves' role as the conveyors of motion and sensation to the parts was well established. It is thus highly unlikely that these physicians thought that arteries (and the pneuma inside them) directly assist in these activities. Second, their pathological theory stresses the change in the compositional pneuma which affects the parts in which it acts and harms their respective functions (see below, p. 221–222). This suggests that the activities of these parts (e.g. motion in the case muscles) depend not on a flow of pneuma reaching them through hollow cavities (whether of

**38** On the concept of transpiration, see Debru 1996, 178–183, 187–198; Thivel 2005.

**39** Oribasius, *Collectiones medicae* 9.5, 9.12 (Raeder 2.8,17–24, 2.12,25–14,18).

**40** Orib. *Coll. med.* 9.12 (Raeder 2.13,10–12).

**41** A third definition by Athenaeus points to the relation between pulsation and heat: "(the pulse is) a motion by a natural and involuntary diastole of the heat in the arteries and the heart being moved out of itself and into itself and co-moving the heart and arteries." Gal. *Diff. Puls.* 4.14 (K. 8.756).

**42** Gal. *Dig. Puls.* 4.2 (K. 8.936–937).

**43** Such a view was probably held by the Ps.-Aristotelian author of the short treatise of *On Pneuma* (see the chapter by Gregoric in this volume, as well as Gregoric, Lewis and Kuhar 2015).

arteries or nerves), but rather on the compositional pneuma inside the substance of the parts and its particular mixture (κρᾶσις) in each part. This brings to mind Ps.-Aristotle, *On Pneuma*,[44] but also Galen and his description of the transmission of sensory and motor faculties through the continuity of matter. For Galen, the material substratum is almost always the brain-matter which extends through the nerves like "heartwood" and it allows the faculty or sensory impulses to travel through it between the brain and the parts.[45] For the Pneumatists, however, the pneuma itself has unique effects in each of the particular parts. This pneuma is *present* in each of the parts and does not flow to it from a certain centre. They might have thought that this compositional pneuma, which pervades through the body's solid parts, is connected to an "intellectual" or "psychic" centre. There are also some hints that the concept of a "vital tension" (ζωτικὸς τόνος), which a few sources report was used by the Pneumatists to explain things like the strength of the pulse and the cohesion of the body, is closely related to pneuma. Namely, that it is the compositional pneuma, extending from the heart through the arteries to the bodily parts, which constitutes and thus provides this "vital tension".[46] Our sources, however, are mostly silent on this point.

### 2.3 (Pathological) pneuma produced during digestion

In addition to the compositional and arterial pneumata we have discussed, the Pneumatists refer to a third kind: a pneuma generated during digestion. In our sources this pneuma appears as a harmful substance, which causes pain and disrupts the body's normal activity.[47] Faulty digestion (on account, for instance, of the presence of the wrong amount of heat) causes pneumatisation ([ἐμ]πνευμάτωσις), a unnatural accumulation of pneuma in the stomach that cannot naturally exit through belching or flatulence.[48] This pneuma mixes with the undigested food in the stomach to produce a kind of porous mass (ὄγκος ὑπόχαυνος) which could not easily exit the stomach by natural means.[49]

**44** Gregoric, Lewis and Kuhar 2015, 120–121 and see also the chapter by Gregoric in the present volume.

**45** Galen, *De placitis Hippocratis et Platonis* 7.3.5, 7.4.1–25 (De Lacy 440,15–19, 448–452 = K. 5.602, 5.611–617) and see the chapter by Singer in this volume.

**46** See, e.g., Gal. *Diff. Puls.* 3.2 (K. 8.647); *Loc. Aff.* 5.1 (K. 8.301–302); for Archigenes: Aëtius of Amida, *Libri medicinales* (= *Tetrabiblos*) 8.50 (Olivieri 2.478,25–27).

**47** This idea was not uncommon in antiquity; see for example in Diocles of Carystus, Gal. *Loc. Aff.* 3.10 (K. 8.185–189 = Diocl. fr. 109 vdE), and the chapter by Lewis and Leith in this volume; and in Galen, e.g.: *De symptomatum causis* 3.6 (K. 7.239–42); *De sanitate tuenda.* 6.10.24 (Koch 189,2–4 = K. 6.430), and van der Eijk 2020 and Gärtner 2015 721–722, notes *ad* 324,3 and 324,4.

**48** For Archigenes: Aët. *Lib. med.* 9.27 (Zervos 329,2–330,32); for Athenaeus: Orib. *Coll. med.* 1.2 (Raeder 1.7,1–16).

**49** The idea seems to be that this mass of semi- or entirely unconcocted food was too airy to naturally exit as excrement and too solid in order to allow the pneuma to escape through belching or flatulence, which were "blocked" or "stopped" (ἐποχή, ἐπέχεθαι: Aët. *Lib. med.* 9.27, Zervos 330,3–9).

Enclosed in a confined area, the pneuma causes the stomach to inflate and become distended (διατεινόμενον) and the pressure it exerts causes pain and discomfort; particularly if more food is taken in before this mass is expelled. At times, the pain spreads to other parts of the body, such as the head and back. Archigenes refers to headaches caused in this manner as "pneumatic headaches" (κεφαλάλγουντες πνευματικῶς) and he describes certain pains as "distended" (διατείνων).[50] It can also cause more severe affections, such as apoplexy and dizziness, which involve sensory, motor and cognitive disruptions – presumably since they cause a *dyskrasia* of the compositional pneuma in the relevant body parts.[51] It is unclear whether any of the Pneumatists think that pneuma is produced during natural digestion too and that it becomes harmful only when a large amount is produced or its qualities are particularly strong. Our sources offer no evidence about this, and there is thus no evidence suggesting that such a pneuma produced during digestion contributes anything to the natural functioning of the body, as in the theories of the Stoics and Galen.[52]

## 3 Pathology and clinical methods

Our investigation so far has shown that the pillar of Pneumatist physiology, and what distinguishes it from the theories of other medical authors, was the idea of a pneuma working on the compositional level, inside the actual substance of the body's parts. The living being's natural growth and maintenance depends on the existence within them of this pneuma. It comes as no surprise, therefore, that the Pneumatists' pathological theory and clinical methods consider pneuma, in particular the compositional pneuma, as a distinct object of diagnosis and therapy, in a way absent from other authors. In particular, they consider an "imbalance" (*dyskrasia*) of pneuma as the underlying cause of disease, believe that the pulse can indicate the condition of pneuma and some of their treatments are aimed at restoring the natural condition of pneuma as a requirement for the healthy functioning of the body.

In what follows, we introduce the role of pneuma in the pathological theory and then discuss Pneumatist diagnostic and therapeutic methods. We discuss these matters

50 Galen, *De compositione medicamentorum secundum locos* 2.1 (K. 12.537–538) for "pneumatic headaches." For "distended pain," see *Loc. Aff.* 2.8.2 (Gärtner 330,9 = K. 8.91), cf. Aët. *Lib. med.* 9.27 (Zervos 330,6–10).

51 For headaches and back pains, see: Aët. *Lib. med.* 9.27; for dizziness, see *ibid.* 6.7 (Olivieri 2.134,29–135,1); for apoplexy, see *ibid*. 6.27 (Olivieri 2.170,26–27), where the "summoning of the pneumata" is mentioned and by the same means as are listed in the case of headaches and back pains in *ibid*. 9.27 (lines 30–44), on which see below, p. 225.

52 The Stoics and Galen claimed that this "digestive pneuma" contributed to the production of the vital pneuma active in the body: Gal. *Hipp. Epid.* 6.5.5 (Wenkebach 270,26–29 = K. 17b.246–247 = *SVF* 2.782); Gal. *PHP* 7.3.28 (De Lacy 444,33–446,1 = K. 5.608).

insofar as they contribute to answering the main question of this paper: what is distinctive about the pneuma of the Pneumatist school? Our discussion therefore focuses only on the place of pneuma in the Pneumatists' clinical methods, and it is not intended to be taken as a comprehensive exploration of their clinical theories.

### 3.1 Pneuma and disease – *dyskrasia* of pneuma

Athenaeus' theory places the compositional, connate pneuma (الروح الغريزي) at the centre of pathological processes. External causes such as weather conditions, poisons and drugs affect the compositional pneuma: they cause a "bad mixture" (سوء مزاج, *dyskrasia*) of the pneuma by making the pneuma hotter, colder, moister or dryer than it naturally is.[53] The changes in the qualities of the pneuma affect the "capacity" (*dynamis*) of the pneuma and hence its effects on the parts of the body in which it is present. Excessive moisture, for instance, can make the pneuma "heavy" (βαρύς) and undermine its performance.[54] When the qualitative change in the pneuma is significant it brings about disease. It does so by changing the "natural mixture" (مزاج طبيعي) of the body part in which it is present ("it changes them through its own change and assimilates them to itself").[55]

The idea that diseases arise from bodily changes (brought about by external or internal causes) which affect the performance of pneuma is not new. However, Hippocratic and Hellenistic authors focus on the blockage of the motion of pneuma through hollows and cavities in the body (e.g. vessels, heart or brain). This means that pneuma cannot reach the places in which it is required and disease arises as a result. Accordingly, their treatments aim at unblocking the passage, not at treating the pneuma as such. By contrast, in the Pneumatist theory it is the effect of pneuma present and acting inside the actual matter of the part which causes the pathology. Galen opposes it in particular to the view (which he himself holds) that external and internal causes affect the substance of the body parts *directly*, with no intermediate medium such as pneuma.[56] Galen's theory emphasises the quality of the mixture of parts as physiological and pathological agents, ensuring healthy functioning or acting as the cause of illness.[57] Psychic pneuma

53 Gal. *CC* 2.1, 2.3–4 (Lyons 54); *Hipp. Aer.* (ed. Strohmaier), *ad* Hipp. *Aer.* 10.1 (Jouanna 211,12–212,2 = L. 2.42). For *dyskrasia* of pneuma in the Greek fragments (δυσκρασία τοῦ πνεύματος): Gal. *Dig. Puls.* 4.2 (K. 8.944).

54 Orib. *Coll. med.* (libri incerti) 41 (Raeder 4.147,1–6).

55 Gal. *CC* 2.3 (Lyons 54,17–18); cf. Gal. *Hipp. Aer.* (ed. Strohmaier), note *ad* Hipp. *Aer.* 10.1 (Jouanna 211,12–212,2 = L. 2.42); on the effects on the *dynamis* see below, p. 222–225.

56 Gal. *Hipp. Aer.* (ed. Strohmaier), note *ad* Hipp. *Aer.* 10.1 (Jouanna 211,12–212,2 = L. 2.42). For Galen's view see in particular his explanation of diseases of homoiomerous parts in Galen, *De differentiis morborum* 4, 5 (K. 6.843–844, 6.848–855).

57 On the possibility that Galen attributed some pathological role to qualitative changes in the pneuma, see van der Eijk 2020.

is important for sensory and motor functions; and vital pneuma is required to maintain life, but Galen does not treat either of them as objects of diagnostic or therapeutic measures. He stresses that the activities and faculties are dependent on bodily parts and their mixtures, and these are the ones which need to be diagnosed and treated.[58] He does not incorporate into his theory the concept of "innate pneuma," but rather that of an "innate heat" which is the vital principle. This innate heat is aided by the so-called "vital pneuma" only to the extent that the latter tempers the heat and thus maintains it. It is this innate heat, moreover, rather than the pneuma, which determines the size, speed and other characteristics of the pulse. For the Pneumatists, however, changes in the pneuma were an essential part of disease, and as we shall see below, it appears to have a more active role in pulsation.

Athenaeus introduces the idea of pneuma, in its imbalanced state, as the "cohesive cause" of diseases: "the cohesive cause (of the disease) is the pneuma, which has gone too far towards either heat, cold, dryness or wetness" (وسببه الماسك هو الروح إما لأنه سخن بأكثر من المقدار وإما لأنه برد وإما لأنه يبس وإما لأنه رطب).[59] The causes that bring about the initial change in pneuma, i.e. external causes and the changes they cause inside the body (e.g. humoural changes) he calls antecedent and preceding causes respectively.[60] For it is the pneuma which not only causes the disease but "holds it together" and sustains it, so to speak: unless the pneuma is brought back to balance, the disease remains. This mirrors the physiological theory according to which "natural things are composed and governed by means of pneuma."[61] In accordance with this underlying pathological theory, pneuma is a prominent part of the diagnostic and therapeutic methods aimed at identifying and eliminating disease. Identifying the disease entails also the identification of the condition of the pneuma (and the anatomical location in which it was harmed and harmful); treatment entails correcting the *dyskrasia* of the pneuma and restoring its balance.

### 3.2 Pneuma as an object of diagnosis

The important evidence for the Pneumatists' diagnostic consideration of pneuma derives from their pulse theory, in particular with regard to their notion of "fullness" (πληρότης) of the pulse, and distinction between "full" (πλήρης) and "empty" (κενός) pulses. Agathinus' definition of the full and empty pulses includes an explicit reference to pneuma. Galen cites it verbatim:

**58** See van der Eijk 2014; van der Eijk 2015.

**59** Gal. *CC* 2.4 (Lyons 54,23–25). On cohesive causes, still the best discussions are in Frede 1980 and Hankinson 1998; see now also Coughlin 2020.

**60** Gal. *CC* 2.1–6 (Lyons 54–56), translated by Lyons slightly modified.

**61** Ps.-Gal. *Intro.* 9 (Petit 22,13–15 = K. 14.699). See above, p. 213–214.

**T4** τοῦ μὲν πλήρους τεταμένον καὶ ἐξεριστικὸν δι' ὅλου τὸ πνεῦμα παριστάντος, τοῦ δὲ κενοῦ διαῤῥέον καὶ ταῖς ἀντιβάσεσιν ἐναφανιζόμενον, ὡς ῥήξει τινὸς ὑδατίνης πομφόλυγος ἐοικέναι.

The full pulse presents the pneuma taught and resistant throughout, whereas the empty pulse (presents) the pneuma flowing and disappearing under resistance (*sc.* upon the pressure from the fingers), so that it seems like a bursting of some wet bubble.

Gal. *Dig. Puls.* 4.2 (K. 8.936)[62]

Galen remarks that this account does not indicate whether Agathinus was referring to the "connate pneuma (τὸ σύμφυτον πνεῦμα), that is, the vital (ζωτικόν) (pneuma), which, on their (*sc.* the Pneumatists') account, extends through the bodies," or rather to the "airy and material (ὑλικόν) pneuma, which is in the cavities (εὐρυχωρίαι) (of the arteries)."[63] Elsewhere Galen distinguishes three main views regarding the physiological and clinical significance of the full and empty pulses:

**T5** εὑρίσκω γὰρ τοὺς νεωτέρους ἰατροὺς, τοὺς μὲν, ὅταν ὁ τῆς ἀρτηρίας χιτὼν ὅπως ἔχει συστάσεως μηνῦσαι θελήσωσι, τῷ τε τοῦ πλήρους ὀνόματι καὶ τῷ τοῦ κενοῦ κατὰ τοῦτο χρωμένους, τοὺς δ' ὅταν τὴν ἐν τῇ κοιλότητι περιεχομένην οὐσίαν. καὶ ταύτης οἱ μὲν τὸ ποσὸν διὰ τῶν ὀνομάτων δηλοῦσθαι νομίζουσιν, οἱ δὲ τὸ ποιὸν, οἱ δ' ἀμφότερα. Ἀρχιγένει δ,' ὡς ἔοικεν, οὐκ ἀρκεῖ μόνον ταῦτα, προσεπεισάγει δ' ἡμῖν καὶ τὸ τῆς τοῦ πνεύματος δυνάμεως σημαινόμενον.

I find that the young physicians use the terms "full" and "empty" when they want to communicate either (i) the state of the composition of the wall of the artery; or (ii) the substance contained inside the artery's cavity. Of these, some think that (ii.a) the terms indicate the quantity, some (ii.b) the quality, some (ii.c) both. But Archigenes, it seems, is not satisfied with these alone but introduces for us the additional meaning (iii), namely with reference to the *dynamis* of the pneuma.

Gal. *Diff. Puls.* 2.3 (K. 8.575)[64]

**62** Cf. Gal. *Dig. Puls.* 4.2 (K. 8.937–938).
**63** Gal. *Dig. Puls.* 4.2 (K. 8.936–937).
**64** Cf. Gal. *Diff. Puls.* 3.6 (K. 8.678, 8.683); *Dig. Puls.* 4.3 (K. 8.947).

Despite the ambiguity concerning Agathinus' view, Galen places him in a particular group. According to Galen, it is possible to deduce (τεκμαίρεσθαι) from the Pneumatist opinion as a whole, that Agathinus meant the vital pneuma, that is, the structural pneuma in the arterial walls rather than cavities.[65] Galen thus places Agathinus firmly in the first group, which considers the fullness and emptiness of the pulse as indicative of the composition of the arteries and the connate pneuma inside their walls. We have just seen that Agathinus' pupil, Archigenes, connects the fullness and emptiness of the pulse to the *dynamis* of the pneuma. From another passage in Galen we learn that this refers to the very same pneuma as Agathinus, for we are told that this third interpretation of the fullness or emptiness of the pulse "makes known the *dynamis* of its (*sc.* the artery's) connate pneuma" ([τὸ] τοῦ συμφύτου πνεύματος αὐτῆς τὴν δύναμιν γνωρίζον).[66] Unlike his master, Archigenes does not mention the pneuma in his definition of the full and empty pulses:

> **T6** ἔστι δὲ πλήρης σφυγμὸς ὁ ναστοτέραν ἐπιδεικνὺς τὴν ἀρτηρίαν καὶ τὴν ὑπόπτωσιν αὐτῆς διασεσαγμένην ἐγχύλως, κενὸς δὲ ὁ πομφολυγώδη τὴν ἔγερσιν τῆς ἀρτηρίας ποιούμενος, ὥστε κατὰ τὸν ἐπιπιεσμὸν τῶν δακτύλων κενεμβάτησιν ὑποπίπτειν.
>
> Full pulse is the one which presents the artery rather replete and its impact upon the fingers as stuffed with fluid; and the empty pulse makes the rising of the artery bubbly, so that the emptiness falls upon the pressure of the fingers.
>
> Gal. *Dig. Puls.* 1.3 (K. 8.931)[67]

Whereas Agathinus incorporates the condition of the pneuma into his description of the full and empty pulses and the tactile perception they produce, Archigenes' definition refers only to the artery itself and its feel to the touch, not to the pneuma inside it. According to Archigenes, one does not sense the pneuma as such; instead, the haptic sensation of the artery indicates the condition of the pneuma and allows to diagnose it. Our fragmentary evidence does not reveal the exact correlations between the degree of fullness and the conditions of the pneuma's *dynamis*, but there are some clues, nonetheless. Several passages in Galen tell us that Archigenes opposed *dynamis* to substance (*ousia*) and considers fullness or emptiness with regard to *dynamis* in a metaphorical sense, namely, to refer to a *quality* rather than a quantity. Archigenes compares this to the way the term "full" is used to describe the capacity of wines. One way to understand this metaphor is that, according to Archigenes, when we describe a pulse as "full," we

65 Gal. *Dig. Puls.* 4.2 (K. 8.937).
66 Gal. *Dig. Puls.* 4.3 (K. 8.947).
67 Cf. *Diff. Puls.* 1.5 (K. 8.509).

mean to say that it reflects a strong capacity, as opposed to a poor and weak capacity which would result in an "empty" pulse.[68] The idea seems to be that a full (i.e. strong and sufficient) capacity of the pneuma will result in a smooth and uniform motion, which allows a smooth flow of the fluid (ἐγχύλως) inside it (namely blood mixed with some non-compositional pneuma). This stream of matter will be apparent in the motion, in so far as the swelling during the diastole will be prominent. In the opposite case the pneuma does not flow smoothly with the blood, but hits the walls irregularly, like bubbles exploding upon a solid surface. With some caution we may consider this to be suggestive of the way in which the compositional pneuma "governs" the activities of the body. The condition of compositional pneuma in the arteries directly affects the pulse, presumably since it is the compositional pneuma inside the parts – namely its *dynamis* – which facilitates and maintains the distinctive activity of each part. In the case of the arteries this activity is pulsation, the expansion and contraction of the arteries required for moving respired pneuma through the body. It is the pneuma which "possesses" the *dynamis* of the parts.

Our evidence suggests that the Pneumatists recognise more minute and particular distinctions in the *dynamis* of the pneuma and that *dynamis* in this respect also refers to particular physical effects of the pneuma. In his discussion of the fullness of the pulse, Archigenes says the following (cited verbatim by Galen): "heaviness in capacity characterizes the full pulse in such cases as are the names of the bad-mixture of the pneuma" (τὸ ἐν δυνάμει καρῶδες ἐπὶ τῶν τοιούτων τὸν πλήρη σφυγμὸν χαρακτηρίζει, ὀνόματα ὄντα τῆς δυσκρασίας τοῦ πνεύματος).[69] Archigenes seems to be saying that the different *dyskrasiai* of the pneuma are named with respect to the particular physical condition of the pneuma and its effects, for example, causing heaviness. Such an idea is reflected in Athenaeus' reference to conditions in which the pneuma is "heavy" (βαρύς).[70] It is possible that this concept is related to the notion of the powers (*dynameis*) of drugs which caused different physical effects on the body. We know that Archigenes distinguishes different degrees of changes in the qualities of the pulse, for instance in the case of its size.[71] It would make sense that he identifies different degrees of fullness or emptiness and correlates them to a distinct *dynamis* of the pneuma.

Questions remain concerning the role of pneuma in altering the pulse, but these must await a dedicated study. What is important for our present purpose is that these sources show that these physicians consider pneuma to be an agent affecting the pulse

**68** Gal. *Diff. Puls.* 3.6 (K. 8.671; 8.677–681, 8.683), *Dig. Puls.* 4.2 (K. 8.944–945).

**69** Gal. *Dig. Puls.* 4.2 (K. 8.944).

**70** See p. 220.

**71** See Gal. *Diff. Puls.* 2.7–10 (K. 8.602–620) and Lewis [forthcoming].

and hence consider it to be an object of the diagnostic process.[72] By examining the pulse, these physicians believe one can identify the condition of the pneuma, namely of the connate (i.e. the vital and what he have been calling "compositional" pneuma). This suggests that the physiological Pneumatist theory is incorporated into their clinical method, as well as diagnostic and therapeutic theory.

### 3.3 Pneuma as an object of treatment

There are two types or manifestations of pneuma as an object of treatment in the theories of the Pneumatist physicians. The first is the pneuma arising in the digestive system and whose presence as such is disruptive. This pneuma is a part of treatment in so far as it has to be expelled. In order to achieve this, physicians induce belching, vomiting and stools by regimen and pharmacological means such as baths, drugs and remedies they applied externally. Some of these are described by Archigenes as means to "summon the pneuma" (τὸ πνεῦμα προσκαλεῖν), i.e. to draw it out of the stomach and body.[73] Pathological pneuma is a fairly common idea in antiquity.[74] Where the Pneumatist therapeutic theory stands out is in its concern with a second kind of pneuma, namely the connate, compositional pneuma required for healthy bodily functions. We have seen that under certain circumstances this pneuma may undergo a qualitative alteration that incapacitates it or makes it, and thus the body, dysfunctional; in such cases it must be restored to its natural, healthy state. Take for example the following passage, which discusses Archigenes' therapeutic method of using sponges:

> **T7** Περὶ ἀποσπογγισμοῦ Ἀρχιγένους. Ἀποσπογγισμὸν παραλαμβάνομεν ἐπὶ μὲν τῶν ἄλλων μερῶν ἤτοι τὸν ἐπικείμενον ῥύπον ἀπονίψαι ἢ ἰχῶρα ἢ αἷμα ἢ πύον ἢ αὐτὰ τὰ φάρμακα ἢ ὑπὸ δήξεως ἢ κνησμοῦ ἐνοχλούμενα τὰ σώματα παρηγορεῖν πειρώμενοι· ἐπὶ δὲ τοῦ προσώπου νεαροποιῆσαι καὶ ἀναζωπυρῆσαι τὸ πνεῦμα βουλόμενοι, ὥστε ἐπὶ τῶν λειποθυμούντων ὕδωρ παραλαμβάνομεν, θέρους μὲν ψυχρόν, γαλακτῶδες δὲ χειμῶνος
>
> On sponging from Archigenes. When using sponging on other parts (besides the face) we are either trying to clean dirt which covers the part, or serum, blood or pus, or the substances themselves, or we are attempting to soothe the bodies themselves which are disturbed by a bite or an itch. Whereas when using sponging on the face our wish is *to renew and rekindle the pneuma*, so that in the

72 Affecting the pulse not only in a mechanical manner of a stream of air flowing through a vessel, but also in a functional, teleological manner, as somethings which activates and directs the motion from within the arterial matter itself.

73 Aët. *Lib. med.* 6.27 (Olivieri 2.170,26–27); 9.27 (Zervos 330,14–15).

74 See n. 47 above.

> case of people who have fainted we use cold water in summer and tepid water in winter.
>
> Aët. *Lib. med.* 3.170 (Olivieri 1.344,14–20)

The pneuma at play here is clearly not the pathological pneuma arising from imperfect digestion – in the case at hand the pneuma does not need to be expelled, but rather "renewed" or "rekindled." This implies a belief in the existence of a natural, useful pneuma, which has come into harm's way and needs to be brought back to its natural condition. It must have previously undergone some alteration which rendered it (or, if we think back to the pulse theory, its *dynamis*) weak and dysfunctional.

Importantly, the application of the remedy to the face is opposed here to the application to a particular part: in the latter case the location of application seems to be determined by a local problem in that part; whereas the treatment applied to the head is not directed by the condition of the face itself, but a more "holistic" condition, namely, of the pneuma. The reference to the case of fainting implies a pneuma which keeps the person vital and active. It is not obvious why the face was the desired location. The head is also the part to which Pneumatist physicians apply remedies in the case of mental affections such as memory loss and apoplexy.[75] The motivation for focusing on the face/head may have been non-theoretical – just as most of us are unable to explain the "scientific reason" behind the traditional method of reviving a fainted person by throwing cold water over them (generally substituted today, after much public education, by the method of raising the person's legs).[76]

The present fragment further reveals the tight connection between pneuma and heat in the Pneumatist theory.[77] We learn that in some cases the means for recovering and "renewing" (νεαροποιεῖν) the pneuma is by rekindling (ἀναζωπυρεῖν) its fire. Pneuma thus requires some heat in order to function. Moreover, it is not a new surge of heat which is required for rekindling, but rather cold or tepid water. In other words, the pneuma and its fire can suffer not only by being overcooled, but also overheated. This makes sense in light of their idea of *dyskrasia* of the pneuma, which can arise from an excess of either component of the mixture – the hot or the cold. The exact relation between heat and pneuma in the Pneumatist theory cannot be pursued further here, but it is noteworthy that this idea of rekindling by means of cooling is familiar from

75 For example: Gal. *Loc. Aff.* 3.5 (K. 8.150), Alexander of Tralles, *Therapeutica* 1.15 (Puschmann 1.557,18–559,4), Aët. *Lib. med.* 6.27 (Olivieri 2.170,20–171,1) and see Lewis 2018.

76 On this see also Lewis 2018, 171–172.

77 See 210–211 above. See also Gal. *Dig. Puls.* 4.3 (K. 8.949–950) for evidence for the connection between pneuma and heat in their theory.

authors who explain the body with the notion of "innate heat," which is maintained not (only) by the addition of heat, but (also) by tempering it.[78]

Another example that suggests a therapeutic aim of restoring pneuma to its proper condition appears in Archigenes' treatment of lientery. His recommendation includes, among other remedies, the use of *dropax*, a kind of warm embrocation, which Archigenes often recommends.[79] He explains its use in the following terms:

> **T8** ὁ δρῶπαξ δύναται τονῶσαι τὸ ἐνδεδωκὸς πνεῦμα καὶ ἀνακαλέσασθαι πρὸς τὴν ἐπιφάνειαν καὶ ἀναμνῆσαι τῶν ἰδίων ἔργων.
>
> The dropax can strengthen the deficient pneuma, revive the appearance and remind of one's own activities.
>
> Archigenes, *Fragmenta* (Brescia 24,13–14)

Pneuma here appears again as a distinctive object of treatment. Are the two latter effects (reviving appearance and restoring mnemic faculties) dependent on the pneuma? There is good reason to assume so. We have seen a connection between pneuma and vital signs, which would support connecting pneuma to a general appearance and complexion. Moreover, if pneuma is what governs and activates the parts, then it would be necessary also for mental functions such as memory and recollection (which the Pneumatists assigned to the heart).[80]

*Dropax*, sponging and other therapeutic methods the Pneumatists use are not unique to them, but a common part of Greco-Roman medical practice.[81] The pathological explanation of disease as dependent on a qualitative imbalance, a *dyskrasia*, is also a strong part of that medical tradition. The practical similarity is stressed by Galen, who notes that so long as one explains disease in terms of qualitative imbalance and treatment in terms of restoring balance, it does not matter what the material subject in which this (im)balance occurs:

> **T9** If there is a cold and humid pain in the head, and one says that it is the pneuma (الريح) that has become colder and more humid, and that we need something that warms and dries, while others say that the nature of the head (طبيعة الرأس) has become unbalanced, and has become colder and more humid, and that we need correspondingly something warming and drying, so this

78 See for example: Aristotle, *De respiratione* 13, 477a11–477a24; 21, 480a16–480b21; Galen, *De utilitate respirationis* 5.7–8 (Furley/Wilkie 130–132 = K. 4.508–510).

79 See in particular Aët. *Lib. med.* 3.180 (Olivieri 1.351,3–26).

80 For the cardiac location of cognitive and intellectual functions, see Galen, *Loc. Aff.* 3.5, 3.7 (K. 8.151, 8.167); see Lewis 2018 for discussion.

81 Lewis 2018, 158–165.

> disagreement that they have among themselves does no harm at all; for they are unanimous with respect to the quantity of heat and dryness (*sc.* to be applied), on account of the cold and moisture of the head. If, then, one says that it is a pneuma or something else, it will not hurt in the treatment of diseases.
>
> Gal. *Hipp. Aer.* (ed. Strohmaier), *ad* Hipp. *Aer.* 10.1 (Jouanna 211,12–212,2 = L. 2.42)

Galen goes on to say that some people call "Pneumatist" those who talk about pneuma in this way. As we have seen, what singles the Pneumatists out is that their underlying pathological and therapeutic theories and the stated aim of their therapeutic method were formulated in terms of the pneuma – the connate, compositional pneuma present and active inside the substance of the body – and this pneuma stood at the centre of these theories and methods. Their explicit reference to pneuma in the classification of the pulse is unique in our sources, as is the concern with restoring the strength and power of the pneuma. It is these notions which sets them apart from other authors and justifies their unique appellation.

## 4 The Pneumatists and the Stoics

As a final point we want to briefly address the question of the relation between the Pneumatists and the Stoics. This is not intended to be a close comparison of their respective theories; rather, our aim is to offer some methodological considerations in light of the evidence discussed in this chapter, which we hope will be useful for future studies.

On several occasions, our sources explicitly connect Pneumatist ideas with those of the Stoics. In *CC,* Galen claims that Athenaeus was a disciple of Posidonius, which most scholars now agree is a reference to the Stoic philosopher, Posidonius of Apamea.[82] In the same work, Galen also states that Athenaeus "bases himself upon the Stoics," and Galen makes this remark in order to explain why it is reasonable that Athenaeus introduces the notion of a cohesive cause of disease into medical theory.[83] Elsewhere, Galen labels the Stoic Chrysippus as "the grandfather" (πρόπαππος) of the Pneumatist school and claims that "all these so-called Pneumatists conform to the opinions from the Stoics."[84] The author of *Introduction* also explicitly says that Athenaeus followed the Stoics in

82 Gal. *CC* 2.1 (Lyons 54,3–4). See also Nutton 2013, 202–206.

83 Galen's explanation is that the Stoics discuss cohesive causes in their physics, and Athenaeus follows Stoic physics, so Athenaeus too can use cohesive causes. Gal. *CC* 1.1–2.1 (Lyons 53,2–54,7).

84 Gal. *Diff. Puls.* 2.10, 3.1 (K. 8.631, 8.641–642).

adding a fifth element.[85] We have, then, a consensus in our sources that the Pneumatist physicians are indebted to Stoic ideas. We also find terminological similarities among Pneumatists and certain Stoics. The technical terms used in the *Introduction* when talking about Athenaeus' views on pneuma resemble those used in other sources to discuss Stoic views on pneuma in the body: they all use the vocabulary of "permeating through things" (διήκοντι δι' αὐτῶν), "holding things together" (συνέχεσθαι), and of "cohesive cause" (السبب الماسك, presumably translating συνεκτικὸν αἴτιον).[86] Such similarities in vocabulary suggest it is plausible Athenaeus and other Pneumatists are adopting not just Stoic terminology, but also a network of Stoics concepts and adapting them to their writings (either with or without explicit reference to the Stoics); however, the evidence is not conclusive, and there are few reasons to be cautious.

While our sources almost universally assert that Pneumatists take Stoic physics as a starting point in physiology, it remains unclear to what extent the Pneumatists portrayed or even considered *themselves* to be following Stoic physics. While later authors emphasise the Pneumatists' Stoic heritage, as far as we can tell the Pneumatists do not. This is more than an argument from silence. For we *do* have numerous examples where Galen and other authors explicitly mention Athenaeus' or Archigenes' references to earlier authorities, and these authorities are never Stoic. Rather, we find them citing philosophers like Empedocles, Plato, Xenophon, and Aristotle, and physicians such as Hippocrates, Diocles, and Andreas, or simply "the ancients."[87] Moreover, even if they did explicitly follow the Stoics, we do not have any evidence from the Pneumatists themselves who those Stoics might be. The Stoics are not a monolithic school and aside from Posidonius, we do not know which Stoics the Pneumatists' might have followed.[88] To use

**85** On the Stoic "fifth element," see n. 21 above, and especially the chapter by Hensley in this volume. It should be noted, though, that the Stoics were not the only possible source for the idea of pneuma as an element. Something like it is implied in Arist. *Gen. an.* 2.3 736b35–38. Athenaeus also incorporated the notion of soul into his explanations of the body and medical theory. See also Orib. *Coll. med.* (lib. inc.) 17 and 21 (Raeder 4.106,8–14, 112,19–24). This notion was absent in the theories of most physicians from the classical and Hellenistic periods, on which see Coughlin 2018, 109–113, 119–138, and the chapters by Lewis and Leith and by Leith in this volume.

**86** See p. 221 above.

**87** For example: Athenaeus' reference to Hippocrates: T1 above, p. 209–210; Archigenes citing Herophilus: Gal. *Diff. Puls.* 2.6 (K. 8.592 = Herophilus, fr. 163a vS); Athenaeus quoting Empedocles: Athenaeus *ap.* Orib. *Coll. med.* (lib. inc.) 16 (Raeder 106,4–7); Athenaeus quoting Plato's *Timaeus*: Galen, *De tremore, palpitatione, convulsione, et rigore* 6 (K. 7.609–610); Athenaeus agreeing with Aristotle and Theophrastus: Gal. *Temp.* 1.3 (Helmreich 8,28–10,3 = K. 1.522–523); Report that Athenaeus wrote against Asclepiades, Heraclides of Pontus, and Strato: Gal. *Trem. Palp.* 6 (K. 7.615–616) and Galen, *Caus. Symp.* 2.3 (K. 7.165–166); Athenaeus' appeal to "some the ancients" (τινες τῶν ἀρχαίων): Ps.-Gal. *Def. Med.* 31 (K. 19.356). The fact that Athenaeus endorses the beliefs of "the ancients" (whomever he takes them to be) almost certainly means that he is rejecting a contemporary view, and he is probably doing so on the assumption that writers closer to Hippocrates in time are more authoritative. On Athenaeus' "Hippocratism," see Coughlin 2018, 120–130.

**88** See the chapter by Tieleman and the chapter by Hensley in this volume.

the Stoics to understand the Pneumatists risks the same circularity as would bringing in other physicians whose views resemble those of the Pneumatists. Our suggestion, then, is that the Stoics be used as evidence when a circular argument can be avoided, or, at least, when the circle is not vicious. This is easier said than done. Comparisons with Stoic sources are extremely tempting, for instance, when interpreting a term in the Pneumatist fragments that has several possible meanings. Still, one should avoid assuming that several centuries of Stoic reflection on nature and natural philosophy all count as equally important context for the Pneumatist school.

The question of the Pneumatists' debt to Stoicism, like the question of the Pneumatist school itself, is one that seems to promise insight, but ends up not delivering much. Galen and his contemporaries may have made the Pneumatist physicians out to be the descendants of the Stoics, but this is no reason to adopt such characterizations without scrutiny. Our focus instead should be on understanding how the Pneumatists saw themselves as heirs and attendants of the healing art. Why did they appeal to the ancients, including Hippocrates, Plato and Aristotle, as authorities? Why did they attribute the beliefs to them that they did? Who were they responding to? And what therapeutic practices did these beliefs allow them to promote and develop? These questions have not found answers since Wellmann's study over 100 years ago. We hope this paper offers a place from which to start looking for them again.

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# Galen on Pneuma: Between Metaphysical Speculation and Anatomical Theory

## Summary

The paper investigates the role of pneuma, especially psychic pneuma, in Galen's physiology and psychology, on the basis of all the most relevant textual passages, and considers also its intellectual motivation and intellectual context. The precise details of Galen's account are analysed, as well as certain unclarities or vacillations within it. On the basis of consideration of Galen's relationship with predecessors in anatomy, especially Herophilus and Erasistratus, and a detailed examination of potentially relevant Stoic and Aristotelian parallels, it is argued that Galen's pneuma theory owes far more, and is much more closely allied, to the anatomical-physiological models of the former than to the more metaphysically challenging and less physically specific theories of the latter.

Keywords: anatomy; arteries; brain; nerves; soul

Der Beitrag untersucht die Rolle des Pneuma, besonders des psychischen Pneuma, in Galens Physiologie und Psychologie auf der Basis aller dafür relevanten Texte, dabei werden auch die intellektuelle Motivation und der intellektuelle Kontext berücksichtigt. Die genauen Details in Galens Darstellung werden analysiert, ebenso Unklarheiten und Schwankungen. Galens Verhältnis zu seinen Vorgängern in der Anatomie, besonders Herophilus und Erasistratus, berücksichtigend und eine ausführliche Untersuchung potenziell relevanter stoischer und aristotelischer Parallelen einbeziehend, wird argumentiert, dass Galens Pneuma-Theorie den anatomisch-physiologischen Modellen ersterer deutlich näher steht und mehr verdankt als den metaphysisch anspruchsvolleren und physisch weniger spezifischen Theorien letzterer.

Keywords: Anatomie; Arterien; Gehirn; Nerven; Seele

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## 1 Introduction

Origen of Alexandria attacks Celsus for his maliciously literal interpretation of the Judaeo-Christian story of the creation of Adam: God "breathed into his nostrils the breath of life".[1] We are not talking here about the blowing-up of wineskins, the Christian apologist insists, but figuratively, of the "imperishable pneuma" divinely imparted to humankind. A mosaic in the twelfth-century Cappella Palatina in Palermo, meanwhile, seems to give pictorial form to just such a literal reading: a tangible shaft of breath – for all the world like that of a piper or glassblower – extends directly from mouth of God until it strikes Adam in the face.[2] The Emperor Frederick II ("Stupor Mundi") had a condemned prisoner sealed in a container until death, to disprove the possibility of the soul's immortality: if it did survive, one would surely observe it escaping.[3] Dr Duncan McDougall of Haverhill, Massachusetts, carried out a series of measurements of body weight immediately before and after patients' deaths, which apparently showed the weight of the soul's substance to be roughly one ounce.[4]

We sense something bizarre and incongruous – perhaps even comical – in such arguments and images. Something seems to have gone wrong; we wander in the realm of category errors or verbal perplexities. By the very same token, however, they help to concentrate our minds on the fundamental problem at the heart of our enquiry. Is pneuma – and especially pneuma understood as related to the human soul – plain, ordinary physical breath, on the one hand, or something "higher", more mysterious, spiritual

1 Genesis 2.7. In the Greek of the Septuagint: ἐνεφύσησεν εἰς τὸ πρόσωπον αὐτοῦ πνοὴν ζωῆς. See Origen, *Contra Celsum* 4.37.

2 And the literalism, or anthropomorphism, curiously reminds us of one of Galen's own accounts of the intelligent design of the human body, in *De usu partium*, where the divine Craftsman is described in terms that make him seem like an actual craftsman in a workshop: "he blew well-mixed pneuma through the material and extended it" (εὔκρατον πνεῦμα ... οὕτω διαφυσήσας τε καὶ διαστήσας τὴν ὕλην), Galen, *De usu partium* 6.13 (Helmreich 1.343,23–24 = K. 3.471).

3 As recounted by the chronicler Salimbene da Adam, *Cronica fratris Salimbene de Adam*, fo. 356 = Holder-Egger, MGSS 32, 351.

4 MacDougall 1907.

(but again the polysemic nature, indeed the etymology, of that term just points us back to the intractability of the question), on the other? What is it that gives it its explanatory power, its persistence in accounts of the origin or cause of life, or of vital functions? And do such accounts function in the same way as those which apply to the rest of the world – operating with the same physics and accessible to the same standards of verifiability or observability?

These themes underlie the enquiry pursued by the present volume; and in the present chapter I aim to consider them in the specific context of the medical-philosophical work of Galen. It will be helpful, more succinctly, to frame three questions to bear in mind as we proceed to the detailed text-by-text study of this author's work. (1) What precisely is pneuma? (2) Why is pneuma used in certain kinds of physical and physiological explanation? (3) Where does the concept – in the specific Galenic context – come from?

The simple answer to the first question, that pneuma means "breath", belies the complexity of the problem: pneuma appears in different forms at different levels; it (on at least some understandings) pervades the whole body, and (for Galen definitely) resides in the brain and moves through the nerves. There is a range of answers in the philosophical-medical tradition as to the nature and types of pneuma, and how they relate to plain air or ordinary breath, on the one hand, and to the other substances in the natural world, on the other. Pneuma, is breath, certainly; but not – certainly not always or only – breath as we know it.

The second question also evades any simple answer. The response that accounts of the universe, or of life, relying on air or pneuma are prevalent in the earlier tradition is true, but does not get us very far. Certainly we may point to earlier theories such as those of Anaximenes, Anaxagoras, Empedocles or Diogenes of Apollonia, which prioritize air as either *the* or *a* central element in the cosmos; and equally to the fact that breath, and various terms related to breath, feature centrally in pre-scientific accounts of what it is to be alive, of the nature of the soul and of life and death.[5] And one will here want to consider the macrocosm–microcosm relationship – that is, the notion that the explanatory importance of air in the universe may be derived from analogy with the role of breath in animal life (or indeed *vice versa*).[6]

By the time of Galen, there seems to be some sense that pneuma may be called upon to give physical explanations that, it is felt, "normal" physics, or even biology, cannot give. And the same seems to be true, as we shall partly explore below, in the conceptual

5 On this, and in particular on the "breath soul" as an anthropological category and in early Greek thought, see Bremmer 1983, esp. chapters 1 and 2; also Onians 1951 and more broadly Lloyd 2007.

6 One might for example say that the accounts of respiration in the Hippocratic corpus offer one kind of version of this macrocosm–microcosm model of explanation; see Thivel 2005.

systems of Aristotle and the Stoics (to leave aside the question of the early Christians). That is to say, we have an element theory, not in itself including pneuma, that gives physical explanations of most things in the cosmos. Faced with the phenomenon of life, however, and especially with the specifically animal phenomena of perception and locomotion, such an element theory on its own seems inadequate; and this, typically, is where accounts in terms of the apparently more anomalous pneuma come in.

But how or why is pneuma thought to provide this function? One fairly simplistic answer is that breathing is a concrete, observable phenomenon which animals possess while they are alive; it therefore makes sense to posit a correspondence between breath (pneuma) and animal life; by extension, it might make sense to look to breath to give an account of those particular activities which distinguish animals from the rest of the natural world. Another answer would be in terms of distinctive properties of breath, or possibly of air more generally, which may make them appropriate candidates to give accounts of challenging physical processes. So, for example, the expansion and contraction of the lungs (or of bellows or wineskins) may be seen as providing a parallel for the tension and relaxation observed in muscles. It is relevant too that breath is something which – in some sense (the details of course vary from theory to theory) – can be understood to pass through the body invisibly. Both the invisible transmission and the way in which pneumatic expansion and contraction may be seen to mirror muscle activity are, presumably, part of the answer to the question as to the explanatory power of pneuma. Here it is surely relevant to consider the role of pneuma in ancient mechanics, where "pneumatic" technology – involving the exploitation of pressure in various ways in such mechanisms as water-clocks, organs, theatrical machines – had reached an advanced state of sophistication in Hellenistic times.[7] To put it in very crude historical terms, in a world before the discovery of electricity, or even steam power, breath, or pneuma, may look like the most powerful explainer in the natural world – if one is looking for a physical thing or substance.

Finally – though this point is again related to the macrocosm–microcosm type of explanation already mentioned – the conception of pneuma or air as a "higher" or "more divine" element, a physical thing which somehow provides a connection between beings in this world and a more exalted, heavenly realm, surely provides a relevant background too. Here, the notion of pneuma as something which has a particular degree of physical lightness and fineness, or indeed, the notion of a range of pneumata, of increasing physical fineness – fineness which may, at some level, even take us out of the normal physical world, or at least of the sublunary world – seems intimately connected with its explanatory power.

7 For an account of such technological developments see Berryman 2009, 155–176.

In considering these problems in the specific context of Galen, then, this chapter will fall into four further parts. First, I give an overview of the role of pneuma in Galen, and in particular of the relationship of "vital" (ζωτικόν) and "psychic" (ψυχικόν) pneuma in his thought. Here I make three main points: (a) that the notion of a particular level of elaboration, or fineness, is central to the explanatory power of pneuma; (b) that there is considerable vacillation and uncertainty about the overall physiological theory, and in particular about the role of *vital* pneuma; (c) that the role of *psychic* pneuma itself, by contrast, is comparatively clear and well developed.

Secondly, I consider the possible sources of Galen's physiological/psychological use of pneuma, in Stoic thought and in Hellenistic anatomy and medical theory. Here my main contention is that Galen's pneuma-theory is crucially indebted to Herophilus and Erasistratus, and has very little – in spite of linguistic similarities – in common with Stoic thought (nor, in detail, with Aristotle's). This notion of a strong indebtedness to Herophilus and Erasistratus is itself not new or original; such influence is well established in recent scholarship.[8] The distinctive feature of my argument is, rather, the insistence on a fundamental difference in kind between the Stoic and the Alexandrian anatomical approaches to pneuma, with the related attempt to distinguish the two strands of influence in Galen and to suggest that the latter is of considerably more significance.[9]

Thirdly, I look at Galen's consideration of pneuma as a possible candidate for "the substance of the soul". The view seems ultimately to be rejected, though not without a degree of uncertainty or hesitation; I consider the philosophical significance of this question in Galen, and in particular of the formulation which he ultimately favours: pneuma is the "first instrument" of the soul.

Fourthly, I consider some apparent but ultimately elusive connections with Aristotle's theory of causation in the embryological context and his invocation of a "higher" cause beyond the four elements.

## 2 Vital and psychic pneuma in relation to Galen's physiology

Psychic pneuma for Galen provides some kind of physical account of how the brain – or the *hēgemonikon*, the "leading-part" of the soul – performs its functions in relation to

8 Particularly relevant accounts here are: Debru 1996; Tieleman 1996; Rocca 2003; von Staden 1989 and von Staden 2000.

9 By contrast see e.g. von Staden 2000, 88–89, 102–105, arguing for congruence and possibly influence between Herophilean or Erasistratean views and Stoic ones on soul and pneuma, including in anatomy (see also *ibid*., 112–115, and cf. n. 32 below); and Tieleman 1996, 83–86, arguing for a strong dependence of Chrysippus on Praxagaoras. (Against the latter position cf. n. 38 below.)

the body, specifically how it controls the activities of perception and voluntary motion. The first set of texts below, T1–T7, presents Galen's account of how this psychic pneuma is produced, and of its relationship to vital pneuma and to ordinary air.

As we shall see, there are subtle variations in his description of the process, and even, it seems, vacillations, both on the importance of the category of vital pneuma and on the precise way in which psychic pneuma is generated from inhaled air.[10] However, what I shall call a "standard view" emerges, which has vital pneuma produced in the lungs, heart and arteries, on the basis of air taken into the lungs, and psychic pneuma produced at the base of the brain, out of that vital pneuma.

**T1** τὸ μὲν οὖν κατὰ τὰς ἀρτηρίας πνεῦμα ζωτικόν ἐστί τε καὶ προσαγορεύεται, τὸ δὲ κατὰ τὸν ἐγκέφαλον ψυχικόν ... ὥσπερ δὲ τὸ ζωτικὸν πνεῦμα κατὰ τὰς ἀρτηρίας τε καὶ τὴν καρδίαν γεννᾶται τὴν ὕλην ἔχον τῆς γενέσεως ἔκ τε τῆς εἰσπνοῆς καὶ τῆς τῶν χυμῶν ἀναθυμιάσεως, οὕτω τὸ ψυχικὸν ἐκ τοῦ ζωτικοῦ κατεργασθέντος ἐπὶ πλέον ἔχει τὴν γένεσιν· ἐχρῆν γὰρ δήπου μᾶλλον ἁπάντων αὐτὸ μεταβολῆς ἀκριβοῦς τυχεῖν.

Now the pneuma in the arteries is and is called vital, and that in the brain is called psychic ... Just as vital pneuma is generated in the arteries and the heart, getting the material for its generation from inhalation and from the vaporization of the humors, so the psychic pneuma is generated by a further refinement of the vital. For it was necessary that this pneuma, more than anything else, be changed in precisely the right way.

Galen, *De placitis Hippocratis et Platonis* 7.3.27–28
(De Lacy 444,29–446,3 = K. 5.608)[11]

We note already in this first text the emphasis on the "refinement" or "elaboration" of the psychic pneuma. Vital pneuma is itself the product of a first process of transformation, using inhaled breath (and, in this passage, vapours arising from the humours) as its raw material. It is then the further transformation of this vital pneuma – a process which, we shall see, requires both significant time and anatomical structures of a certain complexity – and the distinctive quality of the end-product of that process that account for the explanatory power of pneuma in physiology and psychology. To become psychic, the pneuma requires "further refinement" (κατεργασθέντος ἐπὶ πλέον) with respect to the vital; and there must be a μεταβολῆς ἀκριβοῦς. De Lacy translates this "changed

10 For these vacillations, and indeed for an important discussion of the significance and role or pneuma within Galen's anatomical and physiological accounts, see the fundamental study of Rocca 2003, as well as Rocca 1998 and Rocca's chapter in the present volume. Still valuable, too, is Temkin 1951.

11 Translations of Gal. *PHP* are from De Lacy 2005.

in precisely the right way"; the adjective ἀκριβής in Galenic Greek, particularly when applied to processes, may also appropriately be translated "complete": Galen is thus emphasizing not so much the precise nature of the change as the fact that a *complete* change in the substance's properties is required.[12]

Further detail of these processes is given in *De usu partium*.

**T2** τὸ δ' ἐκ τῶν τραχειῶν ἀρτηριῶν πνεῦμα τὸ ἔξωθεν ἑλχθὲν ἐν μὲν τῇ σαρκὶ τοῦ πνεύμονος τὴν πρώτην ἐργασίαν λαμβάνει, μετὰ ταῦτα δ' ἐν τῇ καρδίᾳ τε καὶ ταῖς ἀρτηρίαις καὶ μάλιστα ταῖς κατὰ τὸ δικτυοειδὲς πλέγμα τὴν δευτέραν, ἔπειτα τὴν τελεωτάτην ἐν ταῖς τοῦ ἐγκεφάλου κοιλίαις, ἔνθα δὴ καὶ ψυχικὸν ἀκριβῶς γίγνεται.

The outer air[13] drawn in by the rough arteries[14] receives its first elaboration in the flesh of the lungs, its second thereafter in the heart and arteries, particularly those of the retiform plexus [*rete mirabile*], and a final one in the ventricles of the encephalon, where its transformation into psychic pneuma is complete.

Gal. *UP* 7.8 (Helmreich 1.393,23–394,5 = K. 3.541–542)[15]

We note here that a further stage has been added to the account (or perhaps rather that the process is here described in slightly more detail). That is to say, the process which takes place in the heart and the arteries, in T1, is preceded by an elaboration in the lungs. We also note the essential role of the *rete mirabile*. This is explained more fully in some further passages from *De usu partium*. In these passages we will see that a close connection is made between the great intricacy of this structure,[16] the importance of its

12 Cf. the translation of cognate terms in T2, T3 and T5 below ("complete," "completely," "perfect.") It seems to me also that the phrase μᾶλλον ἁπάντων may be taken as qualifying the whole sentence rather than just pneuma, i.e. it is this physical process which is necessary "above all things," rather than the requirement applying to pneuma "above all things."

13 As already suggested, the distinction between "external air" (ὁ ἔξωθεν ἀήρ) and pneuma is not maintained entirely consistently; here "air" translates "pneuma"; elsewhere, what is drawn in by the "rough arteries" is "external air" (*aēr*), and the term "pneuma" seems to be used rather for air at a further stage of elaboration, within the body; cf. *UP* 7.9 (Helmreich 1.399,5–7 = K. 3.548). But the usage throughout can probably be reconciled by the fairly simple interpretation that *aēr*, while in the process of being breathed in, or having just been breathed in, may also be termed "pneuma."

14 "Rough arteries" translates the Greek phrase literally: what are meant are the windpipe and bronchi leading to and extending through the lung, which in traditional terminology were also *artēriai*, contrasted with the "smooth" (λεπταί) *artēriai* which we would now call arteries, in accordance with structural differences between these two types of vessels.

15 Translations from *UP* here and subsequently are by May 1968. I have thus here preserved her use of the term "encephalon" (ἐγκέφαλον), which she justifies on historical grounds but which elsewhere I translate more simply "brain."

16 The term *rete mirabile* or "wonderful network" reflects Galen's description of and attitude to it. His own term is *diktuoeides plegma*, or "net-formed web," translated "retiform plexus" by May (but he de-

function, the fulness of the process of elaboration or processing carried out in it, and the time this takes; and analogies are made with other similarly convoluted structures in the body which have a similar function of producing something fine from coarser matter: the testes and the breasts, producing semen and milk from the raw matter of blood. A passage from *De usu partium*, book 9 (that on the brain and related structures) is worth quoting at length, in view of the light it sheds on Galen's thinking in this area:

**T3** ἔνθα γὰρ ἀκριβῶς κατεργάσασθαι τὴν ὕλην ἡ φύσις βούλεται, πολυχρόνιον αὐτῇ διατριβὴν ἐν τοῖς τῆς πέψεως ὀργάνοις παρασκευάζει. δέδεικται μὲν οὖν καὶ αὐτὸ τοῦτ' ἐν ἑτέροις ἤδη πλείοσιν· εἰς δὲ τὰ παρόντα τῆς κιρσοειδοῦς ἕλικος, ἐν ᾗ τὸ πρὸς τὴν τοῦ σπέρματος γένεσιν ἐπιτήδειον αἷμα καὶ πνεῦμα παρασκευάζεται, μνημονεύσασιν ἡμῖν ἀποχρήσει παράδειγμα ποιῆσαί τι πρὸς τὰ παρόντα. φλέβες γὰρ ἐν ἐκείνῃ καὶ ἀρτηρίαι πολυειδῶς ἐλίττονται κατὰ μὲν τὰ πρῶτα μέρη τῶν ἑλίκων εἰλικρινὲς αἷμα περιέχουσαι· κατὰ δ' αὖ τὰ τελευταῖα τὰ πρὸς αὐτοῖς τοῖς ὄρχεσιν οὐκέτ' ἐρυθρὸς ἀκριβῶς, ἀλλ' ἤδη λευκότερός πώς ἐστιν ὁ ἐν αὐταῖς περιεχόμενος χυμὸς ὀλίγον ἔτι δεόμενος εἰς συμπλήρωσιν οὐσίας σπέρματος, ὃ παρὰ τῶν ὄρχεων αὐτῶν προσλαμβάνει. ἀλλ' ὅσῳ τὸ κατὰ τὸν ἐγκέφαλον πνεῦμα ψυχικὸν ἀκριβεστέρας ἐδεῖτο κατεργασίας τῆς τοῦ σπέρματος, τοσούτῳ καὶ τὸ δικτυοειδὲς πλέγμα τοῦ κιρσοειδοῦς πολυπλοκώτερον ἐγένετο. καλῶς οὖν ἐν ἐκείνοις ἀπεδείκνυτο τοῖς ὑπομνήμασιν ἡ γένεσις τοῦ κατὰ τὸν ἐγκέφαλον πνεύματος ψυχικοῦ τὸ διὰ τῶν ἀρτηριῶν ἀναφερόμενον τὸ ζωτικὸν ὕλην οἰκείαν ἔχειν.

... τοῦ τὴν λογιστικὴν ψυχὴν οἰκεῖν ἐν ἐγκεφάλῳ καὶ κατὰ τοῦθ' ἡμᾶς τὸ μόριον λογίζεσθαι καὶ πνεῦμα ψυχικὸν ἐν αὐτῷ περιέχεσθαι πάμπολυ, τὴν ἰδιότητα τῆς ποιότητος ἐκ τῆς ἐν αὐτῷ[17] κατεργασίας κτώμενον ... ἐνταυθοῖ δὲ τά τ' ἄλλα τῆς παρασκευῆς αὐτοῦ καὶ τὸ δικτυοειδὲς πλέγμα θαυμαστῶς ὁμολογεῖν φαίνεται τοῖς ὀρθῶς ἀποδεδειγμένοις. ὅ τε γὰρ ὅλος ἐγκέφαλος ὑπὸ τούτων τῶν ἀρτηριῶν διαπλέκεται πολυειδῶς σχισθεισῶν καὶ πολλαὶ τῶν ἀποσχίδων εἰς τὰς κοιλίας αὐτοῦ τελευτῶσιν, ὥσπερ οὖν καὶ τῶν ἐκ τῆς κορυφῆς

scribes it as "wonderful" on two occasions). It is an irony of anatomical history that this structure, which acquired such importance not just in Galen's anatomy and physiological explanations but also in those of later anatomists up to the early modern period, is not in fact present in human beings. The structure Galen describes is closely based on his observations of ox brains, the closest equivalent to a *rete mirabile* in humans being the Circle of Willis. On these points see Rocca 1998; Rocca 2003.

17 I read αὐτῷ (supported by MSS B and L), as opposed to Helmreich's ἑαυτῷ. The former reading seems to correspond to the required sense, as well as to May's translation; the reading ἑαυτῷ would seem rather to require a translation "elaboration within itself" (i.e., within the pneuma); that formulation might be thought intriguingly to support the argument that Galen's account of the precise location of elaboration is a subtly shifting one, but such a sense seems too far from *any* of the accounts Galen gives of the process.

κατιουσῶν φλεβῶν. ἐξ ἐναντίων μὲν γὰρ τόπων ἐμβάλλουσιν ταῖς ἀρτηρίαις, εἰς ἅπαντα δ' ὡσαύτως αὐτοῦ τὰ μόρια διανέμονται, τά τ' ἄλλα καὶ [κατ'] αὐτὰς τὰς κοιλίας.

For wherever Nature wishes material to be completely elaborated, she arranges for it to spend a long time in the instruments concocting it. Now I have already pointed this out in several other places,[18] but for our present needs it will be enough for me to cite one example of the arrangement in question by reminding you of the varicose convolutions in which blood and pneuma are rendered suitable to form the semen. For the veins and arteries there are intricately coiled and in the first part of the coils contain pure blood; in the last part, however, near the testes, the humor contained in them is no longer perfectly red but is already whitish and needs little to complete the change into the substance of the semen, a change which is added by the testes themselves. But the retiform plexus is as much more intricately coiled than the varicose plexus as the elaboration needed by the psychic pneuma in the encephalon is more perfect than that needed by the semen. I was right, then, when I showed in those commentaries [*On the Teachings of Hippocrates and Plato*] that the vital pneuma passing up through the arteries is used as the proper material for the generation of psychic pneuma in the encephalon. ...

[I have given the demonstrations proving] that the rational soul is lodged in the encephalon; that this is the part with which we reason; that a very large quantity of psychic pneuma acquires its own special quality from elaboration in the encephalon. ... Here we see that both the retiform plexus and the other features of its construction are in wonderful harmony with those correct demonstrations. For the whole encephalon is interwoven with these intricately divided arteries, many of whose branches end in its ventricles, just as many of the veins do that descend from the crown of the head. Coming from the opposite direction, they encounter the arteries and are distributed as the arteries are into all the parts of the encephalon, both into the ventricles themselves and the other parts as well.

Gal. *UP* 9.4 (Helmreich 2.12,5–13,2 = K. 3.699–700; Helmreich 2.13,6–20 = K. 3.700–701)

Here we see exemplified the points already made about the central concept of "elaboration" and its connection with, and explanation in relation to, the design of particular structures in the body (a design which is of course understood by Galen in a strongly

18 May *ad loc.* mentions passages of Gal. *UP* 4.13, 7.22, 14.10 and 16.10 and Galen, *De semine* 1.12–14 as relevant.

| | Male Reproductive Organs | Brain |
|---|---|---|
| **Raw material** | Blood and pneuma | Vital pneuma |
| **Convoluted structure causing delay and elaboration** | Varicose plexus | *Rete mirabile* (Retiform plexus) |
| **Place of final elaboration** | Testes | Ventricles of brain |
| **Fine substance produced** | Semen | Psychic pneuma |

**Tab. 1** Physiological Function of Pneuma.

teleological, indeed providential, sense). We observe also (a point again well explored by Rocca[19]) the key role of analogical reasoning in the establishment of his views on pneuma and its physiological function. In the reference to semen and the testes, the aim is to present us with a clear parallel on all relevant points. The equivalences can be seen in Table 1.

In what immediately follows, we encounter a further aspect of Galen's explanations. Here, interestingly, he adds to the physiological account an explanation in terms of the straightforward physical properties of the substance contained in (and eventually expelled from) the vessels: the lightness of pneuma leads it upwards, the relative heaviness of the humours leads them downwards.

**T4** ἀλλ' ὥσπερ εἰς τὴν γαστέρα καὶ τὰ ἔντερα καθήκουσιν ἀρτηρίαι τε καὶ φλέβες πάμπολλαι, χολὴν μὲν καὶ φλέγμα καί τινας ἑτέρας τοιαύτας ὑγρότητας εἰς τὴν ἐκτὸς εὐρυχωρίαν ἀποχέουσαι, στέγουσαι δ' ἐντὸς ἑαυτῶν τό θ' αἷμα καὶ τὸ πνεῦμα τὸ ζωτικόν, οὕτως εἰς τὰς κατὰ τὸν ἐγκέφαλον κοιλίας αἱ μὲν φλέβες ὡσαύτως ἐκκρίνουσι μὲν τὰ περιττώματα, τὸ δ' αἷμα κατέχουσιν, αἱ δ' ἀρτηρίαι τὸ πνεῦμα καὶ μάλιστα πάντων ἀναπνεύουσιν. αὗται μὲν γὰρ ἐκ τῶν κάτωθεν ἀναφέρονται μερῶν, αἱ φλέβες δ' ἐκ τῆς κορυφῆς εἰς αὐτὸν καθήκουσι προνοησαμένης καὶ τοῦτο θαυμαστῶς τῆς φύσεως, ἵν' αἱ διεκπίπτουσαι τῶν κατ' αὐτὰς στομάτων οὐσίαι διεξέρχωνται τὸν ὅλον ἐγκέφαλον. ἔστ' ἂν μὲν γὰρ ἐν αὐτοῖς τοῖς ἀγγείοις ὦσι περιεχόμεναι, πάντη τοῦ σώματος ἅμ' ἐκείνοις ἴασιν· ἐπειδὰν δ' ἅπαξ αὐτῶν ἐκπέσωσι, κατὰ τὴν οἰκείαν ἑκατέρα φέρεται ῥοπήν, ἄνω μὲν ἡ κούφη τε καὶ λεπτή, κάτω δ' ἡ παχεῖά τε καὶ βαρεῖα.

Now just as very many arteries and veins extend to the stomach and intestines and pour out bile, phlegm, and other such humors into the free space outside

19 See Rocca 2003, esp. 211–217.

themselves, while retaining within themselves the blood and vital pneuma, so in the same way the veins expel the residues into the ventricles of the encephalon while retaining the blood; but the arteries most of all breathe forth the [vital] pneuma. For they come up from the parts below, whereas the veins descend into the encephalon from the crown of the head, Nature having marvellously made this provision too, in order that the substances escaping from their orifices may penetrate the whole encephalon. As long as they are contained in the vessels themselves, these substances travel with them into all parts of the body, but when they have once escaped from the vessels, each moves according to its own proper weight, the thin, light material passing up and the thick, heavy material down.

Gal. *UP* 9.4 (Helmreich 2.13,20–14,12 = K. 3.701–702)

And we see, further (again in the lines immediately following), how the nature of the anatomical structures co-operates with these physical properties of the substances in this process of providing psychic pneuma to the brain:

**T5** τῶν μὲν οὖν εἰς τὰ κατὰ τὴν κοιλίαν μόρια περαινουσῶν ἀρτηριῶν κατάντη τὴν θέσιν ἐχουσῶν οὐδὲν εἰς τὴν ὑποδεχομένην εὐρυχωρίαν ἐκπίπτει πνεῦμα, πλὴν ὅσον ἂν ὑπ᾽ αὐτῆς τῶν ἀγγείων τῆς ἐγεργείας προωθῆταί ποτε. τῶν δ᾽ εἰς τὸν ἐγκεφάλον ἀνάντης μὲν ἡ θέσις, ἐκρεῖ δ᾽ ἀεὶ τὸ καλῶς κατειργασμένον ἐν τῷ δικτυοειδεῖ πλέγματι, τοσοῦτον ἑκάστοτε ἐπιφερόμενον, ὅσον ἂν αἱ κατ᾽ αὐτὸ προπέμπωσιν ἀρτηρίαι. οὐ γὰρ δὴ καὶ ταύτας γε δύναται ταχέως διεξελθεῖν, ἀλλ᾽ ἴσχεται κατά τε τὰς ἄνωθεν κάτω καὶ τὰς εἰς τὸ πλάγιον ἐπιστροφάς τε καὶ καμπὰς πολλάς τε καὶ πολυειδεῖς οὔσας παντοίως ἀλώμενον. ὥστ᾽ ἐν ταύταις μὲν χρόνῳ παμπόλλῳ μένον κατεργάζεται, τὸ κατεργασθὲν δ᾽ εὐθέως ἐμπίπτει ταῖς κοιλίαις τοῦ ἐγκεφάλου. οὔτε γὰρ τοῦτ᾽ ἔτι μέλλειν ἐχρῆν οὔτε τὸ ἀκατέργαστον ἤδη φθανεῖν. καὶ οὐχὶ κατὰ τὰς κοιλίας μὲν αὐτὰς μόνον, οὐχὶ δέ γε καὶ καθ᾽ ὅλον οὕτω συνέφερεν ἔχειν τὸν ἐγκέφαλον, ἀλλὰ καὶ κατὰ τοῦτον οὐδὲν ἧττον.

Now since the arteries that end in the abdominal parts slant steeply downward, no pneuma escapes from them into the free space that receives them [the cavities of the intestinal tract], except what is forced out by the very action [the pulsation] of the vessels, but since the arteries ending in the encephalon slant steeply upward, as much pneuma, well elaborated in the retiform plexus, always flows out of them in a given length of time as the arteries in the plexus send forward. For indeed it cannot pass rapidly through them, but is held back, wandering in every direction, up, down, and to the sides, in the many intricate

turns and windings. Hence, remaining for a very long time in the arteries, the pneuma is elaborated, but when its elaboration is complete, it falls at once into the ventricles of the encephalon; for it ought not to be delayed longer, nor should it escape before it has been elaborated. And it was not expedient that this should happen only in the ventricles and not in the encepahlon as a whole; rather it should happen to the same degree in the encephalon as well.

Gal. *UP* 9.4 (Helmreich 2.14,12–15,4 = K. 3.702–703)

The concluding lines of T5 again focus on the length of time spent within the *rete mirabile* as crucial to the nature of the transformation.

The point is re-emphasized again in book 16.10 of *UP*; there, after another reminder of the process of elaboration of milk from blood in the breasts, and that of semen from blood in the testes,[20] Galen remarks:

**T6** φλέβες μὲν οὖν ἐν τῷδε τῷ χωρίῳ μόνον ἑλίττονται, ἀρτηρίαι δὲ κἀνταυθοῖ μὲν ὁμοίως ταῖς φλεψίν, ἐπὶ πλεῖστον δὲ κατὰ τὸ δικτυοειδὲς ὀνομαζόμενον πλέγμα τῆς αὐτῆς χρείας ἕνεκα. τρέφουσι γὰρ αὗται τὸ ψυχικὸν ἐν ἐγκεφάλῳ πνεῦμα πολὺ δή τι παραλλάττον τῇ φύσει πάντων τῶν ἄλλων πνευμάτων, ὥστ᾽ οὐδὲν θαυμαστὸν ἐπὶ πλεῖστον προπεπεμμένης καὶ προκατειργασμένης καὶ πάντα τρόπον ἠλλοιωμένης χρῄζειν αὐτὸ τροφῆς.

Now the veins are coiled only in this region, but the arteries are coiled here like the veins, and also very much so in the so-called retiform plexus [*rete mirabile*] for the very same reason. For in the encephalon these arteries nourish the psychic pneuma, the nature of which differs greatly from all other pneumas so that it is no wonder that it needs a nutriment very much concocted and elaborated beforehand and altered in every way.

Gal. *UP* 16.10 (Helmreich 2.420,13–21 = K. 4.323)

We notice here too the focus on *nourishment* of the psychic pneuma; other texts, too, describe the role of the arteries as performing this specific function of nourishment:

**T7** εἴη ἂν ... ἀρτηριῶν (*sc.* χρεία) ... φυλάττειν τε τὴν κατὰ φύσιν θερμασίαν καὶ τρέφειν τὸ πνεῦμα τὸ ψυχικόν ...

20 The parallels are made in more specific terms: semen requires *more* perfect elaboration of the blood than milk; therefore, in the case of the testes the process relies not just on length of vessels but also on their being intricately coiled.

> The usefulness ... of the arteries ... is to maintain the natural heat and nourish the psychic pneuma ...
>
> Gal. *UP* 1.16 (Helmreich 1.33,4–8 = K. 3.45–46)

As again discussed by Rocca[21], this description in terms of *nourishment* also involves an analogy, this time with the process of breaking-down of the blood which Galen describes (for example in *De naturalibus facultatibus*) in his account of digestion; this too is a process of "elaboration" or "processing".

So far we have seen a fairly consistent account of elaboration, albeit with some differences of detail as to how the stages of the process are described, and as to the precise locations in which it begins and ends. We have observed how this conception of elaboration – with its concomitant notion of an exceptionally fine end product residing in the brain (sometimes more specifically, in the ventricles of the brain) – emerges as central to Galen's account of psychic pneuma.

The distinct nature of pneuma – and in particular, of more "elaborated" pneuma – is emphasized, both by the anatomical-physiological account and by the account of its properties as a substance, in contrast to other substances. Outstanding or distinct physical properties ("light", "fine", "highly-processed") are associated by Galen with the ability of a substance to perform particularly sophisticated functions in the body.

Before proceeding to consider both the functioning of the psychic pneuma so produced and the relationship of that function to that of the vital pneuma, however, we must pause to address an apparent problem for this consistent account. For, having considered at some length texts that emphasize the drawn-out process of elaboration of inhaled air, and the stages of this process in the body, we must confront the fact that Galen seems in other texts to refer to a process of inhalation – also leading to the production of psychic pneuma – straight from nostrils to brain, without involving any of those other organs or processes.

A passage from *De utilitate respirationis* seems particularly problematic here; perhaps, though, we shall find that close attention to both verbal details and argumentative context of the passage will help solve the problem. In this text, in the context of a consideration of the nature of psychic pneuma, Galen engages with Erasistratus, who believed that the arteries contained pneuma *only*, and not also blood, thus assigning a very different role to the arteries to that assigned by Galen. Turning to the psychic pneuma, he says:

> **T8** πόθεν οὖν ἄλλοθεν ἕξει τὴν τροφὴν, εἰ μὴ παρὰ τοῦ διὰ τῆς εἰσπνοῆς ἑλκομένου; καίτοι κἀκ τῆς τοῦ αἵματος ἀναθυμιάσεως οὐκ ἀπεικὸς αὐτὸ τρέ-

21 See n. 19 above.

φεσθαι, καθάπερ καὶ πολλοῖς τῶν ἐλλογίμων ἰατρῶν τε καὶ φιλοσόφων ἔδοξεν. ἀλλ' οὐδ' ἐκ τῆς εἰσπνοῆς ὁμοίως οἱ περὶ τὸν Ἐρασίστρατον τοῖς <περὶ τὸν> Ἱπποκράτην τρέφεσθαί φασι τὸ ψυχικὸν πνεῦμα· τοῖς μὲν γὰρ ἐκ τῆς καρδίας διὰ τῶν ἀρτηριῶν ἐπὶ τὰς μήνιγγας, τοῖς δὲ εὐθὺς διὰ τῶν ῥινῶν εἰς τὰς κατὰ τὸν ἐγκέφαλον κοιλίας ἔρχεσθαι τὸ πνεῦμα δοκεῖ.

τὴν μὲν οὖν Ἐρασιστράτου περὶ τούτων δόξαν κἀνταῦθα καταλίπωμεν, ἐξελεγχομένην πολυειδῶς ...

... τὸ μὴ πάνυ τι δεῖσθαι τοῦ παρὰ τῆς καρδίας πνεύματος τὸν ἐγκέφαλον. ἀπολείπεται γοῦν ἤτοι τὴν ἀναθυμίασιν αὐτῷ τὴν ἐκ τοῦ αἵματος ἱκανὴν ὑπάρχειν <ἢ τὴν> διὰ τῶν ῥινῶν εἰσπνοήν. ... ἀναγκαῖον <οὖν> ἐκ τῆς διὰ τῶν ῥινῶν εἰσπνοῆς τῆν πλείστην εἶναι τροφὴν τῷ ψυχικῷ πνεύματι.

From what other source, therefore, will it [*sc.* the psychic pneuma] get nourishment unless from that which is drawn in while breathing in? But it is not improbable that it may be nourished also from the vapor rising from the blood, as has seemed true to many distinguished physicians and philosophers. But Erasistratus and his school do not say that the psychic pneuma is nourished by what is breathed in, in the same way as does the school of Hippocrates. For to the former the pneuma appears to come from the heart through the arteries to the membranes of the brain, to the latter, to come directly through the nostrils into the hollows in the brain.

And here too let us leave alone the opinion of Erasistratus on this matter, for it was refuted in many ways ...

... the brain does not at all need the pneuma from the heart. It is accepted that either the vapor rising to it from the blood is sufficient, or what is inhaled through the nostrils ... it must be that it is for the most part from breathing in through the nostrils that the nourishment comes for the psychic pneuma.

Galen, *De utilitate respirationis* 5.1–2 (Furley/Wilkie 120–124 = K. 4.502–504)[22]

The notion that there is a direct connection between the nasal passages and the ventricles of the brain, through which pneuma passes, is consistent with Galen's anatomical views expressed elsewhere.[23] The relationship between the directly-inhaled pneuma suggested by T8 and that supplied in the complex process we have seen – and in particular, the

22 Translations from both *De utilitate respirationis* and *De usu pulsuum* are those of Furley and Wilkie 1984. With T8 one may compare also Galen, *De methodo medendi* 12.5 (K. 10.839).

23 See e.g. Gal. *PHP* 7.4.6 (De Lacy 448,32–33 = K. 5.613), 7.5.45 (De Lacy 462,13–17 = K. 5.628).

relationship of these two accounts of inhalation – may be puzzling and ultimately less than clear, especially regarding the evaluation given of "the pneuma from the heart" at the end of T8. Perhaps, however, such a view is not ultimately in contradiction with the "standard view". After all, a final role for the ventricles of the brain in elaboration of psychic pneuma is part of that view; and, although it seems odd that this other, "direct", source is not mentioned in the passages considered above, one may, perhaps, think in terms of some sort of process of combination of pneuma from the two sources, in this final elaborative process within the brain.[24]

What is problematic here, however, is that Galen at least seems explicitly to polemicize against something very like the view he has elsewhere outlined at some length – a pathway involving heart, arteries and structures at the base of the brain – in favour of one involving the nasal passages alone.

We may also place alongside this some material from *De usu pulsuum* (a text closely connected with *De utilitate respirationis*, there being a number of explicit cross-references between them). In chapter 2 of that work Galen says, defining the purpose or function of breathing:

> **T9** ... τὴν δὲ ἑτέραν, τὴν ἐλάττονα, θρέψιν τοῦ ψυχικοῦ πνεύματος. ἀλλ' εἰς ἄμφω ταῦτα παρὰ τῆς διὰ τῶν ῥινῶν εἰσπνοῆς ὠφελεῖσθαι τὸν ἐγκέφαλον ἐλέγομεν. ὥστ' οὐδὲν θαυμαστόν, ὀλίγης αὐτῷ παρὰ καρδίας χορηγουμένης τῆς ἐπικουρίας, ὀλίγην εἶναι καὶ τὴν βλαβήν, τῶν καρωτίδων λεγομένων ἀρτηριῶν βρόχοις διαληφθεισῶν.
>
> ... the other, the less important [*sc.* use of breathing], the nourishing of the psychic pneuma. We said that the brain profits by the inbreathing through the nostrils in respect to both of these. ... since little profit is supplied to it [the brain] from the heart, it suffers but little harm if the arteries called "carotids" are ligatured.
>
> Galen, *De usu pulsuum* 2 (Furley/Wilkie 198 = K. 5.154)

Galen seems to be denying a role to the arteries and heart or at least, in the latter passage, downplaying the role of the heart.

24 We might in this context consider a further text from *De usu partium*, on the role of the anterior ventricles of the brain in relation to inhalation and exhalation of air: "The two anterior [lateral] ventricles perform inspiration, expiration, and the blowing out of breath from the encephalon. ... I have also shown that they elaborate and prepare the psychic pneuma for it" (αἱ μὲν δὴ πρόσθιοι δύο τήν τ' εἰσπνοὴν καὶ τὴν ἐκπνοὴν καὶ τὴν ἐκφύσησιν ἐργάζονται τὴν ἐξ ἐγκεφάλου ... ἀποδέδεικται δὲ καὶ ὅτι προκατεργάζονταί τε καὶ προπαρασκευάζουσιν αὐτῷ τὸ ψυχικὸν πνεῦμα.), Gal. *UP* 8.10 (Helmreich 1.481,6–10 = K. 3.663). Again, though, this seems less problematic for the "standard view," which does allow a role to the brain and its ventricles.

Let us, however, look at T8 a little more closely, remembering that Galen's particular target here is Erasistratus' position, and that that position involves arteries filled only with pneuma, and carrying that pneuma to other parts of the body, with the heart as the source of that motion. Although the end of T8 does, at least at first sight, look very like a refutation of views expressed by Galen himself elsewhere, let us look at the argument of this passage stage by stage. The first sentence asserts (at least rhetorically) that inhalation is the only source of pneuma. But that does not unequivocally mean inhalation direct to the brain; and the next sentence adds another source as "not improbable", and as having "seemed true to many distinguished physicians and philosophers": vaporization from the blood. This, of course, is directly in line with what was said in T1 above. The problems begin with the next sentence, which sets up a distinction between an Erasistratean view and a Hippocratic one on the nature of inhalation. Apart from the fact that we would, on the grounds of his usual affiliation, expect Galen to be supporting (what he takes to be) the Hippocratic view (inhalation direct to the brain), he then proceeds in the next sentence to describe the Erasistratean position as thoroughly refuted elsewhere (he refers here to *De causis pulsuum*, though as Furley points out the true reference seems to be to *De usu pulsuum*).

The fact, however, that the Erasistratean view "on these matters" is attacked does not mean – though a surface reading of the passage would give one this impression – that only pneuma inhaled directly to the brain is relevant. Galen's first point is that inhalation, in general, is the only source; he then also adds vaporization from the blood. This is all in fact consistent with the standard view; what is being attacked is not *any* notion involving a role for heart and arteries in the generation of psychic pneuma, but the specifically Erasistratean scheme which sees the heart as the source of pneuma, including for the brain, and the arteries as vessels whose primary role is to convey this pneuma, rather than to convey blood and pneuma combined.

A further aspect of the context of both these texts needs to be understood: both are concerned with an experiment whereby the arteries communicating from heart to brain are ligated, but the animal is able both to breathe and to move without hindrance. This experiment is related also in *PHP*, where it provides Galen with clear support for his thesis that the heart is not the source of voluntary motion. In our present contexts, the focus is rather on a different conclusion: the independence of the brain and, in particular, of the psychic pneuma; their non-reliance on the heart for the performance of their proper functions. Galen, in fact, expresses himself amazed at the outcome of the experiment, the conclusion of which leads him to the affirmation:

T10 τὸ μὴ πάνυ τι δεῖσθαι τοῦ παρὰ τῆς καρδίας πνεύματος τὸν ἐγκέφαλον.

that the brain does not at all need the pneuma from the heart.

Gal. *Ut. Resp.* 5.2 (Furley/Wilkie 122 = K. 4.503)

He immediately carries on, however, to reassert the possibility of vaporization from the blood as a source – although he does then suggest the conclusion that inhalation from the nostrils is the largest source of nourishment for psychic pneuma, precisely on the grounds that the this rising vaporization (via the arteries) must run out when the arteries are ligated.

On the basis of this text Rocca[25] has suggested a harmonization of Galen's views along the following lines: inhalation through the lungs, with the attendant processes discussed above as the "standard" position, and inhalation direct to the brain are considered as a dual source of nourishment for psychic pneuma, whose final elaboration is in the ventricles of the brain. Since, however, the psychic pneuma is a finite commodity, and is used up in the processes of voluntary motion, the former source is likely to run out at times when the animal is being particularly active, and will then need to be supplemented by more directly inhaled air.

It seems undeniable that Galen's account, especially in these two texts on the function of breathing and on that of the pulse, is less than wholly clear. In fact, in *De usu pulsuum* he seems to present something like the reverse of the above analysis: psychic pneuma is indeed liable to run out; in particular, one would expect it to do so when the arteries are ligated; the reason that the animal does not immediately collapse in such a situation is, in fact, precisely the delay in the process of the pneuma traversing the *rete mirabile*. So, we are in that case back with the standard view, with the air from the lungs as the main source – and even as the main source in cases where the arteries are cut off.

What does seem clear, at least, is that – in spite of an undeniably confusing presentation, in the context of his polemic against Erasistratus, and perhaps some genuine vacillation on the exact position – Galen is not, even in these two texts, denying *any* role to the arteries and heart in the production of psychic pneuma. Rather, he is concerned to refute a distinct position of Erasistratus' which – by denying the presence of blood in the arteries and thus of a role for arterial blood-pumping – gave both heart and arteries a fundamentally different role in relation to pneuma and the bodies' activities.

As we shall see, however, in what follows – and in a way not uncharacteristic of Galen – the attack on Erasistratus on these explicit points seems to mask what is in reality a very considerable indebtedness to that author's anatomical investigations and theories.

25 See Rocca 2003, 231–237.

## 3 The functioning of psychic pneuma

As discussed especially in *PHP*, psychic pneuma functions as an instrument or organ of the soul (on which formulation see further below), present in the ventricles of the brain and in nerves, and involved in the functions of perception and voluntary motion. We shall consider below the possible sources of Galen's notion of psychic pneuma, in particular in Stoic thought and in Hellenistic anatomy (in particular, that of Herophilus and Erasistratus). It will emerge that Galen's theory, centrally involving the notion of nerves as pathways down which the pneuma is transmitted, is much closer to the latter than to the former.

In the following three texts, we see how the notion of nerves as hollow channels seems to have motivated him to the view that pneuma may function as an agent of communication: it does so by passing through these channels. We also see that he is drawing on previous anatomical work, in particular that of Herophilus, for this notion.

**T11** πρὸς τοῦτ' οὖν τὸ πέρας τῶν κοιλιῶν ἀνήκει τῶν ὀπτικῶν νευρῶν ἡ ἀρχὴ τρῆμα δυσθεώρητον ἔχουσα ... ὅτι μὲν οὖν φέρεταί τι πνεῦμα διὰ τῶν πορῶν τούτων ἐπὶ τοὺς ὀφθαλμούς, ἥ τε κατασκευή σε διδάσκει ...

The beginning of the optic nerves, which has a perforation that is difficult to see, extends to this end of the ventricles. ... That a pneuma is carried through these passages to the eyes you learn from the structure ...

Gal. *PHP* 7.4.8–11 (De Lacy 450,1–11 = K. 5.613–614)

**T12** δοκεῖ δέ μοι τὸ ἀπ' ἐγκεφάλου καταφερόμενον ἐπὶ τὸν ὀφθαλμὸν νεῦρον, ὃ δὴ καὶ πόρον ὀνομάζουσιν οἱ περὶ Ἡρόφιλον, ὅτι τοῦτο μόνον φανερόν ἐστι τὸ τρῆμα, πνεύματος ὑπάρχειν ὁδὸς αἰσθητικοῦ.

The nerve which proceeds down from the brain to the eye – which Herophilus and his followers in fact also call a "passage", because its perforation [*lumen?*] alone [*sc.* unlike that of other nerves] is clearly visible – seems to me to exist as a pathway for sensory pneuma.

Galen, *De symptomatum causis* 1.2 (K. 7.88–89)[26]

**T13** τῶν γὰρ ἐπὶ τοὺς ὀφθαλμοὺς ἀπ' ἐγκεφάλου κατιόντων νεύρων τῶν αἰσθητικῶν, ἃ δὴ καὶ πόρους ὠνόμαζεν Ἡρόφιλος, ὅτι μόνοις αὐτοῖς αἰσθηταὶ καὶ σαφεῖς εἰσιν αἱ τοῦ πνεύματος ὁδοί ...

26 Translation by von Staden 1989, 203.

> As regards the sensory nerves that descend to the eyes from the brain, which Herophilus in fact also calls "passages" since they alone have clear, perceptible paths for the *pneuma* ...
>
> Gal. *UP* 10.12 (Helmreich 2.93,10–14 = K. 3.813)[27]

Now, it is true that Galen is not certain as to whether *all* nerves are hollow, as he believes the optic nerve to be. For the same reason, it is therefore also not clear whether one should envisage the communication carried out by pneuma as involving (i) the physical movement of pneuma through the nerves, or rather (ii) a "qualitative change of continuous parts" or "transmission of power" – an explanation, that is, of how a substance may affect the substance next to it without itself moving (as, say, in the conduction of heat). That is the main issue at stake in the following passage:

> **T14** πότερον ... ἡγητέον ἐστὶ καὶ καθ' ἕκαστον νεῦρον εἶναί τι πνεῦμα; καὶ πότερον ἐγχώριόν γέ τι καὶ σύμφυτον αὐτοῖς εἶναι τοῦτο, πληττόμενον ὑπὸ τοῦ παρὰ τῆς ἀρχῆς ἥκοντος ὥσπερ ἀγγέλου τινός, ἢ σύμφυτον μὲν ἔνεστιν αὐτοῖς οὐδέν, ἐπιρρεῖ δ' ἐξ ἐγκεφάλου κατ' ἐκεῖνον τὸν καιρὸν ἐν ᾧ κινῆσαι προαιρούμεθα τὸ μέρος; ἐγὼ μὲν οὐκ ἔχω προχείρως ἀποφήνασθαι, προκείσθω δ' ἐν κοινῷ σκοπεῖσθαι καὶ ταῦτα μὲν ἄμφω τὰ νῦν εἰρημένα καὶ πρὸς τοῖσδε τρίτον ἡ κατὰ ποιότητα τῶν συνεχῶν ἀλλοίωσις, ὅπερ αἰνιττεῖσθαί μοι δοκοῦσιν οἱ κατὰ δύναμιν ἐπιρρεῖν τινα χωρὶς οὐσίας φάσκοντες. αἱ γὰρ κατ' ἀλλοίωσιν εἰς τὰ συνεχῆ σώματα διαδόσεις τῶν ποιοτήτων ἐπιρροαὶ δυνάμεως ὑπ' αὐτῶν λέγονται, καθάπερ ὅταν ἐπὶ τοῦ περιέχοντος ἀέρος ἐκ τῆς ἡλιακῆς αὐγῆς ὁρμηθεῖσά τις ποιότη<το>ς εἰς ἅπαν αὐτοῦ μέρος ἀφικνῆται διάδοσις, αὐτῆς τῆς οὐσίας τοῦ ἡλίου μενούσης κατὰ χώραν ...
>
> ... should we ... suppose that there is also a certain pneuma in each nerve? And should we suppose that this pneuma is something local and native to the nerves, being struck by the pneuma that comes like a messenger from the source (of power), or is there no native pneuma in them, and does it rather flow in from the brain at that moment when we choose to move the member? I have no ready answer. Let these two alternatives be investigated in common, and in addition to them a third, the qualitative change of continuous parts, a view that seems to me to be hinted at by those who say that the flow is by virtue of some power without substance. The transmission of qualities to continuous bodies by alteration they call a flow of power, as when the in the surrounding

27 Translation by von Staden 1989, 317–318. See von Staden 1989, 252, for discussion.

air some transmission of quality sets out from the light of the sun and reaches every part of the air, while the actual substance of the sun remains in its place.

Gal. *PHP* 7.4.1–2 (De Lacy 448,4–18 = K. 5.611–612)

What is clear, however, is that the way in which the psychic pneuma operates, both in transmitting "voluntary motion" and in controlling or responding to the organs of perception, is by some kind of transmission of pneuma – either of its actual physical movement or of its "transmission of quality" – down distinct, empirically observable channels: the nerves. We are reminded too, by the reference to Herophilus in T12, that such a theory is intimately connected with and dependent on the findings, and probably the theories, of Galen's predecessors in anatomy.[28]

## 4 The dubious role of vital pneuma

When one turns to the vital pneuma, on the other hand, one must admit that its precise function – indeed, its very existence – is, by Galen's own admission, much less clear.[29] One may say, on the basis of a range of texts, that it is somehow connected with vital *dynamis* (that is, with the ability to perform the functions essential to the maintenance of life), with pulse and with *tonos* (tension) in the body, and also with a range of emotions (*pathē*). An account of the latter in relation to pneuma follows closely after the passage cited below. But the nature of its physical functioning seems less than obvious; indeed, here, the very theory of pneuma seems to be called into question. It is perhaps relevant that this happens in a comparatively late work in Galen's output – where, also, the existence of a third, "natural", pneuma (not elsewhere part of his "system") is very tentatively proposed.[30] At any rate, both facts – taken in conjunction with the consideration that vital pneuma seems, in the "standard-view" texts with which we started, to be considered mainly in its function as a preliminary elaboration on the way towards psychic pneuma – bespeak a less important, less well-developed, role for this substance.

**T15** τοῦ μὲν δὴ ψυχικοῦ πνεύματος ἐναργῶς ἐδείξαμεν οἷον πηγήν τινα οὖσαν τὸν ἐγκέφαλον, ἀρδομένου καὶ τρεφομένου διά τε τῆς εἰσπνοῆς καὶ τῆς ἐκ

28 But whether Herophilus himself had a developed psychic-pneuma theory, in particular one which performed all the same functions as Galen's, is not completely clear on the basis of the surviving fragments (see von Staden 1989, esp. 254–259, and Tieleman 1996 (esp. 33 and 63), who denies the terminology to Herophilus but attributes it to Diocles of Carystus).

29 Further on Galen's vital pneuma, see the chapter by Trompeter in this volume.

30 On the dubious status of this third pneuma in Galen, on the one hand, and its substantial *Nachleben*, on the other, see Temkin 1951.

τοῦ δικτυοειδοῦς πλέγματος χορηγίας. τοῦ δὲ ζωτικοῦ πνεύματος οὐχ ὁμοίως μὲν ἐναργῶς ἡ ἀπόδειξις ἦν, οὐ μὲν ἀπίθανόν γε κατά τε τὴν καρδίαν αὐτὸ καὶ τὰς ἀρτηρίας δοκεῖν περιέχεσθαι, τρεφόμενον καὶ τοῦτο μάλιστα μὲν ἐκ τῆς ἀναπνοῆς, ἤδη δὲ καὶ τοῦ αἵματος. εἰ δέ ἐστί τι καὶ φυσικὸν πνεῦμα, περιέχοιτ' ἂν καὶ τοῦτο κατά τε τὸ ἧπαρ καὶ τὰς φλέβας. εἴρηται δὲ ἐπὶ πλεῖστον ὑπὲρ οὐσίας δυνάμεων ἐν τοῖς Περὶ τῶν Ἱπποκράτους καὶ Πλάτωνος δογμάτων.

Now I showed clearly that the brain is a fount, as it were, of the psychic *pneuma* which is refreshed and nourished by the inspiration of air and from what the netlike plexus arrangement (*rete mirabile*) provides. My demonstration concerning the vital *pneuma* was not, however, similarly clear. It is certainly not implausible that it seems to be contained in the heart and arteries, this too being nourished particularly from the respiration, but now from the blood as well. If there is a physical *pneuma*, it too would be contained in the liver and the veins. There was a very full discussion of the substance of *capacities* [my italics] in my work *On the Opinions of Hippocrates and Plato.*

Galen, *De methodo medendi* 12.5 (K. 10.839–840,
tr. Johnston and Horsley, with slight changes)

It is also worth noting, in relation to the cross-reference to *PHP* here, that *pneuma zōtikon* is explicitly mentioned in only three passages in that work, two of them involving either just the attribution of a view to Erasistratus or the mention of the concept in a dialectical context. In book 2, for example, Erasistratus is credited with the view that the brain is the source of psychic, and the heart of vital, pneuma[31]; and the remaining argument on vital pneuma in this same passage does not explicitly commit Galen to its existence: "even if they (*sc.* Aristotle, Chrysippus and their followers) say that vital pneuma has its source in the heart, it will not necessarily follow that psychic pneuma has the same source". We may, I think, conclude, not just that vital pneuma is not a fully developed concept in Galen's physiology, but also that in his mention and/or use of the term he is drawing on Erasistratus.[32]

31 Gal. *PHP* 2.8.38 (De Lacy 164,13–16 = K. 5.281); cf. *PHP* 1.6.3 (De Lacy 78,24–26 = K. 5.185)

32 See von Staden 1989, 527, n. 23 for further references, and for the "vital"–"psychic" distinction as "Stoic and Erasistratean"; in the context of physiological-anatomical explanation, I suggest, it is clearly Erasistratean.

## 5 The sources: Stoic influence?

I have already argued that Galen's understanding of psychic pneuma, involving as it does specific anatomical structures and pathways of transmission, belongs within a system of explanation which is close to – and which indeed draws upon – those of his anatomical predecessors. There is, however, another possible link to be drawn, namely with Stoic views. These must be taken seriously, in view of two considerations in particular: first, that the well-known Stoic view of a number of capacities, which may also be understood as pneumata, extending through the body from a single command-centre, seems at least superficially close to the model which Galen proposes for the functioning of brain and nerves; secondly, Galen's willingness to consider (at least) the possibility that the soul may actually *be* pneuma – a view otherwise evinced by Stoic thinkers.

I believe, however, that a close examination of those Stoic texts which most clearly lay out their views in this area will support my contention that those views are in their fundamental nature different from Galen's. Let us now consider those texts which are usually taken to shed most light on early Stoic thinking[33] on the *hēgemonikon* and its faculties, and on their relationship with pneuma. I start (T16–20) with the five main such texts, which I will then discuss together.

**T16** οἱ Στωϊκοὶ ἐξ ὀκτὼ μερῶν φασι συνεστάναι (*sc.* τὴν ψυχήν), πέντε μὲν τῶν αἰσθητικῶν, ὁρατικοῦ ἀκουστικου ὀσφραντικοῦ γευστικοῦ ἁπτικοῦ, ἕκτου δὲ φωνητικοῦ, ἑβδόμου <δὲ> σπερματικοῦ, ὀγδόου <δ'> αὐτοῦ τοῦ ἡγεμονικοῦ, ἀφ' οὗ ταῦτα πάντα ἐπιτέταται διὰ τῶν οἰκείων ὀργάνων προσφερῶς ταῖς τοῦ πολύποδος πλεκτάναις.

The Stoics state that the soul is composed from eight parts: the five perceptual ones – sight, hearing, smell, taste and touch – the sixth that of speech, the seventh the generative and the eighth the *hēgemonikon* itself, from which all are extended through their appropriate instruments, similarly to the tentacles of an octopus.

Ps.-Plutarch, *Placita philosophorum* 4.4, 898e–f (= *SVF* 2.827)

**T17** οἱ ἀπὸ Ζήνωνος ὀκταμερῆ τὴν ψυχὴν [δια]δοξάζουσι ... ἐν τῷ ἡγεμονικῷ ἐνυπαρχουσῶν φαντασίας, συγκαταθέσεως, ὁρμῆς, λόγου.

33 These texts, all of which appear in von Arnim's *Stoicorum Veterum Fragmenta*, are passages from a variety of later authors relaying the views, sometimes of particular named Stoic philosophers, but more often of "the Stoics." One should caution that this lack of specificity of attribution creates a methodological problem for the historian.

The followers of Zeno opine that the soul has eight parts ... in the *hēgemonikon* are representation, assent, impulse and reason (*or* speech).

Iamblichus, *De anima* apud Stobaeum, *Eclogae* 1.49.34
(Wachsmuth 369,6–9 = *SVF* 2.831)

**T18** οἱ Στωϊκοί φασιν εἶναι τῆς ψυχῆς ἀνώτατον μέρος τὸ ἡγεμονικὸν τὸ ποιοῦν τὰς φαντασίας καὶ συγκαταθέσεις καὶ αἰσθήσεις καὶ ὁρμάς· καὶ τοῦτο λογισμὸν καλοῦσιν. ἀπὸ δὲ τοῦ ἡγεμονικοῦ ἑπτὰ μέρη ἐστὶ τῆς ψυχῆς ἐκπεφυκότα καὶ ἐκτεινόμενα εἰς τὸ σῶμα καθάπερ αἱ τοῦ πολύποδος πλεκτάναι· τῶν δ' ἑπτὰ μερῶν τῆς ψυχῆς ... ἡ μὲν ὅρασίς ἐστι πνεῦμα διατεῖνον ἀπὸ τοῦ ἡγεμονικοῦ μέχρις ὀφθαλμῶν, ἀκοὴ δὲ πνεῦμα διατεῖνον ἀπὸ τοῦ ἡγεμονικοῦ μέχρις ὤτων, ὄσφρησις δὲ πνεῦμα διατεῖνον ἀπὸ τοῦ ἡγεμονικοῦ μέχρι μυκτήρων, γεῦσις δὲ πνεῦμα δ. ἀ. ἡ. μ. γλώττης, ἁφὴ δὲ πνεῦμα δ. ἀ. ἡ. μ. ἐπιφανείας ... σπέρμα ... καὶ αὐτὸ πνεῦμά ἐστι δ. ἀ. ἡ. μ. τῶν παραστατῶν· τὸ δὲ φωνᾶεν ... ὃ καὶ φωνὴν καλοῦσιν, ἔστι πνεῦμα δ. ἀ. ἡ. μ. φάρυγγος καὶ γλώττης ...

The Stoics say that the highest part of the soul, the *hēgemonikon*, is the maker of (mental) representations and assent, perceptions and impulses. They call it "reasoning". From the *hēgemonikon*, there are seven parts of the soul which have grown out of it and stretch out into the body, just like the tentacles of the octopus. Of the seven parts of the soul ... sight is pneuma extending out from the *hēgemonikon* as far as the eyes; hearing is pneuma extending out from the *hēgemonikon* as far as the ears; smell is pneuma extending from the *hēgemonikon* as far as the nostrils; taste is pneuma extending from the *hēgemonikon* as far as the surface ... seed ... is also pneuma, extending from the *hēgemonikon* as far as the testicles; and the "vocalization" ... which they also call "voice", is pneuma extending from the *hēgemonikon* as far as the throat and tongue ...

Ps.-Plut. *Plac.* 4.21, 903a–c (= *SVF* 2.836, tr. Coughlin,
with slight alterations in Kornmeier 2016, 20)

**T19** μέρη δὲ ψυχῆς λέγουσιν ὀκτώ, τὰς πέντε αἰσθήσεις καὶ τοὺς ἐν ἡμῖν σπερματικοὺς λόγους καὶ τὸ φωνητικὸν καὶ τὸ λογιστικόν.

The say that the parts of the soul are eight: the five senses and our reproductive principles and the vocal and the rational.

Diogenes Laërtius, *Vitae philosophorum* 7.157 (= *SVF* 2.828)[34]

34 See, similarly, Porphyry, *De anima* apud Stobaeum, *Ecl.* 1.49.25a (Wachsmuth 350,13–18 = *SVF* 2.830).

**T20** πνεύματα γὰρ ἀπὸ τοῦ ἡγεμονικοῦ φασιν οὗτοι διατείνειν ἄλλα κατ᾽ ἄλλα, τὰ μὲν εἰς ὀφθαλμούς, τὰ δὲ εἰς ὦτα, τὰ δὲ εἰς ἄλλα αἰσθητήρια.

For they (*sc.* the Stoics) state that pneumata extend from the *hēgemonikon* – different ones to different parts, some to the eyes, some to the ears, some to other organs of sense.

Iamblichus, *De anima* apud Stobaeum, *Ecl.* 1.49.33
(Wachsmuth 368,14–16 = *SVF* 2.826)

All these texts distinguish different parts of the soul; in T16–19 these are explicitly called "parts" and identified as eight in number, while T16 and T18 add the image of the octopus[35]; all explicitly identify the *hēgemonikon* (except for T19, where the term *logistikon* may be taken as equivalent); all, except for T17 and T19, have the notion of this *hēgemonikon* as a centre from which a number of other soul faculties "extend out" or communicate with the body. T18 and T20 explicitly equate these faculties, parts or forms of soul which extend through the body with different pneumata.

Those sources which use the octopus-image, or in general the eight parts of the soul, are quite consistent in identifying the eight as: the five senses; the spermatic or reproductive; speech or *logos*; and the *hēgemonikon* itself. The image of "tentacles" or "web" is used to explain the way in which perceptions arrive at the soul's "command centre", and also to account for speech and reproduction.

The view of the *hēgemonikon* which we see in these texts, as a psychological "command centre" for a number of faculties through which it communicates with the rest of the body, may seem to have much in common with the Galenic picture. But note – as a first and very significant departure from Galen's understanding – that this image, and indeed this eight-part division of the soul, are not used to give an account of voluntary motion, which does not appear at all in this context. T17 and T18, to be sure, place both impulse (*hormē*) and assent (*sunkatathesis*) in the *hēgemonikon*, as one would expect; these conceptual items would, indeed, on a Stoic scheme, be those responsible for what Galen calls "voluntary motion". But there is no sense that impulse and assent are part of the elaborate system described by the octopus image: in other words, the commands for voluntary action do not, according to these texts, involve transmission of information from the *hēgemonikon* through the "tentacles" or eight-part system; impulse and assent – indeed, the whole Stoic theory of action – are simply not part of this explanatory account based on the "extending out" of pneuma.

35 For the details and oddities of the octopus image (including the oddity that the octopus in question seems to have seven tentacles), as well as a good discussion of Stoic soul division more broadly, see Inwood 2014.

Now in fact Galen, in putting forward his own account of the *hēgemonikon* in terms of voluntariness, claims that the Stoics themselves accept his definition of the *hēgemonikon*: it is the "source of perception and impulse."[36] But the fact, if it is so, that this is a Stoic characterization of the *hēgemonikon* does not, however, undermine my argument in what follows: certainly, the *hēgemonikon* must be responsible for voluntary motion, for the Stoics. But this does not entail that the *hēgemonikon* is seen as transmitting the commands for motion, via pneuma, as in Galen's system.

Quite how such "commands" are transmitted, in early Stoic thought, may be difficult to ascertain. It seems possible, on the basis of other Stoic texts that present different levels of tension of the pneuma as explanatory of various natural phenomena, that some such notion – an increased pneumatic tension pervading the whole body, rather than a bit of pneuma sent down a particular channel in the body – is more likely to represent the model of explanation here.[37] The fact remains that, explicitly at least, the "voluntary motion" part of what Galen says is done by the *hēgemonikon* is not a feature of the eight-part, pneuma-related scheme attested in these texts.

Let me try to be clearer about what I am and am not arguing in relation to the Stoic view. While voluntary motion is undoubtedly part of what the *hēgemonikon* is responsible for according to our Stoic authors, its operation is not incorporated in a scheme of transmission of commands, via pneuma, along channels – even to the extent that the tentacles of the octopus in the metaphor can, indeed, be interpreted as channels. Such transmission *is* used to account rather for a range of other functions – sensation, reproduction, language – but not explicitly for voluntary motion in general.

It also seems undoubtedly the case that pneuma forms part of the Stoics' account of how the physical process of "voluntary motion" takes place. Again, though, it does not seem to be the case that the *hēgemonikon*, conceived as a physically located centre, is sending this pneuma out *via identifiable channels* in this process. A further text is worth considering here, albeit one which is even sketchier than the ones considered so far in relation to Stoic accounts of physiological process.

36 τὸ καταρχὸν αἰσθήσεώς τε καὶ ὁρμῆς, Gal. *PHP* 2.3.4 (De Lacy 110,1–2 = K. 5.219), where the use of the phrase ὡς αὐτοὶ βούλονται ("as they themselves would have it"), in conjunction with the use of the term *hormē*, suggests that Galen is actually quoting a Stoic definition here. It is important in this context to note his appropriation or adoption of Stoic technical vocabulary without consciousness of any possible problem of "translatability" between the Stoic model and his own: elsewhere in *PHP* he uses subtly varying vocabulary with the same (for him) underlying sense of "voluntary motion": τὸ καταρχὸν αἰσθήσεώς τε καὶ τῆς καθ' ὁρμὴν κινήσεως, Gal. *PHP* 7.1.7 (De Lacy 430,4 = K. 5.588); τὸ καταρχὸν αἰσθήσεώς τε καὶ κινήσεως τῆς κατὰ προαίρεσιν, *PHP* 8.1.1 (De Lacy 480,9–10 = K. 5.648–649), in this latter passage explicitly stating that it makes no difference whether one uses the term *hormē* or the term *proairesis*.

37 Cf., relatedly, Rocca's helpful discussion of the fundamental unlikeness between the Stoic and the Galenic understanding of pneuma, in its relation to the human body, emphasizing in particular that Stoic pneuma does not undergo qualitative change (as e.g. in the transformation from vital to psychic) and is not associated with specific parts of the body: Rocca 2003, 59–66.

> **T21** ... inter Cleanthen et discipulum eius Chrysippum non convenit quid sit ambulatio. Cleanthes ait spiritum esse a principali usque in pedes permissum, Chrysippus ipsum principale.
>
> Cleanthes and his pupil Chrysippus did not agree on what walking is. Cleanthes said it was breath extending from the commanding-faculty to the feet, Chrysippus that it was the commanding-faculty itself.
>
> Seneca, *Epistulae morales* 113.23 (= *SVF* 2.836, second text)

The position here attributed to Cleanthes *may*, perhaps, be thought to look something like the transmission-from-the-*hēgemonikon* model for voluntary motion which we find in Galen. On that attributed to Chrysippus, however (which is, after all, the one likely to have become orthodox in Stoicism and certainly that to which Galen is mainly responding), walking is somehow accounted for in terms of the motion of the *hēgemonikon* itself, rather than of any physical substance sent out from it. This must presumably be taken to mean, either that some transformation in the *hēgemonikon* itself in some sense *is* the action of walking, or that the *hēgemonikon* is *itself* conceived as somehow extending to parts of the body – for example to the feet in the action of walking. The latter may, indeed, be the most plausible way of understanding Seneca's account of Chrysippus in T21 (and perhaps also the notion of the *hēgemonikon* as one of the eight parts in T16).

The central contrast that I am aiming to highlight is that between pneuma operating, in the account of voluntary motion, as a substance with a clear central physical location, from which it is emitted along identifiable channels (Galen) and pneuma as a substance which may in some sense pervade the whole body, its transformations corresponding directly – though not necessarily in an anatomically defined way – to those of the *hēgemonikon* (which may also at least in some sense pervade the body).

It seems to me, further, that on any analysis of the T21 (even the Cleanthes part of it) – and consistently with the evidence of T16 – the notion of transmission *along channels* is absent from the Stoic account (and especially so in the case of the account of voluntary motion, as opposed to perception).[38]

Mention of channels – or rather their absence – leads me to the next point of departure. As already discussed, psychic pneuma, for Galen, has specific locations and

38 Cf. also n. 9 above: while Tieleman 1996, 83–86, argues for Chrysippus' adoption of Praxagoras' anatomy and theory of action, this seems to me a substantial overreading of the evidence. The texts there cited, esp. Gal. *PHP* 1.7.1 (De Lacy 82,11–14 = *SVF* 2.897, text 4), seems to justify only Chrysippus' mention of Praxagoras, in the polemical context of the enlisting of his doxographical support for cardiocentrism, and his use of the term neura in that same context. Moreover, this Galenic evidence has to be taken in conjunction with a passage a little earlier in the same text (Gal. *PHP* 1.6.12–13, De Lacy 80,18–24 = *SVF* 2.897, text 3), where Chrysippus is said to have confessed openly that he was unskilled in anatomical matters. On this see further Lewis 2017, 104, note to lines 5 and 7, 236, 280–283.

pathways, in a way related with his anatomical views. It seems central to his conception that it exists, at least primarily, in hollow spaces, and requires hollow, or at least partially hollow, channels down which to pass. The physics of pneuma are quite different in Stoic thought. Indeed, the common characterization of the Stoics as "physicalist" ("corporealist" is a more precise term, though I have retained the more conventional "physicalist") is in a sense quite misleading: they equate soul with the physical (or bodily) substance pneuma, but this is physicalism only according to a physics in which one body can totally pervade – that is, occupy the same space as – another, in a way which fundamentally alters the nature of that second body. And indeed, this "pervading" is something especially associated with pneuma. The relationship between this soul-pneuma and the rest of the body thus begins to look very like (what from a Platonist or Aristotelian perspective would be considered as) the relationship of form to matter, rather than that of one body to another. A couple of (admittedly hostile) texts will suffice to summarize this position. The conditional clause in both these texts refers to what is taken to be the – to the authors, thoroughly paradoxical – Stoic view.

**T22** ... εἰ ἡ ψυχὴ σῶμα, ἢ πῦρ ἢ πνεῦμα λεπτομερές ἐστι διὰ παντὸς διῆκον τοῦ ἐμψύχου σώματος.

If the soul is a body, it is either fire or a fine-parted *pneuma* pervading the whole of the ensouled body.

"Alexander," *Mantissa* (Bruns 115,6–7 = *SVF* 2.785; in an attack on the Stoic view)

**T23** ... εἰ σῶμα οὖσα ἡ ψυχὴ διῆλθε διὰ παντός ...

... if the soul is a body and permeates all ...

Plotinus, *Enneads* 4.7.8(2), Henry/Schwyzer 200,36 ( = *SVF* 2.799; again in an attack on Stoic soul-theory)

We may also in this context consider the "total mixture" of soul and body in *SVF* 2.826 (just before the Iamblichus passage quoted above).[39]

To the above passages on the Stoic *hēgemonikon*, finally, we may add one from Galen himself, which he presents as a direct quotation from Chrysippus. The passage in ques-

39 That Iamblichus passage evokes a metaphysically complex scenario, defining the soul's capacities (δυνάμεις) as properties of the substrate (τὸ ὑποκείμενον) and the soul as its "pre-substrate" substance (οὐσίαν προϋποκειμένην). The precise physical or metaphysical notions in play here are technical ones within a Neoplatonist discourse; and again we seem rather far from Galen's thoughts or speculations in this area.

tion, from book 3 of *PHP*, contains very similar material to T16–T20 above, with the seven parts understood as pneuma extending to the various sense organs and the *hēgemonikon* in the heart (and again no mention of the mechanism of voluntary motion); but the introductory words, before we get to these details, are also instructive:

**T24** ... λέγει· ἡ ψυχὴ πνεῦμά ἐστι σύμφυτον ἡμῖν συνεχὲς παντὶ τῷ σώματι διῆκον ἔστ᾽ ἂν ἡ τῆς ζωῆς εὔπνοια παρῇ ἐν τῷ σώματι.

He says: The soul is pneuma connate with us, extending as a continuum through the whole body as long as the free-flowing breath of life is present in the body.

Gal. *PHP* 3.1.10–11 (De Lacy 170,9–10 = K. 5.287 = *SVF* 2.885)

Again, we are reminded of the clearly non-anatomical, non-localized nature of the Stoic conception, and of the fact that it seems to have connotations belonging to a conceptual scheme fundamentally alien to Galen's. In case the contrast between anatomically-based and Stoic conceptions of pneuma argued for here is still found unconvincing, however, let us consider (finally on this point) a passage in which Galen himself appears to make that contrast quite explicit. The passage comes from Galen's *De propriis placitis*, and is one of several in that work in which the author states his own ignorance on the question of the substance of the soul (on which see further below), while at the same time identifying a divergence in the doxographical tradition, between the theory that it is incorporeal (attributed to Plato) and other, materialist theories.

**T25** ... περὶ τῆς οὐσίας αὐτῆς (*sc.* τῆς ψυχῆς) εἴτ᾽ ἀσώματός ἐστιν παντάπασιν ὡς ὁ Πλάτων ὑπελάμβανεν, εἴτε σωματοειδὴς ὡς ὁ Χρύσιππος οἴεται, πνεῦμα μὲν ἀποφηνάμενος ὑπάρχειν αὐτήν, **οὐ διορισάμενος δὲ σαφῶς, ὡς ὁ Ἐρασίστρατος διωρίσατο, πότερον αὐτὸ καθ᾽ αὑτὸ κατά τινος κοίλ<ου> ἐν τῷ τοῦ ζῴου σώματι περιέχεται τὸ πνεῦμα τὸ ψυχικὸν ἢ δι᾽ ὅλων διελήλυθεν τῶν στερεῶν σωμάτων**, καὶ πότερον κατα<τε>θραυσμένον, ὡς ὁ Ἐμπεδοκλῆς ὑποτίθεται τὴν ἐκ τῶν στοιχείων ὑπάρχειν ἡμῖν γένεσιν, **ἢ διὰ παντὸς μορίου τῶν στερεῶν <σωμάτων> τεταμένον, ὡς μηδὲν αὐτῶν εἶναι ψυχῆς ἄμοιρον**· ὅτι δὲ οὐδαμόθ<ι μ>ὲν σαφῶς που, διὰ παντὸς δὲ φαίνεται λέγων ταὐτά, δέδεικται δι᾽ ἑνὸς ὑπομνήματος, ὃ περὶ ψυχῆς αὐτὸς (*or* αὐτοῦ) πεποίημαι.

... so too with regard to the question of its substance: whether it is wholly incorporeal, as Plato supposed, or corporeal, as Chrysippus believes. The latter asserts that the soul is pneuma; *but he does not specify clearly, as Erasistratus did, whether the soul pneuma is contained separately, within some empty space of the body, or whether it pervades all the solid bodies*; nor whether it is divided into tiny parts,

> in accordance with Empedocles' view of our generation from the elements, *or extended through every part of the solid bodies, so that none is without some share in it*. The fact that he can be observed to say the same things throughout his work, but never clearly, has also been shown, in one book which I myself have produced on the [*or* his] soul.
>
> Galen, *De propriis placitis* 7 (Boudon-Millot/Pietrobelli 179,17–38, my emphasis)

There is quite a lot going on here, as well as a certain amount of textual uncertainty.[40] The main point of relevance for us, however, is that raised by the passages printed in italics in translation. In the first of these, Galen seems to be drawing a distinction of precisely the sort which I have outlined, between an Erasistratean view which understands psychic pneuma as contained in specific hollow anatomical structures, on the one hand, and a Chrysippean one whereby psychic pneuma pervades all solid parts of the body, on the other. To be more precise: Galen is stating that *it is not clear* whether the latter is the Chrysippean view, because Chrysippus expresses himself unclearly. Nonetheless, the conceptual contrast is clear – as, indeed, is the strong implication that Chrysippus *does* subscribe to such a "pervasion" view. Not only is the language used to characterize this second view distinctively Stoic, e.g. in the terms for "pervading" (διελήλυθεν) and "extension" (τεταμένον), as can be seen from the Stoic passages already cited (esp. T16, T18, T20-23); it is also language that echoes the view explicitly attributed to Chrysippus by Galen in T24. The point of the second passage in italics – although the argument here is admittedly brief and almost parenthetical – seems again to be that of offering a characterization which highlights the distinctiveness and oddity of Stoic thought, in this case of Stoic physics in general, not just the soul-theory. (And the purpose of Empedocles, in this context, seems to be to represent the more "normal" or mainstream tradition, to which Galen broadly subscribes, in contradistinction to this Stoic eccentricity.)

Finally, the mention of another work exposing Chrysippus' fallacies, or unclarities, although not entirely clear in its reference, is of interest, in the following way. The phraseology calls to mind a passage in *De foetuum formatione*, again claiming to have refuted Chrysippus in a separate work. In that case the reference is clearly to a work dedicated to *Chrysippus' treatise on the soul*; partly for that reason, I have tentatively suggested the emendation αὐτοῦ at the end of T25, which, even if odd Greek, seems to give the right sense: it is a work specifically about Chrysippus' soul theory that is in question (and it seems unclear, on the other reading, what is the point of emphasizing that

40 The text here printed is based on the *editio princeps* of the full Greek text in Boudon-Millot and Pietrobelli 2005, while adopting several corrections and improvements suggested by Lami 2010.

Galen *himself* (αὐτὸς) wrote the work). The immediate context of the *De foetuum formatione* passage, then, is perhaps informative. Galen has just given a doxographical list of a number of ways of understanding the process of conception, and in particular the relationship of soul and seed. There are those, he says, "who think that the seed itself is the craftsman – some, the whole of the seed, others rather the pneuma contained within it." And it is immediately following that sentence that we find the reference to the work on Chrysippus: "and I have written specifically about these matters in the book where I investigate Chrysippus' statements in his work on the soul".[41] We should not read too much into a passing reference; but it does seem possible, at least, that here the mention of a specifically Stoic – and metaphysically exalted or anomalous – role for pneuma has led Galen to refer to a text in which he may have refuted precisely such a Stoic doctrine.

Galen's understanding of pneuma in relation to soul and in relation to its functioning in the body, then, seems essentially different from that attested for the Stoics, both in detail and in fundamental approach.

The Galenic relationship with Aristotle might also be considered. But again, the distance between Galen's developed pneuma-theory and anything we find here is striking. It would be tedious to cite a lot of texts just to show the paucity of material in Aristotle that links pneuma to perception and motion;[42] one may simply note, in particular, that a central text for his account of the mechanism of motion, *De motu animalium*, gives just a very brief account of the role of pneuma in animal activity (even if it seems clear that pneuma is in some way a crucial part of that account);[43] and that there are no more than hints of a role for pneuma in sensation in the *De anima*.[44]

It is true that there are occasions, at least, where Galen reflects on an Aristotelian text in the context of his own theory of pneuma. In book 1 of *De semine*, he apostrophizes Aristotle, criticizing him for denying the continuing presence of semen in the uterus after conception:

> **T26** οὐδὲ γὰρ ὅτι πλῆρές ἐστι τοῦ πνεύματος τοῦ ζωτικοῦ, τοῦτο λέληθέ σε· σὺ γὰρ εἶ ὁ καλῶς εἰκάσας ἀφρῷ τὸ σπέρμα ... σὺ καὶ τὸν μῦθον οὐκ ἐμέμψω, τὴν Ἀφροδίτην ἐξ ἀφροῦ γεγενῆσθαι λέγοντα.

41 The relevant passage runs as follows: δοκεῖ γὰρ αὐτοῖς τεχνίτης αὐτος εἶναι τὸ σπέρμα, τισὶ μὲν ὅλον, ἐνίοις δὲ τὸ περιεχόμενον ἐν αὐτῷ πνεῦμα. καί μοι περὶ τούτων ἰδίᾳ γέγραπται κατά τε τὸ βιβλίον, ἐν ᾧ περὶ τῶν ὑπὸ Χρυσίππου λελεγμένων ἐν τοῖς Περὶ ψυχῆς αὐτοῦ γράμμασιν ἐπισκέπτομαι .... Galen, *De foetuum formatione* 6.29–30 (Nickel 104,7–11 = K. 4.699).

42 On the evidence for Aristotle's theories in the area of the soul and its functioning within the body – and on the difficulties of reaching clarity, in particular on his views of the mechanisms of perception and motion – see van der Eijk 1997 and van der Eijk 2000. See also Gregoric and Kuhar 2014.

43 Arist. *De motu an.* 10, 703a9–21.

44 Arist. *De an.* 2.8, 420b20 and 421b15.

> And this fact also did not escape you, that the semen is full of vital pneuma. You are the one who made the excellent comparison of semen to foam ... And you did not find fault with the myth that says that Aphrodite was born from foam.
>
> Gal. *Sem.* 1.5.18 (De Lacy 82,15–19 = K. 4.531, tr. De Lacy)

Here, it seems clear that Galen has in mind the following passage of *De generatione animalium*:

> **T27** ἔστι μὲν τὸ σπέρμα κοινὸν πνεύματος καὶ ὕδατος ... αἴτιον δὲ τῆς λευκότητος τοῦ σπέρματος ὅτι ἐστιν ἡ γονὴ ἀφρός ... ἔοικε δὲ οὐδὲ τοὺς ἀρχαίους λανθάνειν ἀφρωδὴς ἡ τοῦ σπέρματος οὖσα φύσις· τὴν γοῦν κυρίαν θεὸν τῆς μίξεως ἀπὸ τῆς δυνάμεως ταύτης προσηγόρευσαν.
>
> Semen, then, is a compound of *pneuma* and water ... The cause of the whiteness of semen is that it is foam ... That the natural substance of semen is foam-like was, so it seems, not unknown even in early days; at any rate, the goddess who is supreme in matters of sexual intercourse was called after foam.
>
> Arist. *Gen. an.* 2.2, 736a1–22 (tr. Peck)

But it is noteworthy here that Aristotle in this text made no mention, explicitly, of *vital* pneuma. Galen has – in line with what we may have come to expect in the light of our earlier argument – reflected back his own, post-Erasistratean, schema and terminology onto the Aristotelian text.

## 6 Substance or instrument of the soul

As is well known, Galen on a number of occasions raises the question of the identity of the "substance of the soul"; and, consistently throughout the corpus, refuses to answer that question unequivocally. This subject has been discussed quite extensively as it relates to Galen's philosophy of mind, and in particular the question of his materialism, or whether he can be characterized as embracing some form of mind–body identity thesis.

In relation to pneuma, meanwhile, the discussion of substance of the soul takes on a distinct dimension, which requires individual attention.

On a number of occasions, Galen presents us with the following dichotomous choice: is pneuma (a) the substance of the soul; or (b) the soul's "first instrument"? One may be inclined to see in these texts a temptation, on Galen's part, to adopt a materialist

solution to the question of substance of the soul, just as he seems similarly tempted in *Quod animi mores corporis temperamenta sequantur* (*QAM*) – albeit the specific materialist solution proposed there is a different one (substance of the soul = mixture of the body[45]). The way in which he seems drawn to such an answer, while never definitively or finally adopting it, may seem parallel in the two cases.

We might, furthermore, in line with the remarks made at the outset, as well as Galen's apparent emphasis on the unique status and properties of pneuma, amongst bodily items, think that Galen is looking for a sufficiently "high" or "fine" physical item to meet the needs of this particular metaphysical entity: the substance of the soul. We might, that is, take it that he is hesitating over the adoption of outright materialism of the soul, but inclined to do so if he can find a sufficiently "fine" physical item as candidate for that material entity.

On closer inspection, however, the texts seem not to support such a view – both in the sense that they fairly clearly reject soul–pneuma identity, and in the sense that pneuma, in fact, seems to turn out *not* to have the "highest" status, even within the brain.

To put it slightly differently: we at first think that we are involved in a metaphysical debate, between mind–body identity (with pneuma as the body in question) and some sort of mind–body interactionism; and that "first instrument" is, as it were, the next status down for pneuma, if the mind–body identity thesis is abandoned; that is, that mind–body identity may be false, but that in that case this particular body will be something second best to substance, namely first instrument.

In fact, something rather different seems to be going on. Let us again look at the most relevant texts *en bloc*, before drawing our conclusions on them.

**T28** οἱ μὲν οὖν Στωϊκοὶ ταὐτὸν τοῦτο τὸ πνεῦμα τὴν οὐσίαν τῆς ψυχῆς εἶναι δοξάζουσιν· ἡμεῖς δὲ περὶ οὐσίας ψυχῆς οὔτε πάνυ τι τολμῶμεν ἀποφαίνεσθαι καὶ πρὸς τὰ παρόντα περιττὸν ὑπολαμβάνομεν. ὅτι μέντοι τὸ σύμφυτον πνεῦμα, κἂν εἰ μὴ τῆς ψυχῆς ἐστιν ἡ οὐσία, ἀλλὰ τὸ πρῶτον αὐτῆς ὄργανον ὑπαρχει, φθάνομεν ἐν τοῖς περὶ τῶν Ἱπποκράτους καὶ Πλάτωνος δογμάτων ὑπομνήμασιν ἀποδεδειχέναι.

The Stoics opine that this very same pneuma is the substance of the soul; we, on the other hand, not only in no way dare to make a declaration about the substance of the soul, but also consider that beside the point of the present enquiry. However, the fact that the connate pneuma, even if it is not the substance of

45 See Gal. *QAM* 3 (Müller 37,19–24 = K. 4.774) and 4 (Müller 44,18–45,3 = K. 4.783).

the soul, is nevertheless its first instrument, we have already demonstrated in our work on *The Doctrines of Hippocrates and Plato.*[46]

Galen, *De simplicium medicamentorum facultatibus* 5.9 (K. 11.731)

**T29** εἰ δὲ καὶ περὶ ψυχῆς οὐσίας ἀποφήνασθαι χρὴ, δυοῖν θάτερον ἀναγκαῖον εἰπεῖν· ἢ τοῦτ᾽ εἶναι τὸ οἷον αὐγοειδές τε καὶ αἰθερῶδες σῶμα λεκτέον αὐτήν, εἰς ὃ κἂν μὴ βούλωνται κατ᾽ ἀκολουθίαν ἀφικνοῦνται Στωϊκοί τε καὶ Ἀριστοτέλης, ἢ αὐτὸν μὲν ἀσώματον ὑπάρχειν οὐσίαν, ὄχημα δὲ τὸ πρῶτον αὐτῆς εἶναι τουτὶ τὸ σῶμα δι᾽ οὗ μέσου τὴν πρὸς τἄλλα σώματα κοινωνίαν λαμβάνει.

And if we must speak of the substance of the soul, we must say one of two things: we must say either that it is this, as it were, bright and etherial body, a view to which the Stoics and Aristotle are carried in spite of themselves, as the logical consequence (of their teachings), or that it is (itself) an incorporeal substance and this body is its first vehicle, by means of which it establishes partnership with other bodies.

Gal. *PHP* 7.7.25 (De Lacy 474,22–27 = K. 5.643)

**T30** αὐτῆς μὲν γὰρ τῆς ψυχῆς τὴν οὐσίαν ἴσως μὲν καὶ κατ᾽ ἄλλην τινα πραγματείαν ἀποφήνασθαι τολμηρόν, ἐν δὲ τῇ νῦν ἐνεστώσῃ πρὸς τῷ τολμηρῷ καὶ περιττόν. ἔοικε δ᾽ οὖν ἥ τις ποτ᾽ ἂν ᾖ, δυοῖν θάτερον, ἤτοι πρώτοις ὀργάνοις εἰς ἁπάσας τὰς ἐνεργείας χρῆσθαι πνεύματί τε καὶ αἵματι καὶ τῇ θερμασίᾳ τῇ κατὰ θάτερον καὶ συναμφότερον, ἢ ἐν αὐτοῖς τούτοις ὑπάρχειν. ἔνεστι δὲ ἐναργῶς θεάσασθαι τὰς κίνησεις αὐτῆς ἐν ἄλλοις τε πολλοῖς καὶ μάλιστα τοῖς ψυχικοῖς πάθεσιν.

Well, to make a declaration on the substance of the soul itself might perhaps be bold, even in some other work; in the present one it is not only bold but also superfluous. Whatever it actually is, one of two things seems to be the case: that it uses pneuma, blood and the heat that is in both of them as the primary instruments for all its activities, or that it subsists in those things. And

46 The reference here to, specifically, *connate* (*sumphuton*) pneuma is worthy of note. This particular type of pneuma does not (as we have seen above) in general feature in Galen's anatomical-physiological system. It seems to me that the appearance of the term here is due to the Stoic context of discussion: Galen attributes the term explicitly to Chrysippus (T24 above), and the view of pneuma as substance of soul with which Galen is engaging in T28 is (as indeed he makes quite clear) a Stoic one. It is, then, in the context of his engagement with their argument that he has adopted this element of their terminology. On the relation of connate to psychic pneuma in Stoic thought see von Staden 2000, 102.

it is possible to observe its (*sc.* the heat's) motions manifestly in many other affections, but especially those of the soul.

Gal. *Caus. Symp.* 2.5 (K. 7.191)

**T31** οὐχ ὡς οὐσία ψυχῆς ὑπάρχον, ἀλλ' ὡς ὄργανον πρῶτον αὐτῆς οἰκούσης κατὰ τὸν ἐγκέφαλον, ὁποία τις ἂν ᾖ τὴν οὐσίαν.

... not in the sense that it is the substance, but rather the first instrument of the soul that resides in the brain, whatever its substance may be.

Gal. *PHP* 7.3.27 (De Lacy 444,31–33 = K. 5.608; cf. *ibid*. 446,11–15 = K. 5.609)

In T28–T30, the dichotomous choice is presented, in an apparently open-ended way (albeit with some variations of detail: T29 talks of the "light and etherial body", which can presumably be equated with pneuma, and also uses the term "vehicle" rather than "instrument", though the sense seems roughly equivalent; T30 has not just pneuma but "pneuma, blood and heat" as the entity which may be either the soul itself or its first instrument[47]). But T31 comes down clearly against the identity proposition. It is better to say that pneuma is the first instrument of the soul, not its substance. Now, what "first instrument" refers to, in fact, is a very particular status, *below* that of the *hēgemonikon*. A first instrument is, quite simply, something that carries out the commands of the *hēgemonikon*: the *hēgemonikon* itself is distinct from it. "First instrument" here refers to the role of carrying out or transmitting the functions of perception and voluntary motion – which, as we have already seen, is precisely what the psychic pneuma does. (The term "first" should presumably be taken as specifying that these are the most important, or hegemonic, functions of the soul.)

With that clarified, we are able to see, too, that the establishment of this status (first instrument) for the psychic pneuma has not answered the question of the soul's materialism one way or the other: that is still completely open – as indicated by the recurrence of the phrase "whatever its substance" (T31) *after* the establishment of the equation pneuma = first instrument.

47 Both these specific formulations are rather interesting for our understanding of Galen's dialectical way of proceeding. In T29 Galen lumps together the Stoics and Aristotle as "carried to" the pneuma-soul identity, as it were in spite of themselves. This betokens a certain doxographical vagueness: the Stoics openly assert this identity, after all, rather than being forced to it; and to the extent that Aristotle is "carried to" materialism, it is surely (as Galen will assert elsewhere, cf. the *QAM* texts cited at n. 45 above, with Singer 2013, 350 and ad loc.) a materialism based in bodily mixture, not in pneuma. Variation and imprecision seem also evident in T28, apparently conflating connate and psychic pneuma (on which point cf. also n. 46 above) and T30, where we have the set "pneuma, blood and heat" instead of just pneuma.

In this context we should consider a further text (coming just before T31, in fact), which again asserts the pneuma = first instrument equation, but which also has a further significance.

> **T32** ἐκ τούτων οὖν τῶν φαινομένων ἴσως ἄν τις ὑπονόησειε τὸ κατὰ τὰς κοιλίας τοῦ ἐγκεφάλου πνεῦμα δυοῖν θάτερον, εἰ μὲν ἀσώματός ἐστιν ἡ ψυχή, τὸ πρῶτον ὑπάρχειν, ὡς ἄν εἴποι τις, οἰκητήριον, εἰ δὲ σῶμα, τοῦτ' αὐτὸ [πνεῦμα] τὴν ψυχὴν εἶναι. ἀλλ' ὅταν γε συναχθεισῶν τῶν κοιλιῶν ὀλίγον ὕστερον αὖθις αἰσθάνηται καὶ κίνηται τὸ ζῷον, οὐκέτ' <οὐδέτερον> οἷόν τε φάναι τῶν εἰρημένων ὑπάρχειν τουτὶ τὸ πνεῦμα. βέλτιον οὖν ὑπολαβεῖν ἐν αὐτῷ μὲν τῷ σώματι τοῦ ἐγκεφάλου τὴν ψυχὴν οἰκεῖν, ἥτις ποτ' ἂν ᾖ τὴν οὐσίαν – οὔπω γὰρ περὶ τούτου σκέψις ἥκει –, τὸ πρῶτον δ' αὐτῆς ὄργανον εἵς τε τὰς αἰσθήσεις ἁπάσας τοῦ ζῴου καὶ προσέτι τὰς καθ' ὁρμὴν κινήσεις τοῦτ' εἶναι τὸ πνεῦμα ...
>
> From these phenomena [*sc.* the effect of opening the skull, pressure on brain] you might suppose either of two things about the pneuma in the ventricles of the brain: if the soul is incorporeal, the pneuma is, so to speak, its first home; or, if the soul is corporeal, this very thing is the soul. But when presently, after the ventricles have been closed up, the animal regains sensation and motion, it is no longer possible to accept either alternative. It is better, then, to assume that the soul dwells in the actual body of the brain, whatever its [*sc.* the soul's] substance may be – for the enquiry has not yet reached this question – , and that the soul's first instrument for all the sensations of the animal and for its voluntary motions as well is this pneuma ...
>
> Gal. *PHP* 7.3.19–21 (De Lacy 442,36–444,8 = K. 5.605–606)

At first we may think that, in line with the other texts that we have considered, we are being presented with the same dichotomy (pneuma as substance or as first instrument), introduced by the phrase "one of two things". In fact, the choice of propositions that "one might suppose" to be the case in relation to pneuma is here a different one. One might think that it is either actually the soul (the identity proposition), or that it is the – as it were – *house* of the soul.[48] What is distinctive about the formulation here is that in fact *both* options are rejected on further reflection[49]; in moving to the preferred view – which as we have seen, is that pneuma is the first instrument – Galen has here rejected

48 Both this formulation and that involving the term "vehicle" in T29, seem to echo Platonist thought, and in some sense presumably represent a Galenic response to Platonist ways of speaking; but it is beyond my scope to explore this point here.

49 If one accepts De Lacy's insertion of οὐδέτερον, but this seems clearly required by the sense.

not just soul–pneuma identity, but also the role of pneuma as *housing* the soul. Rather, he goes on to clarify, the soul resides in the *body* of the brain itself (even though we will still not venture to make an assertion about its actual substance). Now, the *body* of the brain, as is also clear from other texts, is clearly distinguished from its empty spaces or ventricles (where the pneuma resides).[50]

The fact, then, that the psychic pneuma is not identical with the soul does not mean that some other materialist candidate may not remain in play. Indeed – although, as we have already insisted, Galen never does answer the question univocally – we may see in the formulation of T32 at least a hint that Galen inclines to some form of materialism as his final answer. That is to say: the talk of the soul *residing*, or having its *home* in, the brain – paralleled also in *Nat. Fac.* and *Loc. Aff.*[51] – in itself seems to imply a form of materialism, although it is certainly one in which he wishes to remain vague on the details. *Some* physical entity, he seems to be saying, which resides in the brain, may be the substance of the soul; but if so, it is not (definitely, at least as far as the present text is concerned) pneuma. (We may also wish to consider in this context the *krasis* option, floated, as we have seen, in *QAM*; but in T32, as in the other passages just mentioned, Galen is being much less precise in the formulation of his "conclusion".)

But if one does interpret the statement of T32 – which here looks very like the final, or at least the most physically precise, thing that Galen is able to offer on the subject – as a materialist one, or at least as one which strongly inclines towards a materialist solution, it is clear that such a solution is here presented as an *alternative* to the equation soul = pneuma, not an adoption of it. Pneuma is thus out of the picture, even if one wants a material candidate for the substance of the soul.[52]

These considerations, then, again point away from an interpretation of Galen's pneumatology as Stoic in its affiliations.

**50** See esp. Gal. *Loc. Aff.* 3.6 (K. 8.164), where, in the context of the pathology of brain function, a clear distinction is made between the ventricles or void spaces, the moist substances within the brain, and its actual solid body.

**51** At Gal. *Loc. Aff.* 2.5 (Gärtner 372–374 = K. 8.127–128) Galen suggests the "inhabiting" notion for the relationship of soul to body, alongside the form-body relationship; at 3.8 (K. 8.174–175), in a passage which very closely echoes T32, he again insists on the distinction between the "soul itself" inhabiting the "body of the brain," and the pneuma which is its "first instrument for all perceptive and voluntary activities." Note also that this latter passage explicitly distinguishes *reasoning* and the *storing of memory* as belonging within the body of the brain, as opposed to perception and motion (which are controlled by pneuma): this distinction in Galen's thought in the area of memory and brain function is explored by Julião 2018.

**52** One further text should be considered, which also presents the instrument/substance dichotomy, and seems to remain quite open-ended, both as to *whether* the pneuma is the first organ or substance and as to the identity of the substance if pneuma *is* the first organ (and apparently pneuma remains in place as one of the candidates, even in that case). However, the passage in question is not only a lightning-speed summary of possibilities; it also has considerable textual problems, and I have therefore not attempted a detailed analysis here. The passage in question is *Ut. Resp.* 5.7 (Furley/Wilkie 130 = K. 4.509).

## 7 Galen's pneuma and the Aristotelian higher element?

Before concluding, though, we should at least consider some evidence which appears to point – ultimately, as I shall argue, inconclusively – in a rather different direction. I refer to Galen's invocation, in several contexts, of the notion of a "higher" or "more divine" cause than that offered by the four material qualities; and to the possibility that this higher cause is in some way related to pneuma and to Aristotle's superlunary physics.

**T33** καὶ διαπλάσεως ἀρίστης τετύχηκεν, ἴσως μὲν ἑπομένης τῇ τῶν τεττάρων στοιχείων εὐκρασίᾳ, τάχα δέ τινα θειοτέραν ἀρχὴν ἑτέραν ἐχούσης ἄνωθεν.

[the well-fleshed man] has received also the best shaping, which possibly follows the good-mixture of the four elements, but perhaps has some other more divine source from above.

Galen, *De temperamentis* 1.9 (Helmreich 36,22–24 = K. 1.567)

**T34** διαμαρτάνουσι τῆς ἀληθείας ... ὅτι τῆς διαπλαστικῆς ἐν τῇ φύσει δυνάμεως οὐ μέμνηνται τεχνικῆς τ' οὔσης καὶ τοῖς τῆς ψυχῆς ἤθεσιν ἀκολούθως διαπλαττούσης τὰ μόρια. περὶ ταύτης γάρ τοι καὶ Ἀριστοτέλης ἠπόρησε, μή ποτ' ἄρα θειοτέρας τινὸς ἀρχῆς εἴη καὶ οὐ κατὰ τὸ θερμὸν καὶ ψυχρὸν καὶ ξηρὸν καὶ ὑγρόν.

… they err ... in that they do not regard the power in nature that shapes us as a craftsmanlike power, which shapes the parts in a way which is a consequence of the character traits of the soul. On this point even Aristotle was in some doubt [or, raised a query]: whether this power may not derive from some more divine source, rather than just that found in the hot, the cold, the dry and the wet.

Gal. *Temp.* 2.6 (Helmreich 79,18–26 = K. 1.635–636)

What is meant by the "more divine source" referred to in T33 and T34 (with the additional term "from above" in T33) seems clearly to be a demiurgic or teleological cause which needs to be mentioned in addition to the material causes (the four elemental qualities) in a full account of how animals, in particular humans, reach their perfection. We are thus in the realms of an Aristotelian, or rather post-Aristotelian, approach to the individuation of causes, within which Galen operates; and it seems natural to interpret these statements within the framework of Aristotle's metaphysics and causal theory.

But it is worth considering in this context two passages from Aristotle's biological work of which T33 and T34 seem to be giving some close verbal echoes.

In the second book of that work, in the context of the distinction of male and female, and the role of each in generation, we read the following phrase:

> **T35** ὡς δὲ διὰ τὸ βέλτιον καὶ τὴν αἰτίαν τὴν ἕνεκά τινος, **ἄνωθεν** ἔχει τὴν ἀρχήν ...
>
> ... in so far as this occurs on account of what is better, i.e. on account of the final cause (the cause "for the sake of which"), the principle is derived *from the upper cosmos*.
>
> Arist. *Gen. an.* 2.1, 731b23–24 (tr. Peck)

Later in the same book, Aristotle discusses the question, how soul, in particular intellect, enters the body in the process of generation.

> **T36** ὅτι μὲν τοίνυν οὐχ οἷόν τε πάσας προϋπάρχειν, φανερόν ἐστιν ἐκ τῶν τοιούτων ... λείπεται δὴ τὸν νοῦν μόνον θύραθεν ἐπεισιέναι καὶ θεῖον εἶναι μόνον· οὐθὲν γὰρ αὐτοῦ τῇ ἐνεργείᾳ κοινωνεῖ σωματικὴ ἐνέργεια.
>
> πάσης μὲν οὖν ψυχῆς δύναμις **ἑτέρου** σώματος ἔοικε κεκοινωνηκέναι καὶ **θειοτέρου** τῶν καλουμένων στοιχείων· ὡς δὲ διαφέρουσι τιμιότητι αἱ ψυχαὶ καὶ ἀτιμίᾳ ἀλλήλων, οὕτω καὶ ἡ τοιαύτη διαφέρει φύσις. πάντων μὲν γὰρ ἐν τῷ σπέρματι ἐνυπάρχει, ὅπερ ποιεῖ γόνιμα εἶναι τὰ σπέρματα, τὸ καλούμενον θερμόν. τοῦτο δ' οὐ πῦρ οὐδὲ τοιαύτη δύναμις ἐστιν, ἀλλὰ τὸ ἐμπεριλαμβόμενον ἐν τῷ σπέρματι καὶ ἐν τῷ ἀφρώδει πνεῦμα καὶ ἡ ἐν τῷ πνεύματι φύσις, ἀνάλογον οὖσα τῷ τῶν ἄστρων στοιχείῳ.
>
> Now, the following considerations plainly show that they [*sc.* the various forms of soul] cannot all be present beforehand. ... It remains, then, that Reason alone enters in, as an additional factor, from outside, and that it alone is divine, because physical activity has nothing whatever in common with the activity of Reason.
>
> Now so far as we can see, the faculty of Soul of every kind has something in common with a body which is *different* from the so-called "elements" and *more divine* than they are; and as the varieties of Soul differ from one another in the scale of value, so too does this nature differ. In all cases the semen contains within itself that which causes it to be fertile – what is known as "hot" substance, which is not fire nor any similar substance but the *pneuma* which is enclosed within the semen or foam-like stuff, and the nature which is in the

*pneuma*, this nature being analogous to the element which belongs to the stars.

Arist. *Gen. an.* 2.2, 736b21–737a1 (tr. Peck, modified)

It is true that the context of these discussions is rather different from that in *De temperamentis*. There, Galen is addressing the question of the overall structuring or shaping (διάπλασις) of the human body, and how to characterize the causation of that. The Aristotelian passages, as seen, relate respectively to the question of male and female in generation and to that of the separate causal account that one must give, specifically, for the presence of intellect in human generation. Yet the close verbal echoes – highlighted in particular by the words printed in italics in translation in T35 and T36 – seem undeniable.

If, then, Peck is right to translate ἄνωθεν in T35 as "from the upper cosmos", and when, further, we see that in Aristotle pneuma is seen as a sublunary counterpart to the fifth, ethereal element, which belongs specifically to the heavenly realm, we begin to wonder, at least, whether Galen does in fact have pneuma – or at least the notion of an Aristotelian higher physics – in mind here.

Certainly the Aristotelian parallels for the use of the terms "from above" (ἄνωθεν and cognates), "more divine" (θειότερος), and "other" (ἕτερος) when used in relation to the elements, occur in the context of his discussion of his higher physics of the superlunary realm.[53]

**T37** διόπερ ὡς ἑτέρου τινὸς ὄντος τοῦ πρώτου σώματος παρὰ γῆν καὶ πῦρ καὶ ἀέρα καὶ ὕδωρ, αἰθέρα προσωνόμασαν τὸν ἀνωτάτω τόπον ...

Thus they [*sc.* the ancients], believing that the primary body was something different from earth and fire and air and water, gave the name *aithēr* to the uppermost region ...

Aristotle, *De caelo* 1.3, 270b21–23 (tr. Guthrie)

**T38** ... φανερὸν ὅτι πέφυκέ τις οὐσία σώματος ἄλλη παρὰ τὰς ἐνταῦθα συστάσεις, θειοτέρα καὶ προτέρα τούτων ἁπάντων ... ἔστι τι παρὰ τὰ σώματα

53 As Sean Coughlin points out to me, the status of pneuma in these and related passages of Aristotle is not straightforward in its interpretation. On the one hand, the nature of pneuma as analogous to *aithēr* in some way guarantees its generative power; on the other, the use of the term "analogous" in itself may serve to *distance* pneuma down here from the celestial element (in a way that was not done by his predecessors). There is, moreover, a question as to precisely *what* causal power pneuma derives "from above," or from the connection in nature between pneuma and *aithēr*; it seems likely that the answer – for Aristotle, unlike for Galen in T33 and T34 – will not include the shaping of animal bodies, but be confined to the ability to generate (in perpetuity).

τὰ δεῦρο καὶ περὶ ἡμᾶς ἕτερον κεχωρισμένον, τοσούτῳ τιμιωτέραν ἔχον τὴν φύσιν ὅσῳπερ ἀφέστηκε τῶν ἐνταῦθα πλεῖον.

... it clearly follows that there exists some physical substance besides the four in our sublunary world, and moreover that it is more divine than, and prior to, all these ... there is some body separate from those around us here, and of a higher nature in proportion as it is removed from the sublunary world.

Arist. *Cael.* 1.2, 269a30–33 and 269b14–17

**T39** ... ἔστι δὲ καθάπερ τῶν ἐπὶ τῆς εὐθείας φορῶν ἡ πρὸς τὸν ἄνω τόπον τιμιωτέρα (θειότερος γὰρ ὁ ἄνω τόπος τοῦ κάτω) ...

... in the same way as of two rectilinear motions the upward one is superior (because the upper place is more divine than the lower) ...

Arist. *Cael.* 2.5, 288a4–6

One could in this context consider a number of further references to the "the higher body" (τὸ ἄνω σῶμα) specific to the superlunary realm.[54]

Ultimately, we are not able to draw any firm conclusion as to what this tells us about the interpretation of the problem passages in *De temperamentis*, T33 and T34. The fact that they seem to echo passages in Aristotle which refer to a higher physics, rather than a higher, in the sense of teleological, cause, is intriguing, and perhaps significant; moreover, the use of the notions of "higher" and of upward motion in these Aristotelian physical and meteorological contexts reminds us of some of the physical properties and associations of pneuma that were relevant to Galen's physiological account, especially in T5. And the further consideration that pneuma for Aristotle provides a sublunary link to that higher realm seems of possible relevance.

It must be said, however, that if such connections are in Galen's thought, they are not drawn out or made explicit.

## 8 Conclusion

We have seen that Galen's theory of pneuma, not always itself clearly worked out, draws on medical and philosophical predecessors in various ways; but that the ways in which it reflects the research and theories of his anatomical and medical predecessors seem the most significant ones. We have seen, further, that it is psychic pneuma, specifically,

54 See e.g. Arist. *De caelo* 2.7, 289a17–18; *Meteorologica* 1.3, 340b6; and cf. also *Mete.* 1.3, 340a19–23.

with its distinct location in brain and nerves and its distinct functions in perception and voluntary motion, which represents the most important and the most consistently developed part of that theory.

We are doubtless engaged in a distortive simplification if we try to construct a straightforward opposition between the "metaphysical" pneuma of the Stoics (or others), replete with associations of divinity and higher properties, having connections with a celestial realm and pervading bodies in physically or metaphysically challenging ways, on the one hand, and an empirically observable physical substance, always corresponding to specific physical properties and only residing in or flowing through identifiable channels or voids in the human body, on the other.

Indeed (to summarize, and at the same time to revisit the second question posed in the introduction), we find in Galen a somewhat complex situation. On the one hand, we have seen certain ways in which Galen's conception of pneuma does seem to draw on traditional, arguably metaphysical, associations related to such terms as "fineness", "lightness" and "higher"; and we have considered possible connections with the philosophical and pre-philosophical tradition.[55] On the other, we must bear in mind that the "lightness" and "fineness" of pneuma are, for Galen, empirically observable properties, at least in principle; and indeed we have seen that the presence of such an in-principle observable substance in specific anatomical structures, in conjunction with a theoretical account of how it acquires its particular "fineness", is what underlies his theory. Taken in the round, Galen's views on pneuma, on psychic pneuma especially, are better understood against the backdrop of Herophilus, Erasistratus, anatomy and animal observations than against that of Stoic or other metaphysical theorizations.[56]

55 A further possible philosophical relevance, not explored above, is that of the fineness of body attributed to soul particles by Epicurus. In view of Galen's almost complete hostility to the Epicurean tradition, this is unlikely to have been of direct influence; it does however provide a further example of the conceptual connection between bodily fineness and explanatory power in relation to the soul.

56 Of course, in terms of our question (2) – the conceptual source of the explanatory power of pneuma – this answer may seem simply to shift the question back to those Alexandrian anatomists. And here, while again some influence from traditional, and indeed philosophical, conceptions of pneuma is not to be excluded, it seems highly probable (as already suggested), that the power of, and recent developments in, pneumatic technology provided a vital analogy – even if such an interpretation may ultimately remain speculative.

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Julius Rocca

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

## Summary

The twin actions of inspiration and expiration are intimately pneumatic ones. Examining how *pneuma* is conceptualised, appropriated, and elaborated in Greek medicine and philosophy is to appreciate how a seemingly simple concept is employed to underwrite a mass of divergent physiological and psychic phenomena. For Galen, the first organ charged with the responsibility of dealing with pneuma at the functional level is the lung. As with other body parts, Galen will seek to show that there is a certain structural affinity, embedded teleologically, that allows the preliminary elaboration of pneuma to take place in the lung and in no other organ.

Keywords: Galen; lung; heart; respiration; pneuma

Die zwei Aktionen des Einatmens und des Ausatmens sind eng pneumatisch. Um zu verstehen, wie Pneuma in der griechischen Medizin und Philosophie konzeptualisiert, angeeignet und ausgearbeitet wird, muss man verstehen, wie ein scheinbar einfaches Konzept verwendet wird, um eine Masse divergierender physiologischer und psychischer Phänomene zu zeichnen. Für Galen ist das erste Organ, das auf der Funktionsebene mit Pneuma befasst ist, die Lunge. Wie bei anderen Körperteilen wird Galen versuchen zu zeigen, dass es eine gewisse strukturelle Affinität gibt, die teleologisch eingebettet ist und die vorläufige Entwicklung von Pneuma in der Lunge und in keinem anderen Organ ermöglicht.

Keywords: Galen; Lunge; Herz; Atmung; Pneuma

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τί ποτ᾽ οὖν τηλικοῦτόν ἐστι τὸ παρὰ τῆς ἀναπνοῆς ἡμῖν χρηστόν;
What, then, is this great benefit to us from breathing?

Galen, *De usu respirationis* 1.2 (Furley/Wilkie 81,9–10 = K. 4.471.1–2)

ἄνθρωπός ἐστι πνεῦμα.
Man is pneuma.

Sophocles, fr. 12 (FTG 133)

## Introduction

The twin actions of inspiration (ἀναπνοή, ἀνάπνευσις) and expiration (ἐκπνοή, ἔκπνευσις) are intimately pneumatic ones. Examining how pneuma is conceptualised, appropriated, and elaborated in Greek medicine and philosophy is to appreciate how a seemingly simple concept is employed to underwrite a mass of divergent physiological and psychic phenomena. For Galen, the first organ charged with the responsibility of dealing with pneuma at the functional level is the lung (πνεύμων, πλεύμων).[1] As with other body parts, Galen will seek to show that there is a certain structural affinity, embedded teleologically, that allows the preliminary elaboration of pneuma to take place in the lung and in no other organ.

For Galen, pneuma is neither air *per se* nor is it carried in the air but is derived from 'the outside air' (ὁ ἔξωθεν ἀήρ),[2] and, in a series of progressive steps, entirely elaborated internally.[3] Air is thus taken in by the lung to *become* pneuma, irrespective of there be-

1 The lung is conventionally referred to as in the plural, but, reflecting its particular function, Greek medicine and philosophy usually rendered this organ in the singular, as found in the Hippocratic Corpus, Plato and Aristotle. Cf. Craik 1998, 155. It is singular in Homer (*Iliad* 4.528, the bronze spear embedded in the lung: στέρνον ὑπὲρ μαζοῖο, πάγη δ᾽ ἐν πνεύμονι χαλκός). Latin writers vary. It is *pulmones* in Cicero, *De natura deorum* 2.55; *pulmo* in Pliny, *Naturalis historia* 11.37.42. Cf. Hyrtl 1880, 431–432. Galen always refers to the lung as one organ. Cf. Durling 1993, 271.

2 This is Galen's standard expression for the outside air. Cf. Galen, *De placitis Hippocratis et Platonis* 8.8 (De Lacy 528,28 and 32 = K. 5.708 and 709). Cf. *De naturalibus facultatibus* 3.14 (Helmreich 250,6 = K. 2.205), where 'the outside air' (τὸν ἔξωθεν ἀέρα) is drawn into the body by the arteries which reach the skin. ἀέρα) is drawn into the body by the arteries which reach the skin.

3 This process of pneumatic elaboration (ἐργασία) is compared to the process of nutrition (τροφή), where the notions of change (μεταβολή) and alteration (ἀλλοίωσις) of food provide Galen with an analogous account which helps underwrite his claim for progressive pneumatic processing and refinement. Cf. Galen, *De anatomicis administrationibus* 6.2 (K. 2.542–543), where Galen's nutritive process is summarized. The completed products of the digestive process (κατεργασθεῖσα), which takes place in the liver, are then distributed to the body by the veins (which have their origin in the liver). The parallel for Galen is the completed pneumatic elaborative

ing any pneuma that is external (ἐπίκτητον).[4] It is these internal, sequential, elaborative steps that renders Galen's pneumatic physiology, if not entirely original, then distinctive not in respect of what he requires of pneuma – in its various iterations – to perform, but rather in the relentless epistemological stress he places on those anatomical structures which he claims deal with pneumatic processing.[5] It is *within the lung itself* where pneumatic conversion from outside air commences, and the product of the alteration of air[6] is a pneuma-like entity (τὸ πνευματῶδες), which is then presented to the left ventricle of the heart (ἡ ἀριστέρα κοιλία τῆς καρδίας) via the pulmonary vein (ἀρτηρία φλεβώδης: the vein-like artery).[7] While pneuma is derived from the outside air, outside air is not to be regarded as pneuma.[8] The left ventricle is literally for Galen a pneumatic *ergasterion*, where the pneuma-like material, innate heat, and blood together manufacture vital pneuma.[9] The vital pneuma now has access to all parts of the body via the arterial system, affording it entry to the ventricles of the brain, where a final (τελεωτάτην)

product – psychic pneuma – being distributed by its elaborative organ, the brain, to the nerves, as will be discussed below.

4 This serves to highlight one critical physiological difference between Galen and Erasistratus; for the latter, the origin of pneuma is external. Cf. Dobson 1927, 24; Martini 1964, 4.3; Galen, *An in arteriis sanguis contineatur* 4 (Furley/Wilkie 156 = K. 4.714 = Erasistratus fr. 101 Garofalo). And see below, n. 7. For Erasistratus, the point of breathing is not so much to provide the material for pneumatic elaboration but rather to replenish the pneuma in the arteries. Cf. *De utilitate respirationis* 1.2 (Furley/Wilkie 80 = K. 4.471 = Diocles fr. 31 vdE). According to Galen, Erasistratus was among those who maintained that the arteries also functioned as organs (ὄργανα) of vital pneuma. Cf. Gal. *Art. Sang.* 4.3 (Furley/Wilkie 156 = K. 4.714 = fr. 102 Garofalo). This accords with Galen's view.

5 I use the word 'stress' both in the sense of 'emphasis' but also to convey the fact that the manifold physiological phenomena Galen articulates places a correspondingly enormous stress on his own anatomical demonstrations, which have to be correct each time they are performed.

6 Air is "matter for the use that belongs to breathing" (ὕλη τυγχάνων τῆς κατὰ τὴν ἀναπνοὴν χρείας). Galen, *De causis respirationis* 1 (Furley/Wilkie 240 = K. 4.466; tr. Furley/Wilkie). On the material nature of pneuma, cf. Gal. *PHP* 2.8 (De Lacy 164,18 = K. 5.281). And see below, n. 44 and n. 70.

7 Gal. *PHP* 1.5 (De Lacy 78,8 = K. 5.184). It is also referred to by Galen as the pneumatic ventricle (τὴν πνευματικὴν κοιλίαν τῆς καρδίας), 1.6 (De Lacy 78,20 = K. 5.184–185). In Gal. *Art. Sang.* 2.2 (Furley/Wilkie 148 = K. 4.706 = fr. 101 Garofalo), Galen states that, for Erasistratus, pneuma comes into the body via 'the air around us' (περιέχοντος ἡμᾶς ἀέρος), enters the arteries in the lung and thence to the heart. See above, n. 4. Although Galen takes issue with Erasistratus' physiological processing of pneuma, he follows him in using the same modes of pneumatic distribution and destination. For example, Galen holds that the left ventricle of the heart is pneumatic in a sense it deals with vital pneuma but is otherwise a haematic part of the heart; for Erasistratus, however, the left ventricle is 'full of vital pneuma' (ζωτικοῦ πνεύματος ... πλήρη) to the exclusion of blood in its natural condition. Cf. Gal. *PHP* 1.6 (De Lacy 78,16–25 = K. 5.184–185).

8 The change from outside air to a pneuma-like entity is also one of functional capacity: within the lung it is essentially functionless until it receives its elaborative change in the heart. Only then is it pneuma for Galen in a valid sense.

9 On the innate heat see Durling 1988. The most important functions of the cause of inspiration (ἡ μὲν χρεία τὸ κυριώτατον ἐστι τῶν τῆς ἀναπνοῆς αἰτίων) are to preserve the balance of the innate heat by regulating it, and to nourish the psychic pneuma. Gal. *Caus. Resp.* 2 (Furley/Wilkie 240 = K. 4.466). In *Ut. Resp.* 1.2 (Furley/Wilkie 80 = K. 4.471–472), Galen shifts the emphasis that respiration is for the sake of the innate heat (τὴν ἔμφυτον θερμότητα).

pneumatic elaboration takes place resulting in the creation of psychic pneuma.[10] Given their importance to Galen's physiological system, it is understandable that the roles of vital and psychic pneuma have been the subject of study.[11] In contrast, the place of the lung in Galen's scheme of progressive pneumatic elaboration, although noted, merits exploration. Not only is the status of the lung as an elaborative organ in its own right of interest, but its study reflects the importance that Galen places on all parts of the body in his powerful teleological scheme.[12] This chapter will examine certain key aspects of the functional anatomy of the lung.

## I

Greek physiology has a long and rich association with air (ἀήρ). Humans and other living things, according to Diogenes of Apollonia, "live by air through breathing."[13] Moreover, in common, it is said, with other *physiologoi*, Diogenes allegedly maintained air (ἀήρ) was easily affected (εὐπαθές) and readily alterable (εὐαλλοίωτον), and suited for change (μεταβολή).[14] Air is also, again at this stage of its physiological development, associated with nutriment, as the following citation from the Hippocratic text *Breaths*, asserts:

**T1** 1. τὰ σώματα καὶ τὰ τῶν ἄλλων ζῴων καὶ τὰ τῶν ἀνθρώπων ὑπὸ τρισσῶν τροφέων τρέφεται· τῇσι δὲ τροφῇσι τάδε ὀνόματά ἐστι· σῖτα, ποτά, πνεῦμα. πνεῦμα δὲ τὸ μὲν ἐν τοῖσι σώμασιν φῦσα καλεῖται, τὸ δὲ ἔξω τῶν σωμάτων ἀήρ. 2. οὗτος δὲ μέγιστος ἐν τοῖσι πᾶσι τῶν πάντων δυνάστης ἐστίν. Ἄξιον δ αὐτοῦ θεήσασθαι τὴν δύναμιν.

The bodies of living things generally and of men are nourished by three kinds of nutriment, which are called food, drink, and pneuma. Pneuma in bodies is called breath, and outside bodies it is called air. It is the most powerful of all and in all, and it is worthwhile examining its power.[15]

Hippocrates, *De flatibus* 3 (Jouanna 105,12–106,4 = L. 6.92–94, tr. Jones, 229–231, slightly modified)

10 See below, 294–295. On Galen's pneumatology see Temkin 1951; Rocca 1995.

11 For example, Debru 1996; Rocca 2003.

12 Note that for Galen (unlike Aristotle), *all* the parts of the body have a purpose, as stressed in the final book of *De usu partium*, the *Epode*.

13 Simplicius, *In Aristotelis Physicorum libros quattuor priores commentaria* Diels 152,16–21 = TEGP7.

14 Simp. *In Phys.* Diels 25,1–13 = TEGP8.

15 Hippocrates, *De alimento* 28 (Heiberg 82 = L. 9.108, 116) says the same thing.

In *Breaths* there is a terminological distinction made between air inside the body (*physa*) and that external to it (*aēr*). There is clearly great scope to expand on the potentiality of these concepts, and such an expansion will increasingly require, at the very least, the presence of a suitable anatomic platform.

A number of key features of the gross anatomy of the lung were known to several of the Hippocratic writers. That it contains fissures (διαφυσίων) is noted in *On the art of medicine*:

> **T2** ὅ τε γὰρ θώρηξ καλεόμενος, ἐν ᾧ το ἦπαρ στεγάζεται ὅ τε τῆς κεφαλῆς κύκλος, ἐν ᾧ ὁ ἐγκέφαλος, τό τε νῶτον πρὸς ᾧ ὁ πλεύμων, τούτων οὐδὲν ὅ τι οὐ καὶ αὐτὸ κενόν ἐστιν, πολλῶν διαφυσίων μεστόν. ἔστι δ' οἷσιν οὐδὲν ἀπέχει πολλῶν ἀγγεῖα εἶναι τῶν μέν τι βλαπτόντων τὸν κεκτημένον, τῶν δὲ καὶ ὠφελεύντων.
>
> For the so-called thorax encases the liver and the round part of the head contains the encephalon; next to the back is the lung. None of these (structures) are themselves empty, each being full of natural fissures, and in these cases, nothing prevents the presence of receptacles for many things, some of which are harmful to their possessor, and some beneficial.
>
> Hippocrates, *De arte* 10.4 (Jouanna 236,7–13 = L. 6.18, tr. Mann, modified)

*On anatomy* offers a particularly rich (and, as it happens, accurate) description of an organ which is noted as ashen (τέφρινος) in colour, punctuated by dark spots (στίγμασιν), comprising five projections termed lobes (λοβούς), and in nature (φύσει) like a honeycomb (τενθρηνιώδης).[16]

The depiction of the lung as resembling a honeycomb is not only an apt metaphor but also reflects an appreciation of the porous, spongy nature of its substance. This is highlighted in *Fleshes* in its depiction of the construction of the lung, which is likened to a sort of foam (ἀφρός), is hollow-like or porous (σηραγγῶδες), and full of many vessels (πολλὰ φλέβια).[17] (This depiction, as shall be shown, is essentially that of Galen's). The recognition of the essential spongiform nature of the lung is also noted in *On the nature of bones*, where the lung is described as very spongiform (σπογγοειδέος πολύ).[18]

16 Hippocrates, *De anatomia* 1 (Duminil 208,12 = Craik 124,11 = L. 8.538). See Craik 2006, 135–136, for a discussion of these descriptive terms for the lung.

17 Hippocrates, *De carnibus* 6.4 (Joly 193,10–16 = L. 8.594).

18 Hippocrates, *De natura ossium* 13 (Duminil 151,19 = L. 9.186). This particular nature of the lung facilitates the absorption of any fluid which may pass to it. In Hippocrates, *De corde* 1 (Duminil 190 = L. 9.80), some ingested fluid is said to reach the lung. Craik 1998, 130, argues that this view is also implicit in *De locis in homine*. Philistion of Locris, according to Plutarch (*Quaestiones convivales* 4.4.3, 669b–c), held this view, and it is also found in Plato, *Timaeus* 70c, 91a.

Plato noted that the task of the lung is to distribute air to the body.[19] The *Timaeus* also describes the lung as porous and like a sponge (οἷον σπόγγου), and as soft and avascular (μαλακὴν καὶ ἄναιμον), which may well reflect at least a superficial acquaintance with the nature of that organ.[20] Arguably the most arresting feature of the lung is its comparison to a sponge, and this is also picked up by Cicero, Celsus and Pliny.[21] The comparison is appealing: like a sponge, the lung is buoyant. The question of the lung's allegedly avascular nature notwithstanding, these descriptions provide a broadly correct rendering of much of the gross external structure of the lung.

Aristotle takes us further. The relationship between windpipe or trachea (the 'rough artery') and the lung is confirmed.

**T3** ἐπὶ δὲ θάτερα καθήκει εἰς τὸ μεταξὺ τοῦ πνεύμονος, εἶτ' ἀπὸ τούτου σχίζεται εἰς ἑκάτερον τῶν μερῶν τοῦ πνεύμονος.

At the other end the windpipe[22] extends to the region between the lung, and from there it divides into each of the two parts of the lung.

Aristotle, *Historia animalium* 1.17, 495a30–31 (tr. Peck, slightly modified)

Following a description of the duplication of the lung into the left and right main bronchus, the connection of the windpipe to each part of the lung, and the attachment to the great blood vessel and the aorta, Aristotle notes that the lung is hollow, and its divisions into what presumably are parts of the bronchial tree:

**T4** φυσωμένης δὲ τῆς ἀρτηρίας διαδίδωσιν εἰς τὰ κοῖλα μέρη τοῦ πνεύμονος τὸ πνεῦμα. ταῦτα δὲ διαφύσεις ἔχει χονδρώδεις εἰς ὀξὺ συνηκούσας· ἐκ δὲ τῶν διαφύσεων τρήματα διὰ παντός ἐστι τοῦ πλεύμονος, ἀεὶ ἐκ μειζόνων εἰς ἐλάττω διαδιδόμενα.

When the windpipe is inflated with air, the breath is distributed to the hollow parts of the lung. These parts have divisions, consisting of cartilage,[23] which meet in a point; and from the divisions there are apertures running through the whole of the lung, breaking up into smaller and smaller ones.

Arist. *Hist. an.* 1.17, 495b8–12 (tr. Peck, slightly modified)

**19** ὅταν μὲν γὰρ ὁ τῶν πνευμάτων τῷ σώματι ταμίας πλεύμων, Pl. *Ti.* 84d.

**20** ἐπικουρίαν αὐτῇ μηχανώμενοι τὴν τοῦ πλεύμονος ἰδέαν ἐνεφύτευσαν, πρῶτον μὲν μαλακὴν καὶ ἄναιμον, εἶτα σήραγγας ἐντὸς ἔχουσαν οἷον σπόγγου κατατετρημένας, Pl. *Ti.* 70c–d.

**21** Cic. *Nat. D.* 2.136; Celsus, *De medicina* 4.1.4 (Marx 147,23–25); Plin. *HN* 11.72,188.

**22** It is described at Arist. *Hist. an.* 1.17, 495a20–30.

**23** A likely reference to the cartilaginous rings of the trachea and bronchi. See T10 below.

The notion of a vascular connection between heart and lung is also described, with a ramification of vascular passages distributed through the lung:

**T5** (*sc.* ἡ καρδία) ἔχει δὲ κοιλίας τρεῖς, ὥσπερ εἴρηται, μεγίστην μὲν τὴν ἐν τοὶς δεξιοῖς, ἐλαχίστην δὲ τὴν ἐν τοῖς ἀριστεροῖς, μέσην δὲ μεγέθει τὴν ἀνὰ μέσον· ἔχει δὲ τὰς δύο μικράς· καὶ εἰς τὸν πλεύμονα τετρημένας ἁπάσας, κατάδηλον δὲ κατὰ μίαν τῶν κοιλιῶν. κάτωθεν δ' ἐκ τῆς προσφύσεως κατὰ μὲν τὴν μεγίστην κοιλίαν ἐξήρτηται τῇ μεγάλῃ φλεβί, πρὸς ἣν καὶ τὸ μεσεντέριόν ἐστι, κατὰ δὲ τὴν μέσην τῇ ἀορτῇ.

As I have already said, it (*sc.* the heart) has three cavities, the largest being on the right hand side, the smallest on the left, and the medium-sized one in the middle. All of them, even the two small ones, have a connexion with the lung and this is quite clearly visible in respect of one of them. Below, at the place of attachment, from the largest cavity there is a connection to the great blood-vessel (besides which lies the mesentery), and from the middle cavity there is a connexion to the aorta.

Arist. *Hist. an.* 1.17, 496a19–27 (tr. Peck)

Breath is carried to the heart via a system of passages that collects air from throughout the lung, and ultimately connects via the heart through two independent passages:

**T6** φέρουσι δὲ καὶ εἰς τὸν πλεύμονα πόροι ἀπὸ τῆς καρδίας, καὶ σχίζονται τὸν αὐτὸν τρόπον ὅνπερ ἡ ἀρτηρία, κατὰ πάντα τὸν πλεύμονα παρακολουθοῦντες τοῖς ἀπὸ τῆς ἀρτηρίας. ἐπάνω δ' εἰσὶν οἱ ἀπὸ τὴς καρδίας· πόρος δ' οὐδείς ἐστι κοινός, ἀλλὰ διὰ τὴν σύναψιν δέχονται τὸ πνεῦμα καὶ τῇ καρδίᾳ διαπέμπουσιν· φέρει γὰρ ὁ μὲν εἰς τὸ δεξιὸν κοῖλον τῶν πόρων, ὁ δ' εἰς τὸ ἀριστερόν.

Passages also lead into the lung from the heart, and they divide off just as the windpipe (τῆς ἀρτηρίας) does, running all over the lung and accompanying those which come from the windpipe. Those from the heart are uppermost. There is no common passage, but in virtue of their contact they receive the breath and convey it to the heart, one passage leading to the right cavity and the other to the left.

Arist. *Hist. an.* 1.17, 496a27–34 (tr. Peck)

Aristotle is describing the vasculature, derived from the heart, that run throughout the lung and ramify much as those pneumatic passages ramify from the trachea onwards.

Aristotle now proceeds to further emphasise the vascular nature of the lung, remarking that of all the parts of the body, the lung has the most blood (αἷμα πλεῖστον). This blood is derived from channels that arise from the vena cava (μεγάλης φλεβός).

**T7** αἷμα δὲ πλεῖστον μὲν ὁ πλεύμων ἔχει τῶν ἐν τοῖς ζῴοις μορίων τοῖς ἔχουσί τε πνεύμονα καὶ ζωοτοκοῦσιν ἐν αὑτοῖς τε καὶ ἐκτός· ἅπας μὲν γάρ ἐστι σομφός, παρ' ἑκάστην δὲ τὴν πόροι φέρουσι τῆς μεγάλης φλεβός.

Of all the parts in the body, so far as those animals are concerned which have a lung and are both internally and externally viviparous, the lung is the part which contains most blood,[24] for the whole substance of the lung is spongy, and alongside each duct passages lead from the great blood vessel.[25]

Arist. *Hist. an.* 1.17, 496a35–b4 (tr. Peck)

The nature of how blood is contained in the lung is however qualified to the extent that the blood is said to be confined to the lung's vasculature; unlike the heart, which has blood 'in itself' (ἐν αὑτῇ):

**T8** τῶν δ' ἄλλων σπλάγχνων ἡ καρδία μόνον ἔχει αἷμα. καὶ ὁ μὲν πλεύμων οὐκ ἐν ἑαυτῷ ἀλλ' ἐν ταῖς φλεψίν, ἡ δὲ καρδιά ἐν αὑτῇ· ἐν ἑκάστῃ γὰρ ἔχει αἷμα τῶν κοιλιῶν, λεπτότατον δ' ἐστὶ τὸ ἐν τῇ μέσῃ.

The only other one of the viscera which contains blood is the heart. Indeed, the blood which the lung contains is not in the lung itself but in the blood vessels, whereas the heart has blood in itself: there is blood in each of the cavities, the thinnest being in the middle cavity.

Arist. *Hist. an.* 1.17, 496b7–10 (tr. Peck)

Aristotle thus makes a fine distinction between the heart, which contains blood, and the lung, which is a haematic organ due to the nature and distribution of its vasculature, which contain and convey blood. For Aristotle this is borne out by close observation from dissection. Finally, for Aristotle, the lung is the instrument (*organon*) of breathing, due to its spongy and porous nature; this breath serves to cool the innate heat, which is why blooded land-dwellers (such as ourselves) possess a lung.[26] The motion of the lung in respiration is however, only apparent, being derived from the heart itself:

24 Cf. Aristotle, *De respiratione* 1, 470b25, where those animals whose "lung is suffused with blood" (ἔναιμον ἔχοντα τὸν πλεύμονα) breathe more for the sake of cooling the innate heat.

25 Aristotle has here noted the close relationship between the substance of the lung and its blood supply, an anatomical fact that Galen will also stress.

26 Arist. *Part. an.* 3.6, 668b32–669a1.

**T9** τοῦ δ' ἀναπνεῖν ὁ πλεύμων ὄργανόν ἐστι, τὴν μὲν ἀρχὴν τῆς κινήσεως ἔχων ἀπὸ τῆς καρδίας, ποιῶν δ' εὐρυχωρίαν τῇ εἰσόδῳ τοῦ πνεύματος διὰ τὴν αὑτοῦ σομφότητα καὶ τὸ μέγεθος. αἰρομένου μὲν γὰρ εἰσρεῖ τὸ πνεῦμα, συνιόντος δ' ἐξέρχεται πάλιν.

The lung is the instrument of breathing, taking its origin of motion from the heart, and providing ample room for the inflow of breath on account of its own sponginess and size; for when it expands breath flows in, and when it contracts breath goes out again.

Aristotle, *De partibus animalium* 3.6, 669a14–18 (tr. Lennox)

Whilst the lung is obviously important for Aristotle as the breathing instrument, its role remains secondary to that of his cardiocentric physiology. Nevertheless, the importance of Aristotle's descriptions of the lung reveal how epistemological aims may be attained by a methodology of systematic dissection and observation. Hellenistic advances in anatomical science, building on Aristotle's epistemological legacy, also sought to comprehend the functional anatomy of the parts of the body. For example, Herophilus seems to have established that the situation of the pulmonary vasculature is the opposite to that of the rest of the body, namely that the largest vein coming from the heart to the lung (our pulmonary artery) is actually like an artery (φλὲψ ἀρτηριώδης) in consistency.[27] This appellation, together with the later ascription of 'vein-like' (ἀρτηρία φλεβώδης) to what we term the pulmonary vein, has at times been a source of confusion.[28] As will be noted in section III, Herophilus also devoted his attention to the lung's motion. Hellenistic medical research, together with the later revival in the fortunes of anatomical science in the first century of the Imperial Era, helped considerably to mould the essential framework from which Galen adapted and crafted his own understanding of the nature of the lung.

27 Rufus of Ephesus, *De nominibus humani corporis partium* 203 (Daremberg/Ruelle 162 = Herophilus fr. 117 von Staden), who comments: "The evidence is explicit on one point only: that Herophilus used 'artery-like vein' to the vessel we call 'pulmonary artery'. Of 'vein-like artery' (for pulmonary vein) there is no explicit mention in the extant Herophilean testimonia and fragments…" von Staden 1989, 240.

28 Harris 1973 offers a thorough (if at times, whiggish) study of the cardio-vascular system in Greek antiquity. For his discussion on the pulmonary vasculature, see especially 281–287; 307–310 (at 286 Harris accepts as Galenic the commentary on the Hippocratic *De alimento*, but this does not significantly lessen the strength of his overall account). The best summary of Galen's views is still Fleming 1955. Useful are French 1979, 14–19, and Bylebyl and Pagel 1971. Galen had no concept of a pulmonary or 'lesser circulation', as correctly noted by Harris 1973, 310; Brain 1986, 10. Siegel 1975, 182, is unconvincing on this point. Wilson 1962 gives a comprehensive and accurate account.

## 2

Galen's anatomical work is conventionally seen in the light of his responses to Hellenistic doctors, principally Herophilus and Erasistratus.[29] Mention should, however, be made of Rufus of Ephesus (later first century CE). Ephesus was known as a centre of medical knowledge,[30] and this is arguably reflected in the detail of Rufus' anatomical descriptions. His account of the lung may well be taken as a distillation of the state of anatomical knowledge in the Imperial era prior to Galen:

> **T10** ἐξήρτηται δὲ ἀπὸ αὐτοῦ ὁ πλεύμων σομφός τε καὶ ἀραιός, περιεχόμενος τῷ κύτει τοῦ θώρακος, σφαιροειδής, καὶ μύουρος τὸ σχῆμα, διαιρούμενος εἰς λοβοὺς πέντε, τὴν χροιὰν τεφρὸς καὶ ὑπόλευκος, ἀεικίνητος, χώνης τρόπον ἐπέχων εἰς δίοδον τοῦ· τὸ γὰρ διὰ φάρυγγος ἀγόμενον εἰς τὰ βρογχία διὰ τῶν ἀραιωμάτων αὐτοῦ εἰς τὰ κενὰ τοῦ θώρακος δίεισι, καὶ πάλιν εἰς τὰ ἐκτὸς ἀπὸ τούτου διαπέμπεται τοῖς κατὰ φύσιν πόροις.
>
> The lung is suspended from the bronchus and is both spongy and loose textured, and is surrounded by the hollow of the thorax. It is spherical, but its termination has a tapering form. It is divided into five lobes, is ash-coloured or whitish, constantly in motion, and acts as a funnel in directing the passage of air. The air travels through the pharynx to the cartilaginous rings (of the trachea and bronchi) and passing through the pores (of the lung) in the cavity of the thorax, where it is taken up and excreted through the channels according to Nature.
>
> Rufus of Ephesus, *De anatomia* 27 (Daremberg-Ruelle 175,1–8)

Rufus' influence on Galen's anatomical knowledge remains moot.[31] However, Galen does make clear that certain of the generation before him were deeply interested in anatomical science. Of all these, it is Marinus whom Galen holds in highest regard.

29 Herophilus' contemporary Eudemus is viewed by Galen as equally skilled in anatomy. Cf. von Staden 1989, 62–63 and frs. 67–69 = Galen, *In Hippocratis De natura homins commentaria* 2.6 (Mewaldt 69–70 = K. 15.134–136); *PHP* 8.1.6 (De Lacy 480,26–31 = K. 5.650).

30 Cf. Scarborough 1969, 132. See also Nutton 2008; Sideras 1994.

31 Cf. Galen, *De ordine librorum suorum ad Eugenianum* 3 (Boudon-Millot 98,5–14 = K. 19.57), where Galen cites Rufus, in company with Sabinus, Pelops, and Numisianus, as a (presumably) accurate Hippocratic commentator (cf. Flemming 2008, 346). Praise for Rufus' skills in this area are given at Galen, *In Hippocratis Prorrheticum I commentaria III* 2.23 (Diels 73,8f. = K. 16.636) and *In Hippocratis Epidemiarum librum primum commentarii II* (Wenkebach 174,11–13 = K. 17B.93). The nature of Galen's borrowing from Rufus should also be noted: a section of Galen's *De locis affectis* may well consist of an unacknowledged summary or abridgement from Rufus' *On Melancholy*. Cf. Pormann 2008, 265.

Marinus 'recovered' (*anaktēsamenos*) the study of anatomy after its alleged fall into neglect.[32] Galen brackets Marinus with Numisianus, who taught Galen's teacher Pelops, as representing the only two who made any further anatomical discoveries beyond those of the Alexandrians Herophilus and Eudemus.[33] The importance of others to his epistemic methodology notwithstanding, it is significant that Galen in *On my own books* devotes more space to Marinus than to any other physician (or philosopher).[34] Galen authored a four-book summary (ἐπιτομή) of Marinus' twenty-volume *Anatomy*.[35] Galen's third volume summarises books eleven to fifteen of Marinus' work, and Book 11 is concerned with addressing whether fluid enters the lung during inspiration, and if air enters the stomach during eating. In this volume, Marinus also dealt with the organs of the thorax as well as the stomach.[36] Clearly, the lung featured as a part of the body that Marinus examined, and Galen's praise likely encompasses an anatomical debt. But there is one other who may also have been influential, and that is Lycus of Macedon. The anatomical genealogy is significant. Lycus was a pupil of Quintus, a doctor described by Galen as possessed with the 'greatest skill in anatomy' (ἀνατομικωτάτου).[37] Quintus taught Galen's first teacher in anatomy, Satyrus, another highly regarded by Galen.[38] Nevertheless, as an anatomist, Lycus is viewed by Galen as inferior to Marinus in accuracy.[39]

**32** Gal. *PHP* 8 (De Lacy 480,28–30 = K. 5.650 = fr. 68 von Staden). Galen refers to Marinus as 'most excellent' (*kratistos*). Only Hippocrates merits a similar encomium. Cf. Rocca 2003, 42–46.

**33** Gal. *HNH* 2.6 (Mewaldt 69–70 = K. 15.134–136 = fr. 69 von Staden). Cf. Gal. *AA* 2.1 (K. 2.280), where Marinus is praised (ἐπαινῶ) for writing on anatomical dissection. In that part of Anatomical Procedures which survives only in Arabic translation, Galen states that Marinus, "had accumulated no small experience in dissections, and it was he himself who had set his hand to and had observed everything that he explained in his writings" *ibid.* 14.1 (Duckworth 185). On Numisianus, see Gal. *AA* 14.1 (Duckworth 183–184), and Nutton 1993, 16–18.

**34** Gal. *Lib. Propr*. 4.9–33 (Boudon-Millot 147,16–153,4 = K. 19.25–30). It is arguable that Marinus' anatomical methodology was of a greater influence to Galen than his Hellenistic exemplars. As Nutton remarks: "the anatomical studies of Marinus influenced Galen in a variety of ways, by setting out a method of anatomy, as well as by posing questions that the anatomist ought to be able to answer." Nutton 1993, 17.

**35** Gal. *Lib Propr.* 4.9 (Boudon-Millot 147,16–17 = K. 19.25).

**36** Gal. *Lib Propr.* 4.23 (Boudon-Millot 151,4–9 = K. 19.28).

**37** Gal. *Lib. Prop.* 3.17 (Boudon-Millot 145,10–11 = K. 19.22). According to Galen, professional jealousy among Empiricist doctors resulted in Quintus being banished from Rome. Galen, *De optimo medico cognoscendo* (Iskandar 53,14–19); *De praenotione ad Epigenen* 1 (Nutton 70,2–25 = K. 14.602). Quintus, according to Galen, was "distinguished and pre-eminent in the time of Hadrian... widely known, and had gained a not inconsiderable reputation through anatomical perspicacity. But he composed no writings on anatomy as Marinus did, and Numisianus also..." Gal. *AA* 14.1 (Duckworth 183).

**38** It is Satyrus whose anatomical demonstrations Galen attended in Pergamum after the death of Quintus (Gal. *AA* 1.2, K. 2.225). Galen says Satyrus was the "most accurate" (ἀκριβέστατα) expositor of Quintus' work at Gal. *Ord. Lib. Prop*. 3.9 (Boudon-Millot 98,23–25 = K. 19.58); cf. *AA* 14.1 (Duckworth 184).

**39** "… Lycus the Macedonian, author of a book on anatomy which at the present time enjoys a wide circulation, although he is a man who, in his lifetime, had no great reputation amongst the Greeks. Had that not been the case, then most certainly I would not have omitted to go and see him also. In regard to these works of his which in this our own day I have seen in the possession of many, it is clear

To showcase Lycus' errors, Galen composed a two-volume abridgment of the anatomy of Lycus. Thanks to the discovery of the Arabic manuscript of Hunain ibn Ishâq's translation of *On my own books*, which provides the missing textual section, and subsequently confirmed by the later acquisition of the corresponding Greek text in the Vlatadon 14 manuscript, the titles of Lycus' 19 books on anatomy are now revealed.[40] Book 6 deals with the lung in death, while Book 7 deals with the lung in living beings.[41] A well-known problem of Galen's polemic is that it works to obscure any of the achievements of his rivals. In the case of Lycus, although we possess only the titles of his anatomical works, it is clear that the subject of the lung was deemed important enough by him to devote two studies to it, which examined the lung from the twin perspectives of vivisection and dissection. It is equally clear that at some level Galen must have engaged with their contents.

## 3

Galen's pneumatology relies on three organs, each linked by the arterial system, which he summaries as follows in *On the function of the parts* (*De usu partium*):

> **T11** τὸ δ' ἐκ τῶν τραχειῶν ἀρτηριῶν πνεῦμα τὸ ἔξωθεν ἑλχθὲν ἐν μὲν τῇ σαρκὶ τοῦ πνεύμονος τὴν πρώτην ἐργασίαν λαμβάνει, μετὰ ταῦτα δ' ἐν τῇ καρδίᾳ τε καὶ ταῖς ἀρτηρίαις καὶ μάλιστα ταῖς κατὰ τὸ δικτυοειδὲς πλέγμα τὴν δευτέραν, ἔπειτα τὴν τελεωτάτην ἐν ταῖς τοῦ ἐγκεφάλου κοιλίαις, ἔνθα δὴ καὶ ψυχικὸν ἀκριβῶς γίγνεται [πρότερον].
>
> The outer pneuma[42] drawn in by the rough arteries receives its first elaboration in the flesh of the lung, its second in the heart and the arteries, especially

that they are constructed out of the writings of Marinus, but they are all full of errors, and are moreover less comprehensive even than the books of Marinus himself." Gal. *AA* 14.1 (Duckworth 184–185). Lycus' work on anatomy is error-ridden, *AA* 4.10 (K. 2.470); cf. *ibid*. 4.6, 4.7 (K. 2.449, 451, 458–459). Lycus also apparently wrote inaccurately concerning Hippocrates, Gal. *Ord. Lib. Prop*. 3.9 (Boudon-Millot 99,3–5 = K. 19.58). Cf. Smith 1979, 67. Lycus' physiology is also said to be incorrect. For example, his views on the formation of urine, Gal. *Nat. Fac*. 1.17 (Helmreich 152 = K. 2.70). Galen prefaces one of his public anatomical demonstration in Rome by announcing that he will examine the errors of his predecessors, but some doctors in the audience tell him not to waste his time since Lycus had already written down all the discoveries up to his own time. Galen should rather concentrate on using Lycus as his point of comparison, which he proceeds to do—albeit not in the way these doctors had intended. Cf. Gal. *Lib. Prop*. (Boudon-Millot 144,25–145,15 = K. 19.22).

40 See Boudon-Millot 2002; Boudon-Millot and Pietrobelli 2005.

41 Gal. *Lib. Prop*. (Boudon-Millot 153,10–11). Cf. Boudon-Millot 2002, 16.

42 Here Galen means air (ἀήρ), not pneuma in the Erasistratean sense. See above, n. 4 and 7.

those of the retiform plexus, and then a final elaboration in the ventricles of the encephalon, which perfects its transformation into psychic pneuma.

Galen, *De usu partium* 7.8 (Helmreich 1.393–394 = K. 3.541–542, tr. May, slightly modified)

This sequential elaborative schema is critically important for Galen, as it not only forms the structure of his pneumatic physiology, but also serves to validate his hegemonic notion that, as psychic pneuma is formed in the encephalon, that organ, and no other, is thereby the source of motion and sensation.[43] Thus, Galen endorses Erasistratus' view that psychic pneuma and vital pneuma 'proceed from' (ὁρμᾶσθαι) the encephalon and heart respectively, while refuting the position held by the Stoic Diogenes of Babylon (and by Peripatetics) who claimed that the *hēgemonikon* must reside in the heart since it is that part which first draws in nutriment and pneuma.[44] For Galen however, the fact that the encephalon is the controlling centre of the body (by virtue of the presence and formation there of psychic pneuma) does in no way lessen the importance of the heart and lung. On the contrary they are indispensable parts of Galen's physiology, and he thus accords them the attention they merit. The lung, therefore, is cited in *Anatomical Procedures* (*AA*) as one of the three most important instruments (τὰ κυριώτατα τῶν ὀργάνων) for breathing:

**T12** πνεύμων μὲν οὖν καὶ καρδία καὶ θώραξ τὰ κυριώτατα τῶν τοῦ πνεύματος ὀργάνων ἐστίν· ἐφεξῆς δὲ αὐτοῖς ἀρτηριῶν γένος διττόν· ἓν μὲν ἀπὸ τῆς ἀριστερᾶς κοιλίας τῆς καρδίας εἰς ὅλον τὸ σῶμα νενεμημένον, αἳ καὶ κατὰ τὸν αὐτὸν ῥυθμὸν πᾶσαι σφύζουσι τῇ καρδίᾳ· πασῶν δ' αὐτῶν ἐστιν ἓν κοινὸν οἷόν τι πρέμνον ἡ ἀρτηρία ἡ μεγίστη... ἕτερον δὲ γένος ἀρτηριῶν, ἃς ὀνομάζουσι τραχείας, ἐν τραχήλῳ μὲν μία μεγίστη, καθ' ὅλον δὲ τὸν πνεύμονα ταύτης ἀπονεμήσεις πολλαί.

The most important instruments for breathing are the lung, the heart and the thorax. After these come two types of arteries. One of which arises from the left ventricle of the heart and is distributed throughout the body, and pulsates with the same rhythm as the heart. They branch, as from a trunk, from the greatest artery… The second is called the trachea, and is greatest in the neck and has multiple subdivisions in the lung.

Gal. *AA* 7.1 (K. 2.589–590, tr. Singer, modified)

43 For a summary of the hegemonic concept, see Rocca 2003, chapter 1.

44 Gal. *PHP* 2.8.38–43 (De Lacy 164,13–31 = K. 5.281). Cf. *ibid* 1.6.3 (De Lacy 78,24–26 = K. 5.185 = fr. 203 Garofalo). See the discussion in Tieleman 1996, 77–86. Galen's argument here is tied to his stress on the material nature of pneuma. See n. 70 below.

This interconnected organic schema of blood and air passages, which bear Aristotle's imprimatur, further stresses the vascular relationship between lung and heart – an anatomical fact that Aristotle had outlined, Hellenistic investigations fleshed out, and Erasistratus used to considerable advantage in his own pneumatic physiology, to reinforce the notion that the arterial system contained only pneuma.[45] For Galen, a fundamental point of departure from this Erasistratean scheme was the insistence that his own physiological theory was dependent on blood *and* pneuma together being present in the arteries.[46] One also notes from the above citation that for Galen the thorax is an instrument (*organon*) for breathing. In *Anatomical procedures*, Galen states that his anatomical teachers, Quintus and Numisianus – following Erasistratus – had 'demonstrated and shown' (ἀποδειξάντων τε καὶ δειξάντων) that the lung is moved by the thorax (that is to say, the intercostals and accessory musculature, including the diaphragm).[47] It is for Galen a voluntary motion, an exercise of the will as performed by the muscles.[48] Here Galen seems to depart from the view of Herophilus, who, while holding that the thorax had a role to play in respiration, also apparently maintained that the lung possessed a unique 'natural tendency' (ὀρέγεσθαι φυσικῶς) of dilation and contraction.[49] Pneuma is drawn from outside through the 'activity' (ἐνέργειαν) of the lung.[50] Of course, this could be interpreted as Herophilus simply acknowledging that the lung is able to move by its own nature *qua* a spongiform body possessing natural elasticity. But it does seem clear Herophilus advocates the lung actively initiating the respiratory cycle. For Galen, the lung is moved by the thorax (which stresses the importance of nervous control), and that such motion is facilitated by the physical nature of the lung. At any event, for Galen, allowing the lung no *kinesis* of its own returns the lung not to a passive instrumentality, but one which emphasises its function as an organ principally of preliminary pneumatic elaboration. The activity of the lung for Galen is not so much to draw in pneuma but

45 "Erasistratus… reasserts an essential connection between the respiratory and vascular systems: the arteries contain only pneuma, and this pneuma is pumped into the arteries by the left ventricle of the heart, to which it has in turn been drawn from the outer atmosphere via the throat, the windpipe, the bronchi or 'first arteries', and the pulmonary vein. Later Galen was to adapt this view to the purposes of his own pneumatology." von Staden 1989, 260.

46 "He (*sc.* Erasistratus) believes that the artery is the vessel of the pneuma, and the vein of the blood (ἀρέσκει δὲ αὐτῷ πνεύματος μὲν ἀγγεῖον εἶναι τὴν ἀρτηρίαν, αἵματος δὲ τὴν φλέβα). Galen, *De venae sectione adversus Erasistratum* 3 (K. 11.153), tr. Brain, 19. The matter is extensively dealt with in Gal. *Art. Sang.* (Furley/Wilkie 144–183 = K. 4.703–736).

47 Gal. *AA* 8.2 (K. 2.660). In Gal. *UP* 6.3 (Helmreich 1.327 = K. 3.448), it is explicitly stated that the lung possesses no motion of its own but is always set in motion by the thorax.

48 This is discussed in Galen, *On problematical movements* 2.5–13 (Nutton/Bos 272–280, with the commentary).

49 Aëtius, *Placita philosophorum* 4.22.3 = Ps.-Plutarch, *Placita philosophorum* 4.22, 903f–904b (Mau 130–131 = fr. 143a-b von Staden), cf. Ps.-Galen, *Historia Philosopha* 103 (DG 639 = K. 19.317–318 = fr. 143c von Staden).

50 *Ibid.* As von Staden notes: "Herophilus' explanation is therefore novel in so far at it introduces… the concept of a natural tendency to dilate and contract. This is not a voluntary motion… but rather of the involuntary motions, calling for an entirely different kind of explanation." von Staden 1989, 262.

to process external air brought into the lung by the actions of the thorax.[51] The key to the lung as an essential pneumatic instrument is the vascular interrelationship of lung and heart which is spelt out by Galen in *On the function of the parts* which provides the most complete depiction of the anatomy of the lung.[52] First, the lung as primarily a vascular plexus is directly compared to another richly haematic organ, the liver (and as shall be shown, Galen uses the analogy with the liver more than once to draw attention to a specific attribute of the lung):

> T13 πλέγμα δή τι καὶ τοῦτ' ἔστι τὸ σπλάγχνον, ὥσπερ καὶ τὸ ἧπαρ, ἀγγείων παμπόλλων, μαλακῇ σαρκὶ καθάπερ στοιβῇ τινι τὰς μεταξὺ χώρας ἀναπεπληρωμένον. ὁρμᾶται δὲ τῶν ἀγγείων τὸ μὲν ἐκ τῆς ἀριστερᾶς κοιλίας τῆς καρδίας, τὸ δ' ἐκ τῆς δεξιᾶς, τὸ δ' ἐκ τῆς φάρυγγος.
>
> Like the liver, this viscus too is a plexus of very many vessels with the spaces between the vessels filled with soft flesh like padding. One of the vessels originates from the left ventricle of the heart, another from the right ventricle, and another from the pharynx.[53]
>
> Gal. *UP* 7.2 (Helmreich 375–376 = K. 3.517, tr. May)

Here the vascular branches (*plegma*) which ramify in the lung are placed in direct relationship to the similarly-arranged network of pneumatic passages, which have their point of origin at the pharynx. From the pharynx arises the trachea or windpipe, which Galen says, "some term 'rough artery,' and others name it bronchus" (ὅ τινες μὲν τραχεῖαν ἀρτηρίαν, ἔνιοι δὲ βρόγχον ὀνομάζουσι).[54] Galen has taken some pains to delin-

51 For an analysis of respiratory motion, see Debru 1996, chapter 3.

52 Why this is not done in *Anatomical Procedures* may at first glance seem odd. However, Galen has probably dealt in part with the anatomy of the *lung* in his (lost) *On the motions of the lung*, an early (but later revised) work.

53 Nature has placed the lung between the pharynx and the heart as a 'reservoir for pneuma' (ταμιεῖον πνεύματος). Gal. *UP* 6.2 (Helmreich 1.301–302 = K. 3.413).

54 Gal. *UP* 7.3 (Helmreich 1.376–377 = K. 3.518). For Galen, the trachea is the 'artery of the lung' (ἡ ἀρτηρία τοῦ πνεύμονος), and is composed of cartilage (ἐκ τῶν βρογχίων), Gal. *UP* 7.7 (Helmreich 1.389 = K. 3.535). These terms are flexible. In the same book of *UP*, for example, Galen refers to the larynx (λάρυγγος) as head of the bronchus (βρόγχου κεφαλή), and the trachea as the bronchus (διότι καὶ αὐτὴν τὴν τραχεῖαν ἀρτηρίαν βρόγχον καλοῦσι), Gal. *UP* 7.11 (Helmreich 1.400 = K. 3.551). Cf. Galen, *In Hippocratis De acutorum morborum victu* (Helmreich 152, 250 = K. 15.492, 691–2). This association of related terms reinforces the vessel-like nature of the vascular and pneumatic carrier systems of the lung. And at Gal. *AA* 7.1 (K. 2.589–590) where the aorta (and its branches) and the respiratory passages (starting with the larynx) are referred to simply as a dual arterial system (ἀρτηριῶν διττόν). As Lewis and Gregoric 2015, 130 point out, citing this passage from *AA*: "… it is not at all clear that this concept of the windpipe, bronchi and vessels as a continuous system had disappeared by the third century BC. On the contrary, the windpipe, bronchi and pulmonary vessels were still generically called *artēriai* and distinguished by some writers by

eate the lobes of the lung: and proceeds to again employ the comparison of the liver to highlight the chief function of the lobular structure of the lung:

**T14** ἀλλὰ καὶ περὶ τῆς εἰς τοὺς λοβοὺς αὐτοῦ σχίσεως εἴρηται. καὶ χρὴ καὶ περὶ τούτων τῶν κεφαλαίων ἀναμνῆσαι μόνον, ὡς πρώτην μὲν χρείαν ὁμοίαν τοῖς κατὰ τὸ ἧπαρ ἔχουσιν. ὡς γὰρ ἐκεῖνο καθάπερ δακτύλοις τισὶ τοῖς λοβοῖς ἀσφαλέστερον περιλαμβάνει τὴν κοιλίαν, οὕτως ὁ πνεύμων τὴν καρδίαν. ἔπειτα δὲ καὶ ὡς ἐν ἑκατέρῳ τῷ μέρει δυοῖν ὄντοιν ὁ μὲν ἕτερος τὴν ἄνω τοῦ θώρακος εὐρυχωρίαν τὴν ὑπὲρ τὰς φρένας, ὁ δ᾽ ἕτερος τὴν κάτω καταλαμβάνει. καὶ μέν γε καὶ ὡς ὁ πέμπτος ὁ σμικρὸς ὁ κατὰ τὸ δεξιὸν μέρος, ὁ τρίγωνος, ἕνεκα τῆς κοίλης γεγένηται φλεβός. καὶ μέν γε καὶ πρὸς τὸ διαστέλλεσθαι καὶ συστέλλεσθαι ῥᾷόν τε ἅμα καὶ δυσπαθέστερον τῷ παντὶ σπλάγχνῳ ἡ εἰς τοὺς λοβούς ἐστι τομή. συνεχὲς γὰρ εἴπερ ἑαυτῷ κατὰ πάντ᾽ ἐγεγόνει τὰ μέρη, τάχ᾽ ἂν ἐπόνησέ ποτε τῶν μορίων αὐτοῦ τι κατὰ τὰς σφοδροτέρας εἰσπνοάς, ἀθρόως ἁπάσας τοῦ θώρακος ἐκπληροῦν ἀναγκαζομένου τὰς εὐρύτητας.

I have spoken about the division of the lung into lobes. It is necessary only to remind you in regard to them of the main points: the principal function of the lobes is similar to that of the lobes of the liver; for just as the liver clasps the stomach more safely with its finger-like lobes, so in the same way do the lungs the heart. Next, are two lobes on each side, one of which occupies the upper part of the space in the thorax above the diaphragm, and the other the lower part. Moreover, the small, triangular, fifth lobe on the right side was formed for the sake of the vena cava. Another purpose of the division into lobes was to make it possible for the whole viscus to expand and contract more easily and with less risk of injury. For if it had been formed with all is parts contiguous, one of them might perhaps suffer during more vigorous inspiration when the lung is under the necessity of filling the whole space within the thorax all at once.

Gal. *UP* 7.10 (Helmreich 1.400 = K. 3.550–551, tr. May, slightly modified)

Galen details the lobular structure: there are two lobes on each side, and a fifth, small, triangular lobe on the right side. The lobular division of the lung helps facilitate its expansion and contraction, as well as allowing itself more easily to fit inside the narrow parts of the thorax. Galen notes that there are five lobes of the lung, but because

adding qualifying adjectives, τραχεῖαι (rough) and λεῖαι (smooth). Even Galen… speaks of all *artēriai* (the windpipe, bronchi and all vessels connected to the left side of the heart) as a continuous part of the respiratory system." See also Hyrtl 1880, 555–557; Skoda 1988, 106–109.

of the proximity of the inferior vena cava to the fifth lobe, the purpose of this lobe is now teleologically detached from a pneumatic function to one of support (since it was formed for the sake of the vena cava), similar to Galen's understanding of the role of glandular structures.[55] There now remains the vascular nature of the lung. According to Galen, the lung receives the nutriment (τροφῆς) that it requires directly from the heart.[56] Although the vena cava passes by in contact with the lung, it is not appropriate for the lung. In fact, the lung requires quite a peculiar vessel, one which must have an outgrowth of membranes, like a vein, so that in the case of the lung, the vein is like an artery, and the artery like a vein, as explained below:

**T15** οὐ γὰρ δὴ μάτην οὐδ' ὡς ἔτυχεν ἡ πάντα σοφὴ φύσις, ὥσπερ οὐδ' ἄλλ' οὐδὲν ἐποίησεν ἐν ἅπασι τοῖς ζῴοις, οὕτως οὐδὲ τοῦ πνεύμονος ἐνήλλαξε τῶν ἀγγείων τοὺς χιτῶνας, ἀρτηριώδη μὲν ἐργασαμένη τὴν φλέβα, φλεβώδη δὲ τὴν ἀρτηρίαν. ἐν μὲν γὰρ τοῖς ἄλλοις ἅπασι μορίοις τῆς ἴσης ἀρτηρίας τῇ φλεβὶ τὸ πάχος τῶν χιτώνων οὐκ ἴσον, ἀλλ' εἰς τοσοῦτον ἄρα διενήνοχεν, ὥσθ' Ἡρόφιλος ὀρθῶς ἐστοχάσθαι δοκεῖ, τὴν ἀρτηρίαν τῆς φλεβὸς ἑξαπλασίαν ἀποφηνάμενος εἶναι τῷ πάχει. κατὰ δέ γε τὸν πνεύμονα μόνον ἁπάντων ὀργάνων τε καὶ μορίων ἡ μὲν ἀρτηρία φλεβός, ἡ δὲ φλὲψ ἀρτηρίας ἔσχε χιτῶνας.

Now when Nature, who is wise in all things, interchanged the tunics of the pulmonary vessels, making the vein like an artery and the artery like a vein, she was not acting in any idle or haphazard manner, any more than she ever does in making any other structure in any animal. Though an artery may be similar to a vein in all its other parts, in the thickness of its tunics it is not the same. On the contrary, it is so different that Herophilus seems to have calculated correctly when he declared that an artery is six times as thick as a vein. Of all the instruments and parts the lung is the only one in which the artery has the tunics of a vein and the vein those of an artery.

Gal. *UP* 6.10 (Helmreich 1.324–325 = K. 3.444–445 = Herophilus fr. 116 von Staden, tr. May)

The vasculature of the lung derives ultimately from the heart itself. These comprise (i), the *pulmonary vein* (ἀρτηρία φλεβώδης: 'vein-like artery' or venous artery), which comes from the left ventricle and is the means by which the pneumatic material prepared by the lung enters that chamber for elaboration into vital pneuma; (ii), the *pulmonary artery*

55 On Galen's handling of glandular structures, see Marmelzat 1991.

56 This point of origin is sometimes neglected, and potentially misleading stress thereby laid on the pulmonary artery and vein as two discrete structures in themselves without taking into account that they ramify throughout the lung.

(φλὲψ ἀρτηριώδης: 'artery-like vein' or arterial vein), by which the lung is supplied with nutriment by the right ventricle.[57] The reversed structural anatomy of these two vessels (and the advantage taken by this apparent anatomical discrepancy) enables Galen to make the claim that the lung is unique in its vascular supply, which serves to further enhance its physiological status as a pneumatic instrument. The subject of the pulmonary artery and pulmonary vein has generated much debate in the secondary literature.[58] Yet for Galen the matter is a relatively simple one since it is in accord with the dictates of a Nature (ἡ φύσις) who notes and attends to the dual needs of the lung: the export of the pneuma-like entity it elaborates, and to furnish it with nourishment. These needs are reflected in the nature of the lung and its blood supply. In the lung, and only in the lung, the function of these vessels is reversed, and are themselves presented as justification of the lung's unique structure. The lung's structure is very light – it appears to be made up of congealed, bloody foam, and so it requires light and spirituous blood. The thick tunic of the artery supplying the lungs will ensure that only thin, spirituous liquid can reach the lungs:

**T16** τῷ δὲ πνεύμονι παχὺς καὶ πυκνὸς γενόμενος οὐδὲν ὅτι μὴ τὸ λεπτότατον ἐπιτρέπει διέρχεσθαι. καὶ τοῖς μὲν ἄλλοις αἱ ἀρτηρίαι παχεῖαι καὶ πυκναὶ γενηθεῖσαι παντάπασιν ὀλίγον ἀτμώδους αἵματος τοῖς παρακειμένοις μορίοις ἔλκειν ἐπιτρέπουσι, τῷ δὲ πνεύμονι μόνῳ πάμπολυ τὸ τοιοῦτον μεθιᾶσιν, ὑπὸ μανότητός τε καὶ λεπτότητος ἀδυνατοῦσαι στέγειν. ὥστε πάντη τῷ πνεύμονι τὰ περὶ τὴν τροφὴν ὑπεναντίως ἔχει τοῖς ἄλλοις ἅπασι τοῦ ζῴου μορίοις, ὥσπερ καὶ τὰ τῆς τοῦ σώματος ἰδέας. οὔτε γὰρ οὕτω μανὸν καὶ κοῦφον καὶ πνευματῶδες εὕροις ἂν ἕτερόν τι μόριον ἀλλ᾽ οὐδ᾽ ἐγγὺς οὔθ᾽ οὕτως αἵματι καθαρῷ καὶ λεπτῷ καὶ ἀτμώδει τρεφόμενον.

Since the tunic of the vessel supplying the lung is thick and dense, it permits nothing but the thinnest blood to pass through. Elsewhere in the body the arteries, having been made thick and dense, permit the surrounding parts to attract an exceedingly small amount of spirituous blood. Only to the lung do they release a very large portion of such blood, being unable to retain it because they are thin and loose-textured. Thus the plan for the nutrition of the lung is the precise opposite of that for all the other parts of the living body, just as its substance too is the opposite of theirs. You will not find any other part that is

57 That is, venous blood from the liver which has been elaborated into a more suitably refined form of nourishment by its interaction with vital pneuma in the right ventricle of the heart. In this respect, and in this only, Galen's pneumatic and vascular systems may be said to 'circulate' in a general sense. They form an interdependent system.

58 See T9 above.

> so loose-textured, light, and airy, nor one nourished with blood that is nearly so pure, thin, and spirituous.
>
> Gal. *UP* 6.10 (Helmreich 1.328–329 = K. 3.450–451, tr. May, 299, slightly modified)

Like any other organ, the lung needs nutriment to function. Its appearance, which Galen compares to being 'of congealed bloody foam' (ἐξ ἀφροῦ τινος αἱματώδους πεπηγότος), not only recalls the description of earlier writers, noted above, but betokens an organ which demands blood which is similarly attenuated in the sense of 'spirituous, thin, and pure blood' (ἀτμώδους καὶ λεπτοῦ καὶ καθαροῦ τοῦ αἵματος).[59] From the right ventricle is sent the thick-walled, artery-like vein (Galen's arterial vein; our pulmonary artery), which, operating *qua* artery in the lung substance, releases a small amount of the pure, manufactured blood. Indeed, since it is an artery, for its tunic is 'thick and dense' (πλεῖστον τοῦ παχέος), then it can in any case release only a small amount of this purer, attenuated blood. Such blood reflects not only a haematically-charged organ, but also the nature of the material it is charged with nourishing. In this respect, considering only this source of blood, the lung itself is absolutely unique in that it alone is the first to receive blood that is 'precisely elaborated and attenuated' (ἀκριβῶς κατειργασμένου τε καὶ λελεπτυσμένου). [60]

The above citation also reveals that the lung has another source of blood: the vein-like artery, Galen's venous artery (our pulmonary vein), which not only transmits the pneuma-like entity elaborated by the lung to the left ventricle, but blood from the left ventricle as well, since here too the reversed anatomical architecture of the vasculature is reflected in their tunics.[61] The venous artery, like veins elsewhere, has a wall that is 'thin and loose-textured' (μανότητός τε καὶ λεπτότητος), and therefore releases to the lung a copious amount (πάμπολυ) of blood. The lung is a voracious organ haematically. In tandem with this notion of a large demand or capacity of blood, the lung has a large pneumatic capacity. Galen compares the lung to a large reservoir not *of* pneuma but *for* pneuma.[62] And as Galen reminds us above, the nutritional needs of the lung exceed

**59** These adjectives emphasize the special nature of both blood and lung, albeit at the expense of the quality of blood from the liver. Note the repetition of this cascade at the end of the passage.

**60** καὶ μέν γε καὶ ἄλλας τρεῖς ἐπικουρίας τῷ πνεύμονι πρὸς εὐπορίαν τροφῆς ἡ φύσις ἐγίγνωσκεν ἐξ ἀνάγκης ἐσομένας, μίαν μὲν τὸ πλῆθος τῆς ἐγχωρίου θερμότητος εἰς λεπτὰ καταθραυούσης καὶ διαχεούσης ἅπασαν τὴν τροφήν, ὡς ἀτμίζειν ἑτοιμότερον, ἑτέραν δὲ τὴν ἐν ταῖς εἰσπνοαῖς τοῦ πνεύμονος διάστασιν ἐξαρπάζουσάν τι βιαίως κἀκ τῶν πυκνοτάτων ὀργάνων, καὶ τρίτην, ἣ καὶ μεγίστη πασῶν, ἀπὸ καρδίας ἐπιπεμπομένου μόνῳ τῷ πνεύμονι τοῦ αἵματος ἀκριβῶς ἐν ἐκείνῃ κατειργασμένου τε καὶ λελεπτυσμένου. Gal. *UP* 6.10 (Helmreich 1.330 = K. 3.452).

**61** This reverses too the traditional (not to say, canonic) left side of the heart (artery) – right side of the heart (vein) distinction.

**62** ὁ δὲ πνεύμων οἷα βαθὺς γαστὴρ ὑπόκειται τῷ πνεύματι ("the lung serves as a deep belly, so to

that of any other organ. For the lung is constantly in motion (derived from the thorax), and its proximity to the heart, the body's great heat source, means in effect that part of the lung's blood supply acts as a heat exchanger (and heat sink) to help thermo-regulate that organ.[63] Both the lung's anatomical position and its mode of function demand a dual source of blood. And while it is dependent on the heart for its very existence, it should by no means be seen as a passive instrument.

The nature of the lung as a richly-endowed vascular plexus is crucial for Galen in another physiological sense as it permits the lung to be compared to another vascular structure, the liver. The heavier flesh of the liver reflects that it was made to concoct nutriment to blood. So too, the aetherial lung is thus perfectly fabricated teleologically to concoct air:[64]

**T17** ἀλλ' ἔν γε τῷ κατὰ φύσιν ἔχειν αὐτό τε τὸ μεταλαμβανόμενον ἐκ τῶν τραχειῶν εἰς τὰς λείας πνεῦμα παντελῶς ὀλίγον ἥ τε σὰρξ τοῦ πνεύμονος ἀερώδης ὁρᾶται καὶ πνεύματος μεστή, σαφῶς εἰς πέψιν ἀέρος ἐνδεικνυμένη παρεσκευάσθαι, καθάπερ ἡ τοῦ ἥπατος εἰς τὴν τῆς τροφῆς. εὔλογον γὰρ οὐκ ἀθρόως οὐδ' ἐξαίφνης τὸν ἔξωθεν ἀέρα τοῦ κατὰ τὸ ζῷον πνεύματος γίγνεσθαι τροφήν, ἀλλὰ κατὰ βραχὺ μὲν ἀλλοιούμενον, ὥσπερ γε καὶ τὰ σιτία, δεχόμενον δὲ τὴν οἰκείαν ποιότητα τῷ συμφύτῳ πνεύματι χρόνῳ πλείονι, καὶ ταύτης τῆς ἀλλοιώσεως τὸ πρῶτον ὄργανον ὑπάρχειν τὴν τοῦ πνεύμονος σάρκα, καθάπερ γε καὶ τῆς εἰς αἷμα μεταβολῆς ἡ σὰρξ τοῦ ἥπατος ἐδείκνυτο τὴν αἰτίαν ἔχειν.

But when conditions are according to Nature, very little actual air is taken over from the rough into the smooth arteries[65] and the flesh of the lung appears light and full of air, showing plainly that it was made to concoct the air, just as the flesh of the liver was made to concoct the nutriment. For it is reasonable that the outer air does not become the nutriment of the pneuma in the animal's body suddenly and all at once; rather, it is altered gradually, just as the food is too, and over a period of time acquires the quality proper to the innate pneuma,

speak, for pneuma"), Gal. *Caus. Resp.* 3 (Furley/Wilkie 240 = K. 4.466, tr. Furley and Wilkie). In Gal. *UP* 6.2 (Helmreich 1.301 = K. 3.413), the lung is a reservoir for breath (καθάπερ τι ταμιεῖον πνεύματος).

63 Gal. *UP* 6.5 (Helmreich 1.326–327 = K. 3.448).

64 Galen now has the vascular arrangement he requires for the elaborative task to hand. This emphasizes that the liver has no need for a natural pneuma. The liver is the source of a faculty (*dynamis*) responsible for what that organ performs; this, and the veins which spring from it are compared to the similar sort of nutritive nature or soul (and root system) found in plants – Gal. *UP* 4.13 (Helmreich 1.226 = K. 3.308). On the problematic status of the natural pneuma in Galen, see Rocca 2012.

65 That is from the trachea (τραχεῖα ἀρτηρία) to the two bronchi.

> the principal instrument of this alteration being the flesh of the lung,[66] just as I have shown the flesh of the liver to be responsible for changing the nutriment into blood.
>
> Gal. *UP* 7.8 (Helmreich 1.392 = K. 539–540, tr. May, slightly modified)

The analogy made with concoction (*pepsis*) of nutriment (*trophē*) is qualified when Galen states it is 'reasonable' (*eulogon*) that the outer air does not suddenly become the nutriment of the pneuma, but, like food, requires a sufficient period of time for a qualitative conversion. This qualification is a necessary one for Galen's argument.[67] In *PHP*, he reiterates the importance that not only sufficient time is essential for a 'great and perfect work' (τῶν τελέων τε καὶ μεγάλων ἔργων) to be performed, but that no single organ can perform the entire elaborative process.[68] Galen's pneumatic physiology is thus irrevocably wedded to an interconnected set of organs, of which the lung is the first elaborative stage. Moreover, that pneuma and nutriment are regarded by Galen as two primary materials essential for life, adds to the overall concept of the broad physiological symmetry of the two processes.[69] For Galen speaks of the so-called 'material pneuma' (πνεῦμα ὑλικόν), "analogous to the dry and moist nutriment."[70] What Galen wishes understood by the use of such analogies is that they are not only valid inferences but also *transferable*. The account of the functional organization of one organ may be analogously shifted to another: each organ, in Galen's teleological physiology, possesses an innate, unique function, mobilised for the sake of the activities proper to that organ and to no other. Galen makes this clear in the following:

> **T18** κατὰ δὲ τὸ ἴδιον εἶδος ἑκάστης οὐσίας ἰδίαν ἀναγκαῖον εἶναι τὴν ἐνέργειαν. οἷον γάρ ἐστι τὸ τοῦ πνεύμονος σῶμα κατὰ τὴν οὐσίαν οὐκ ἂν εὕροις ἕτερον οὐδ' οἷον ἐγκέφαλος οὐδὲν ἄλλο τοιοῦτον, ὥσπερ οὐδὲ ὁποῖον ἡ καρδία σῶμα κατὰ τὴν οὐσίαν ἐστὶν οὐδὲν ἀκριβῶς ἄλλο τοιοῦτον ὑπάρχει, καὶ νεφροὶ δὲ καὶ σπλήν, ἑκάτερον αὐτῶν οἷον οὐκ ἄλλο, καὶ διὰ τοῦτο ἡ ἐνέργεια

66 This is affirmed at *UP* 7.9 (Helmreich 1.396 = K. 3.545): τὸ δὲ καὶ τὴν τοῦ πνεύμονος σάρκα μαλακὴν καὶ μανὴν καὶ ἀφρώδη ποιῆσαι χάριν τοῦ τὸν ἔξωθεν ἀέρα προπέττειν, ὡς τροφὴν οἰκείαν προνοησαμένην αὐτὴν τῷ πνεύματι τῷ ψυχικῷ θαυμάζεσθαι δίκαιον.

67 See Debru 1996, 163.

68 Gal. *PHP* 6.6 (De Lacy 398,7–10 = K. 5.551).

69 For Erasistratus as well: Anonymus Londinensis col. xxii (Manetti 49–52 = fr.78 Garofalo), cf. 23 (Manetti 6–9). See also Pohlenz 1949, 51–52. On the notion of coction in Aristotle (from which Galen draws heavily), see Lloyd 1996, chapter 4.

70 τὸ δὲ ἀνάλογον τῇ ξηρᾷ καὶ ὑγρᾷ τροφῇ. Gal. *PHP* 2.8 (De Lacy 164,17–18 = K. 5.281). De Lacy notes: "From the context it appears that by 'material pneuma Galen refers to air inhaled, which is analogous to food and drink insofar as it is a substance that the body receives from outside." De Lacy 2005, 636. Cf. Galen, *De plenitudine* (K. 7.525), where Galen describes pneuma as the "breathing substance" (πνευματικὴ οὐσία).

καθ' ἕκαστον ἴδιος ἐπὶ τῷ τῆς οὐσίας ἰδίῳ, καὶ εἴ τις δὲ σὰρξ ἰδιότητα πολλὴν ἔχει παρὰ τὰς ἄλλας σάρκας.

But to the extent that each substance has its own individual form, it must also have its own individual activity. The body of the lung has a substance of a kind that you would not find in any other body, and you would find no other like the encephalon, just as there is also none whose substance is of exactly the same description as that of the heart or kidneys or spleen. Each of them is like no other, and therefore each has its individual activity in addition to its individual substance; and so with any flesh that is markedly different in character from the rest.

Gal. *PHP* 6.8 (De Lacy 412,16–23 = K. 5.569–570, tr. De Lacy, slightly modified)

The elaboration of external air by the lung is the first step in Galen's physiology of pneumatic elaboration, and that organ is the starting point from which Galen documents the importance of the necessity of elapsed time for this process to occur. He makes a further analogy with another elaborative instrument of pneuma, the retiform plexus at the base of the encephalon.[71] Within this arterial network Galen places the beginning of the elaboration of psychic pneuma from vital pneuma, a process which must also take a significant amount of time to complete, in order for the Galenic account to be consistent. This plexus is able to elaborate what is presented to it because of its peculiar nature. Further, Galen compares the retiform plexus to the varicose structure of the testicular vasculature that produces semen from blood and pneuma.[72] A long, coiled vascular plexus guarantees that the material to be elaborated is held within the vessel walls for the requisite period.[73] Once again what is stressed is the importance of sufficient time spent by the material to be elaborated within a specific vascular arrangement. We are therefore invited to note carefully the nature of the vasculature of the organ under consideration. The blood supply of the lung may not be a coiled one, but the complex

71 Cf. Galen, *De methodo medendi* 12.5 (K. 10.839–840), and the discussion in Rocca 2003, 202–219.

72 Gal. *UP* 9.4 (Helmreich 2.12 = K. 3.699–700). In *De Semine* this elaboration is partly described as a combination of coction and clotting of the blood while it remains in the spermatic vasculature. Gal. *Sem.* 1.15.19 (De Lacy 118,21–22 = K. 4.567). Cf. Gal. *Sem.* 1.12.1–15 (De Lacy 106,14–108,23 = K. 4.555–556), where the physiological change from blood to semen is described.

73 At *UP* 16.10 (Helmreich 2.419–420 = K. 4.322–323), Galen states that both milk and semen are generated from blood which has been perfectly concocted from within vessels that have traveled a considerable distance. In particular, the coiled or twisted nature of the testicular vessels allows time for the process of coction to occur, and the nature of their vascular anatomy is compared to that of the retiform plexus, whose arteries 'nourish the psychic pneuma' (τρέφονσι τὸ ψυχικὸν πνεῦμα). Cf. Gal. *Sem.* 1.12.9 (De Lacy 108,9–10 = K. 4.556) and 1.14.7–10 (De Lacy 114,10–21 = K. 4.562–563), where the length of time blood spends in the testicular vasculature is also stressed.

ramifications of its many branches provide the requisite measure of physiological delay essential to Galen's elaborative enterprise.

## 4 Conclusion

Galen's lung is an instrument of vocalization and of breathing and is structured to deal efficiently with an air-like substance. The nature of the particular flesh of the lung is responsible for the elaboration of the outside air. It is able to do so, since, like any other organic substance, it has its own particular form (*idea*) and contains its own activity (*energeia*). This not only guarantees an organ's uniqueness by Galen's lights, but prevents any unnecessary duplication of function. The replication of the blood supply of the lung is only an apparent one, since it makes possible the lung's unique elaborative function and so is in accord with Nature (*kata physin*). The lung's substance is teleologically fixed since it is "clearly made to concoct the air" (εἰς πέψιν ἀέρος ἐνδεικνυμένη παρεσκευάσθαι). The comparison with the process of concoction of nutriment is strengthened by Galen's referring to the outside air as the nutriment of pneuma *within the body*, and like the assimilation of the body's nutriment, this process of qualitative alteration of the outside air within the lung must be a *gradual* process.[74] The result is to instill a proper and perfect quality to a now fully innate pneuma so that its physiological role – which commences in the heart and finds completion in the encephalon – can proceed. Facilitated by the powerful anatomical epistemology at Galen's disposal, pneuma is transformed from a general *Lebensprinzip* to a more nuanced set of fully internalised and differentiated entities which are thereby given the capacity to account for the vital and psychic functions of the body.[75] The beginning of this physiological pathway lies in the lung, Galen's first pneumatic organ, as much a part of his physiological thought-world as any other structural and functional part of the body, and of no less importance.

74 It is perhaps interesting to consider that by comparing pneumatic elaboration to the coction of nutriment, Galen implicitly endorses the notion of a confluent physiological system. As far as the lung is concerned, Galen effectively promotes a unified pneumatic-humoural physiology by having the pneumatic substance in intimate association with the blood in the left ventricle of the heart. Blood is after all a humour, derived from nutriment by an elaborative process in the liver.

75 Psychic in the physiological sense of enabling sensation and voluntary motion.

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

## Summary

Galen takes over the Platonic concept of the tripartite soul and combines it with his physiological approach that all voluntary motion starts from the motor nerves in the brain where the rational part resides. This causes the problem that the two irrational parts of the soul, residing in the heart and the liver respectively, have no access to the relevant nerves and therefore cannot cause any voluntary motion. But how can they be agents or agent-like parts then? In this article, I aim to show how the spirited and the appetite parts of the soul can actively influence the rational part of the soul by means of manipulating the *pneuma psychikon* in the brain. The instruments for this influence are innate heat, blood and pneuma.

Keywords: voluntary motion; Plato; tripartite soul; agent; pneuma

Galen adaptiert Platons Konzept von der dreigeteilten Seele und kombiniert es mit einem physiologischen Modell, welches beinhaltet, dass alle willentlichen Bewegungen des Lebewesens von den Motornerven im Gehirn initiiert werden. Dies verursacht das Problem, dass die beiden irrationalen Seelenteile, die in Herz und Leber residieren, von der willentlichen Bewegung ausgeschlossen sind. Im Widerspruch dazu sind sie jedoch psychologisch fähig, eigene Handlungsimpulse zu setzen und einen Menschen z.B. dazu zu bringen, zornig oder wollüstig zu agieren. Dieser Artikel soll zeigen, wie die beiden irrationalen Seelenteile manipulativen und aktiven Einfluss auf die Entscheidungen des rationalen Seelenteils nehmen können, wobei sie die innere Hitze, das Blut und das Pneuma im Organismus als Instrumente einsetzen.

Keywords: willentliche Bewegung; Platon; Dreiteilung der Seele; Bewegung; Pneuma

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## 1 Introduction

This paper deals with the important psychophysical function of pneuma in Galen's tripartite psychology. Galen is known for combining in his day progressive medical findings about the functions of the brain and nerves[1] with the Platonic doctrine of the tripartite soul. With reference to the *Republic* as well as the *Timaeus*, Galen distinguishes the rational part (*logistikon*) of the soul, residing in the brain, the spirited part (*thymos*), residing in the heart, and the appetitive part (*epithymētikon*), located in the liver.[2] According to his physiological approach, the same three organs also function as bodily sources (*pēgai*) for at least two different types of pneuma: the sources of the psychic pneuma (*pneuma psychikon*) are the ventricles of the brain, and the sources of the vital pneuma (*pneuma zōtikon*) are the heart and the arteries.[3] One prominent problem for Galen's psychophysical account is that he sometimes, just like Plato, treats the two irrational parts of the soul, i.e. the *thymos* and the *epithymētikon*, as agent-like parts, which are the causes of certain affective impulses and motions. But the power to distribute sensation and voluntary motion to the muscles is strictly limited to the psychic pneuma and its principles (*archai*), namely the brain and the nerves.[4] Therefore, we need to show how the irrational parts, too, can be causes of certain motivations, as for instance of the

1 For more details concerning Galen's physiology as well as the role of the nerves in ancient medicine and philosophy see von Staden 1989 and von Staden 2000; Burkert 2009, as well as Solmsen 1961; Siegel 1973a; Vegetti 1993.

2 For Galen's adoption of the tripartite soul given in the *Republic* and the *Timaeus* cf. Galen, *De placitis Hippocratis et Platonis* 6.2.1–12 (De Lacy 366,31–370,23 = K. 5.514–518); 9.9.7–8 (De Lacy 598,26–600,4 = K. 5.793). In *Quod animi mores corporis temperamenta sequuntur* 3 (Müller 36,9–12 = K. 4.772.15–18) Galen modifies the localization of the parts of the soul in the organism insofar as he situates them directly in the organs, while Plato gives a looser description of their bodily regions, cf. Plato, *Timaeus* 69e–71d. Despite such modifications, I will challenge the view that Galen, due to some sort of eclecticism, uses Plato only ideologically or without a deeper understanding, as Singer 1991, 41–43, suggests. For a more positive evaluation of the relationship between Plato and Galen, cf. Hankinson 1991, 199–201; De Lacy 1988, 63; De Lacy 1972, 27.

3 Cf. Galen, *De methodo medendi* 12.5 (K. 10.839.10–840.1). Siegel 1968, 186, and Rocca 2003, 65, n. 95, have also emphasized that a threefold division of pneuma is neither needed for nor suited to Galen's system of physiology. Temkin 1951, 185–186, also doubts its relevance: "After what has been said we need not reiterate the difficulties inherent in Galen's concept of the vital spirit; but we may well ask ourselves whether we have learned anything about a natural spirit. Is the latter identical with the pneumatic component of the venous blood? Perhaps. But in that case it would only be an inferior form of the pneuma contained in the arteries. Or as one might say, both veins and arteries carry blood mixed with natural spirit, but the veins have much blood and little vital spirit, whereas the arteries have little and purer blood, and more and thinner natural spirit … But in the Galenic system a natural spirit, distinctly differentiated from the vital spirit, has little meaning. It has no specific function to fulfill … If this is true, we have to ask ourselves why Galen mentioned the natural spirit at all, in view of his obvious doubts." Cf. also Manzoni 2001, 39–44.

4 Cf. Gal. *PHP* 7.3.2 (De Lacy 438,31–33 = K. 5.600–601); *De usu partium* 1.16 (Helmreich 1.32,23–33,15 = K. 3.45–46).

angry striving for revenge or the longing for pleasant objects like food, drink and sex.[5] While up to now scholars have focused on small nerves and nerve-like strands as connecting strands between the brain, the heart and the liver, I count on the pneuma, the blood, and the innate heat as the proper instruments that can *influence* the decisions of the rational part by means of qualitative changes in the brain.[6] Besides some physiological details, one general difference between my own and the former approaches is that I do not see any need to guarantee the independence of the two irrational parts or to explain how they can be their own agents by getting for example control over the psychic pneuma. Instead, I aim to show that and how these parts can actively influence the volitional process of the rational part of the soul by means of a physiological manipulation of the brain's qualitative mixture.

Based on this assumption, it is my general aim to show not only that the body influences the soul,[7] but that there also exists an influence *vice versa* that follows certain rules. In this context, Galen's distinction between a psychic tension (*tonos tēs psychēs*) and a vital tension (*tonos zōtikos*), made in *On the Affected Parts*, helps us to understand the connection between the human being's psychological and physiological processes. To explain the special function of the *tonos tēs psychēs*, we have to take a closer look at Galen's psychological treatises *On the Doctrines of Hippocrates and Plato* (*PHP*), *The Diagnosis and Treatment of the Affections and Errors Peculiar to Each Person's Soul, Character Traits* and *Avoiding Distress*, while the *zōtikos tonos* which comes up in *Semen* needs to be explained in the light of Galen's physiological works.

5 This serious problem leads for instance Mansfeld 1991, 14, to the rather pessimistic conclusion: "The two non-rational parts are in fact precluded from moving any muscle; there is, in the literal sense of the word, no way in which they can determine our actions, because it is reason and reason alone, which makes the muscles move by means of the connecting nerves." Also Gill 2009, 417–418, thinks that this adaptation rather has a negative impact on Galen's own doctrines. On the basis of a fragment that has been treated as an excerpt of Galen's commentary on the *Timaeus*, i.e. *Galeni In Platonis Timaeum commentarii fragmenta* (*Plat. Tim.*), Larrain (who discovered it) argued in the early nineties in favour of a reconciliation between Galen's physiology and psychology. Larrain 1991, 9–30. Nickel 2002, 73–78, argues that it is in fact a pupil's compilation of *PHP* and *Plat. Tim.* See further Garofalo 1995, 645–646. More recently, Das 2014, on the basis of medieval Arabic medical texts, has adduced good reasons for the assumption that these excerpts may indeed be attributed to Galen. The excerpt mentions small nerves that function as connective organs between the brain the heart and the liver. Schiefsky 2012, 331–349, too, has argued in favour of a solution to the problem by pointing to these small nerves. Tieleman 2003b, 155, argues in favour of Galen's awareness of the problem on the basis of that excerpt, but then convincingly contrasts it with a passage from *PHP* in which Galen talks about the mutual independence of the brain and the heart by pointing out that "the heart needs no help from the brain to move the pulse, and the brain needs none from the heart for the animal to have sensation and act in accordance with choice".

6 Cf. Trompeter 2018 where I have argued that when the innate heat is increased, the irrational parts can affect the brain's function to such an extent that the rational part's volitions are reduced to their own desires.

7 Which appears to be pretty clear from Galen's *QAM*.

## 2 The meaning of pneuma for the spirited part's egagement in voluntary motion

In *PHP*, the *magnum opus* among his psychological works, Galen discusses three different models of the soul and their topology in the body. The first concept that he ascribes to the Stoic Chrysippus says that affections or emotions (*pathē*), which are identified with judgments (*kriseis*), belong to one unitary leading psychic faculty, the so-called *hēgemonikon* located in the heart.[8] Galen criticizes Chrysippus' identification of the affections with wrong judgments or intellectual errors.[9] In order to guarantee the possibility of internal psychic conflicts, the affections cannot be judgments but, on the contrary, have to be independent, irrational movements of the soul.[10] When Medea kills her children, her *thymos* and not her *logos* is at work and "decides" to do the bad thing.[11] But how far can we speak about a decision in the proper sense here? In *Character Traits* Galen explicitly describes the decision as being "upon one of the things investigated and examined by thought."[12] The spirited part is seated in the heart, while the leading faculty of the soul cannot be seated there, since Galen takes it as an empirical fact that the heart is not the origin of those nerves that transmit sensory *stimuli* from the sense organs to the brain and motor *stimuli* from the brain to the muscles.[13] This is also why the solution of Aristotle and Posidonius who assume the existence of three different faculties of the soul located in a single organ, the heart, cannot work.[14] Although this position gives the right number of the psychic powers, it fails because it makes the heart the seat of the soul. Only Hippocrates and Plato give the proper account by stating correctly that there are three essentially distinct parts of the soul, i.e. the rational part (*logistikon*), the spirited part (*thymos*), and the appetitive part (*epithymētikon*), which are located at three distinct bodily places, the brain, the heart, and the liver.[15] To start off, I want to focus on a passage from *PHP* central to my argument, in which Galen makes clear that the three parts of the soul *qua* forms are also the subjects of different faculties:

8 Gal. *PHP* 3.1.5–3.8.39 (De Lacy 168,21–232,29 = K. 5.286–359); 4.3.6–10 (De Lacy 248,14–250,2 = K. 5.378–379).

9 Gal. *PHP* 4.3.6–10 (De Lacy 248,14–250,2 = K. 5.378–379), and 4.6.1–4.7.46 (De Lacy 270,10–290,27 = K. 5.403–427). For a detailed examination of the relationship between Galen and Chrysippus see the study of Tieleman 1996.

10 Gal. *PHP* 4.6.9–27 (De Lacy 272,9–274,39 = K. 5.405–410).

11 Gal. *PHP* 4.6.19 (De Lacy 274,13–14 = K. 5.408).

12 Galen, *De Moribus* (Kraus 45).

13 Cf. Gal. *PHP* 1.10.1 (De Lacy 96,12–14 = K. 5.206).

14 Cf. Gal. *PHP* 5.4.1–3 (De Lacy 312,22–31 = K. 5.454).

15 Cf. n. 2 and Gal. *PHP* 5.4.3–4 (De Lacy 312,31–36 = K. 5.455); 6.2.5 (De Lacy 368,20–22 = K. 5.515); 6.3.7 (De Lacy 374,9–19 = K. 5.521); 6.8.50–52 (De Lacy 418,9–16 = K. 5.576); 7.3.2–3 (De Lacy 438,28–440,8 = K. 5.600–601); 7.3.19 (De Lacy 442,36–444,1 = K. 5.606); Pl. *Ti.* 44d; 65e; 67; 69d–70e, 73c–e. While in Galen the appetitive part is seated in the liver, Plato locates it in the belly. Cf. Tieleman 1998, 318. Generally, Galen emphasizes the spatial distance and separateness of the parts more vehemently than is evident from the textual basis of the *Timaeus*. Cf. Gill 1997, 273.

**T1** δέδεικται μὲν γὰρ ὡς ἡ τοῦ γεγεννημένου ζῴου διοίκησις ὑπὸ τριῶν ἀρχῶν γίνεται, μιᾶς μὲν τῆς ἐν τῇ κεφαλῇ κατῳκισμένης ἧς ἔργα καθ' ἑαυτὴν μὲν ἥ τε φαντασία καὶ ἡ μνήμη καὶ <ἡ ἀνάμνησις, ἐπιστήμη τε καὶ> νόησις καὶ διανόησις, ἐν δὲ τῷ πρός τι τῆς τ' αἰσθήσεως ἡγεῖσθαι τοῖς [τ'] αἰσθανομένοις τοῦ ζῴου μέρεσι καὶ τῆς κινήσεως τοῖς κινουμένοις καθ' ὁρμήν, ἑτέρας δὲ τῆς ἐν τῇ καρδίᾳ καθιδρυμένης, ἧς ἔργα καθ' ἑαυτὴν μὲν ὁ τόνος ἐστὶ τῆς ψυχῆς καὶ τὸ μόνιμον ἐν οἷς ἂν ὁ λογισμὸς κελεύσῃ καὶ τὸ ἀήττητον, κατὰ πάθος δ' <ἡ> οἷον ζέσις τῆς ἐμφύτου θερμασίας ποθούσης τιμωρήσασθαι τῆς ψυχῆς τηνικαῦτα τὸν ἀδικεῖν δόξαντα, καὶ καλεῖται τὸ τοιοῦτον θυμός, ἐν δὲ τῷ πρός τι θερμασίας ἀρχὴ τοῖς κατὰ μέρος εἶναι μορίοις ἀρτηρίαις τε κινήσεως σφυγμικῆς· τῆς δ' ὑπολοίπου δυνάμεως ἐν ἥπατι καθιδρυμένης ἔργα τὰ περὶ τὴν θρέψιν ἅπαντα κατὰ τὸ ζῷον, ὧν μέγιστον μέρος ἐν ἡμῖν τε καὶ πᾶσι τοῖς ἐναίμοις ζῴοις ἐστὶν ἡ τοῦ αἵματος γένεσις. τῆς δ' αὐτῆς ταύτης δυνάμεως καὶ ἡ τῶν ἡδέων ἐστὶν ἀπόλαυσις, ἐν ᾗ σφοδρότερον τοῦ δέοντος κινουμένη τήν τ' ἀκρασίαν καὶ τὴν ἀκολασίαν ἐργάζεται.

I have proved that an animal after birth is governed by three sources, one located in the head, whose function is by itself to provide imagination and memory and recollection, knowledge and thought and ratiocination, and in its relation to the other parts of the animal to guide the sensation of the sensory parts and the motion of the parts that move voluntarily. A second source is seated in the heart; its function is by itself to provide the 'tone' of the soul, to be constant and unyielding in the things that reason commands, and in states of passions to provide the boiling, as it were, of the innate heat, as the soul at such times desires to avenge itself on the supposed wrongdoer, and this kind of thing is called anger; in its relation to other things its function is to be the source of warmth for the several parts and of pulsing motion for the arteries. The remaining power, seated in the liver, has as its functions all the things that have to do with nutrition in the animal, the most important of which in us and in all sanguineous animals is the production of blood. To this same power belongs also the enjoyment of pleasures, and when it is moved by this enjoyment more than it should be, it produces intemperance and licentiousness.

Gal. *PHP* 7.3.2–3 (De Lacy 438,28–440,8 = K. 5.600–601, tr. De Lacy)

Above, Galen distinguishes three kinds of functions (*erga*), one that applies to the parts in a specific or intrinsic way (*kath' heautēn*), another that applies to them in relation to something else (*pros ti*), i.e. in relation to the functions of the rest of the body (like the production of the blood in the liver or the pulsation of the blood through the organism starting from the heart), and a third one that emerges only during an affection (*kata*

*pathos*). Regarding the spirited part, for instance, this affective movement is the boiling of the innate heat in case of a supposed injustice. Regarding the appetitive part, although not distinctly labelled as "*kata pathos*," these movements obviously are the mentioned intemperance (*akrasia*) and licentiousness (*akolasia*). With regard to the rational part, there are no affective functions mentioned. As we will see in more detail later on, this is the case because its *pathos* is not an active function but a passive suffering from the strong motions of the lower parts of the soul whenever *they* move in an unnaturally strong way.[16]

In the above passage, Galen subsumes both the faculty of sensation and "of the motion of the parts that move voluntarily" (τῆς κινήσεως τοῖς κινουμένοις καθ' ὁρμήν) under the relational functions (*pros ti*) of the rational part of the soul. The relevant body parts meant by the term *pros ti* are those equipped with muscles and governed according to one's will. Galen shows in elaborate anatomical experiments that the voluntary motions and sensations are restricted to the brain and nerves, just like the movement of the pulse is restricted to the heart and arteries, and the production of blood to the liver and veins.[17] In cases of voluntary motion, our bones are moved by the muscles, which again are moved by means of the power (*dynamis*) of movement led through the nerves.[18] Since, then, the heart and the liver are the principles of the arteries and veins, but not of the nerves necessary for sensation and voluntary motion, it remains unclear as to how the spirited and appetitive parts can be the physiological origins of their own movements – like for instance the realization of Medea's spirited striving for revenge.[19]

It is no wonder that scholars have criticized Galen for not paying enough attention to the notorious problem of incompatibility between the physiological approach to the brain as the source of the nerves, and the psychological demands of tripartition.[20] While some scholars have at least noticed that Galen *recognizes* this severe and notorious problem,[21] there are others who, for the sake of coherence of Galen's system, have argued in favour of a reconciliation between his physiology and psychology in the early

**16** Cf. Gal. *PHP* 6.1.8–15 (De Lacy 362,3–364,2 = K. 5.507–509). *QAM* suggests that one reason for these strong motions is the increasing of the body's innate heat: cf. *QAM* 10 (Müller 71,6–11 = K. 4.812.7–12).

**17** *Ibid*.

**18** Cf. Gal. *UP* 1.1.16 (Helmreich 32,23–33,15 = K. 3.45.10–46.9).

**19** Cf. Gal. *PHP* 3.7.14–15 (De Lacy 214,16–20 = K. 5.338); 4.6.19 (De Lacy 274,13–14 = K. 5.408).

**20** Mansfeld 1991, 141. The harsh critique culminates in the statement that the adaptation of the tripartition harms rather than benefits Galen's own doctrines. Cf. Gill 2009, 417–418.

**21** Cf. Tieleman 2003b, 155, who argues in favour of Galen's awareness of the problem with respect to *PHP*: "the heart needs no help from the brain to move the pulse, and the brain needs none from the heart for the animal to have sensation and act in accordance with choice" (μήτε τὴν καρδίαν εἰς τὴν τῶν σφυγμῶν κίνησιν ἐγκεφάλου τι προσδεῖσθαι μήτε τὸν ἐγκέφαλον καρδίας, ἵν' αἰσθάνηταί τε καὶ κατὰ προαίρεσιν ἐνεργῇ τὸ ζῷον), Gal. *PHP* 2.6.9–10 (De Lacy 150,3–6 = K. 5.264).

nineties.[22] These approaches are based on the existence of small nerves that function as connective organs between the brain, the heart and the liver.[23] One general question here is whether they can be reconciled with a passage from *PHP*, in which Galen provides a complicated anatomical proof of the mutual independence of the three organs.[24] Since the small connecting nerves between the heart and the brain do not allow for a transfer of the power of voluntary motion and sensation from the heart to the brain, the heart cannot be the first principle (*hē prōtē archē*) for voluntary movements which it later on transmits to the brain. The demonstration of a small nerve leading into the heart[25] would be of great importance for the consistency of Galen's doctrine, if he had somehow demonstrated its psychological relevance, which he never does. In one of the mentioned fragments, however, Galen gives a teleological proof of the existence of small offshoots of the nerves by pointing out that the spirited part has to participate in the rational part in the brain for the sake of service.[26] Also a passage from *De usu partium* shows that Galen is aware of the psychological necessity of a connection between the three parts.[27]

But besides the fact that Galen never clearly states how this *communication* might work, the problem is aggravated through the fact that the concept of tripartition also demands that all three parts of the soul can be the cause of their own actions, and that the two irrational parts can get in the way of the rational part of the soul. We definitively cannot use these small nerves mentioned above as transmitters of the special *dynamis* for voluntary motion from the lower parts to the brain in order that they can function as

22 This has happened mainly on the basis of the above mentioned fragment that has been treated as an excerpt of Galen's commentary on the *Timaeus*, cf. n. 5.

23 With reference to *PHP*, *UP* as well as from fragments mentioned in n. 21 above, it can be shown that the brain and the heart are connected with each other via the smallest nerves or nerve-like strands. More recently, Schiefsky 2012, 331–349, too, has argued in favour of a solution to the problem by pointing to these small nerves.

24 Gal. *PHP* 2.6.13–17 (De Lacy 150,20–152,1 = K. 5.265–266), with Tieleman 2003b, 155–156.

25 καὶ οὕτως δὲ δείξομεν οὐκ ἔχουσαν ἀξιόλογα τὸ μέγεθος ἢ τὸ πλῆθος αἰσθητικά τε καὶ προαιρετικὰ νεῦρα τὴν καρδίαν ἐναργῶς, ἀλλ' ὡς ἔμπροσθεν εἴρηται σμικρὸν ἀπ' ἐγκεφάλου κατιὸν εἰς αὐτὴν ἐμφύεται. (Gal. *PHP* 1.10.1, De Lacy 96,12–14 = K. 5.206).

26 "It can be shown that all the nerves of the living being have their principle in the brain, from which fine offshoots lead into the heart. For also this needs to participate in the higher principle, because it wants to serve it, as will be shown in the following," ὅτι ἀπὸ <τοῦ> ἐγκεφάλου πάντα φαίνεται τὰ κατὰ τὸ ζῷον νεῦρα τὴν ἀρχὴν ἔχοντα, ἀφ' ὧν καὶ εἰς τὴν καρδίαν ἀποφύσεις μικραὶ παραγίνονται. καὶ γὰρ καὶ ταύτην ἔδει μετασχεῖν τῆς ἄνωθεν ἀρχῆς ὑπηρετήσειν ταύτῃ μέλλουσαν, ὡς ἐξῆς δειχθήσεται. (Gal. *Plat. Tim*. fr. 14.1–4 Larrain). The term *hypēretein* comes up in some of Plato's and Galen's psychological remarks, whenever the alliance between the spirited part and reason is emphasized, cf. Gal. *PHP* 5.7.60–61 (De Lacy 350,31–352,5 = K. 5.496), and Pl. *Ti*. 70d.

27 Gal. *UP* 1.4.13 (Helmreich 226,25–227,15 = K. 3.309.7–310.4). Schiefsky 2012, 346, interprets this passage as Galen's ultimate answer to the required possibility for a communication between the parts of the soul: "the need for communication is explicitly linked with the demands of the tripartite theory: the three parts are connected by 'offshoots' (*apophyseis*) so that they may 'heed' (*epaiein*) one another."

their own quasi-agents.[28] To sum up some interim results: it is true that Galen admits the existence of connecting nerves between the organs, but he denies that they give the liver and the heart a share in voluntary motion and sensation. Even if there are some indications in Galen's work that these small nerves might have the psychological function of guaranteeing the physiological realization of heedfulness between the three parts of the soul, this option is never explicitly elaborated. As I have shown in more detail elsewhere,[29] there are more promising physiological solutions for our problem. In this context, I have elaborated on a short note by Hankinson in 1993 to show the truth of the 'speculative' option that the boiling blood in the arteries can have an influence on the brain by impairing its proper functions such that it emits abnormal signals.[30] By means of the heart, the arteries, the pneuma, and the innate heat (*emphyton thermon*) the spirited part of the soul can causally influence the voluntary motions which start from the brain.[31]

The present paper deals mainly with the psychological relevance of the pneuma in the organism. I first want to give a broad outline of the way in which the spirited part can influence the rational part by means of pneumatic changes.[32] Galen's psychophysical theory is characterized by a combination of the tripartition-cum-trilocation of the soul with the assumption of two kinds of pneuma in the organism, the psychic pneuma *(pneuma psychikon),* which is generated in the brain and its nerves, the retiform plexus and its choroid plexuses, and the vital pneuma *(pneuma zōtikon)* generated in the heart and the arteries.[33] The vital pneuma and the psychic pneuma are connected. First, outer air is inhaled and undergoes some change in the lungs to become a pneuma-like substrate,[34] afterwards it is changed into vital pneuma by means of blood and innate heat

**28** The same is true in the case of the liver. In *UP* cited above (n. 27), Galen includes the liver in his examination of the connection between the organs, while at the same time the liver is not equipped with those nerves relevant for sensation and voluntary motion. And even though there exists a small nerve in the liver, which guarantees an organic connection between the liver and the heart analogous to the small branches of the heart with a communicative function of any kind whatsoever, we should be very skeptical about the relevance of this primitive small nerve (*elakhistou de neurou*, cf. Gal. *UP* 1.4.13, Helmreich 226,2–7 = K. 3.308.2–7) with respect to the transmission of voluntary motion. Cf. *UP* 1.6.18 (Helmreich 365,5–13 = K. 3.501.9–17). Indeed, the liver is sometimes presented as forming part of the nervous system in *UP*, though only by means of a small nerve, in view of the primitive, non-cognitive type of functions associated with the liver, which are here again linked with the idea of "nature" (Gill 2007, 421).

**29** Trompeter 2018.

**30** Hankinson 1993, 208, n. 76.

**31** And, with respect to the liver, the veins, the blood and also the innate heat turn out to be the relevant connective organs between the psychic centers.

**32** I will omit the appetitive part for now, but I have shown possible ways in which the appetitive part can influence the rational in Trompeter 2018.

**33** Cf. Gal. *MM* 12.5 (K. 10.839.10–840.1). The natural pneuma in the liver and veins, however, which is uncertain and doubtful even to Galen himself, he probably mentions only for the sake of structural completeness. Cf. n. 3.

**34** On the unclear status of this substrate cf. Rocca 2003, 237, and Eastwood 1981, 169, n. 3.

in the left ventricle of the heart.[35] Through the system of the arteries, in which it undergoes further changes, it finally enters the brain. Afterwards it is further modified in the brain's retiform plexus and its choroid plexuses. This qualitative change of the outer air into vital and finally into psychic pneuma is completed in the ventricles of the brain.[36] The outer air nourishes the psychic pneuma, and the vital pneuma contributes to it.[37] We can see that many factors are indispensable for the production of psychic pneuma. The required connection between the heart and the brain is given by the system of the arteries. That the heart cannot function as the first principle (*hē prōtē arkhē*)[38] and supply the brain with the psychic power through the arteries does not contradict the option that the psychic pneuma is influenced through the vital pneuma.

The dependence described above provides the interesting possibility that the temperature of the vital pneuma can influence the temperature of the psychic pneuma by means of innate heat. The heart functions as the source and regulating instrument of the innate heat,[39] and the vital pneuma is called a 'kind of source of the innate heat' (πηγή τις οὖσα καὶ ἥδε τῆς ἐμφύτου θερμασίας).[40] The innate heat plays a significant role in many psychophysical processes: it is increased in the heart by bodily exercises as well as by affections like anger, desperation and shame.[41] As we have already seen, the *ergon kata pathos* of the spirited part consists in the boiling of the innate heat in the heart in the face of an assumed injustice, which is anger.[42] When the innate heat is unnaturally increased, this has negative consequences for the body and the soul. Since then the movements of the spirited part are immoderate and runaway (*ametroi*, *ekphoroi*) and thus contrary to nature (*kinēsis para physin*),[43] this justifies their description as an illness of the soul.[44] As we have seen, the vital pneuma provides the basis for the creation of psychic pneuma via the arteries that connect the heart and the brain. Therefore, we can justifiably assume that an excessive heating of the vital pneuma co-affects the temperature of the psychic pneuma in the brain by heating it up. Galen illustrates the bad consequences that occur when the brain and the psychic pneuma get hotter than appropriate

35 Rocca 2003, 64, interprets this as a tribute to the Stoic doctrine of pneuma, while Galen himself attributes the great importance of the outer air to Hippocrates.

36 Cf. Gal. *UP* 1.7.8 (Helmreich 393,23–394,7 = K. 3.541.15–542.3) with Kovačić 2001, 120. The retiform plexus is described by Rocca as 'a network of fine arteries at the base of the brain,' the choroid plexuses as a network 'of veins and arteries in the ventricular system, which complete the transformation of vital to psychic pneuma.' On the whole process of that transformation see Rocca 2003, 64–65.

37 Cf. Gal. *Plat. Tim*. frg. 25,4–6 Larrain.

38 Gal. *PHP* 2.6,14–16 (De Lacy 150,25–33 = K. 5.266).

39 Cf. *UP* 1.6.7 (Helmreich 318,15–17 = K. 3.436.3–5) and Temkin 1951, 180.

40 Gal. *MM* 9.10 (K. 10.635.17–18). No distinct writing about the innate heat has survived, but there are many signs of its comprehensive relevance in Galen's doctrines as shows the helpful overview given by Durling 1988.

41 Cf. Galen, *De sanitate tuenda* 2.9 (Koch 61,21–31= K. 6.138.3–14).

42 Cf. Gal. *PHP* 7.3.2 (De Lacy 438,35–440,2 = K. 5.601).

43 Cf. Gal. *PHP* 6.1.8–15 (De Lacy 362,3–364,2 = K. 5.507–509).

44 Cf. Hankinson 1991, 207.

by the example of wine that "commands the soul to abandon its previous accuracy in intellectual activity and the previously correct performances of its actions."[45] As Plato has shown, the drunk person's soul suffers,

> **T2** for wine fills the whole body, and especially the head, with hot vapours, and thus becomes the cause of too unbalanced a motion in the appetitive and the spirited part of the soul, and too rash a decision in the rational (βουλῆς δὲ προπετεστέρας τῷ λογιστικῷ).
>
> Gal. *QAM* 10 (Müller 71,6–11 = K. 4.812.7–12)

This overheating of the body leads to immoderate movements of the spirited and the appetitive parts which vitiate thinking, the most peculiar function of the rational part. According to *PHP*, a solution is "too rash" whenever the rational part is not able to assess the right moment (*kairos*) for the initiation of an action, which usually is the special ability of the rational part of the soul when it is in its natural condition. Both the spirited and appetitive parts, however, are naturally prone to rash judgments and actions. Just as the appetitive part too rashly inclines to that which appears pleasant to it (ἐπὶ τὸ φαινόμενον ἡδὺ προπετῶς φερομένη) before the rational part has had the chance to investigate thoroughly what is going on,[46] so the spirited part, when it is not restricted by reason, starts to rage against the supposed wrongdoer in the very moment when it experiences a supposed injustice.[47] Galen's examples of the different reactions of Medea, Leontios and Odysseus, who all perform acts in a state of strong affection, show that affective practical actions are more spontaneous than those performed after a thorough consideration.[48] It is striking that Galen in *QAM* cited above[49] ascribes overhasty decisions, which usually apply to the irrational parts of the soul, to the rational part whenever it operates under changed conditions in a heated organism. This negative influence of heating occurs not only through the consumption of wine but also in the affection of

45 οἶνος κελεύει τὴν ψυχὴν μήτε νοεῖν ἀκριβῶς, ἃ πρόσθεν ἐνόει, μήτε πράττειν ὀρθῶς, ἃ πρόσθεν ἔπραττε (Gal. *QAM* 10, Müller 70,17–9 = K. 4.811.17–19, tr. Singer, with slight changes).

46 Galen, *De propriorum animi cuiuslibet affectuum dignotione et curatione* 6.7 (De Boer 20,7–13 = K. 5.29.1–7), and *PHP* 5.7.17–19 (De Lacy 340,10–18 = K. 5.383–384).

47 Galen illuminates this on the basis of a well-known passage of the Odyssey, in which the returning Odysseus finds suitors in his own home; and while his spirit strives for immediate revenge, his rational part, recognizing that it was the wrong moment (*akairian*) for action, obstructs this action. Cf. Gal. *PHP* 3.3.11–12 (De Lacy 188,5–8 = K. 5.305) and Homer, *Odyssey* 20,23–4. Plato, too, picks up this passage in the Republic in order to show the difference between the spirited and the rational part, as Galen is aware: cf. Plato, *Respublica* 441b3–c2.

48 Cf. Galen's examples of the irrational actions of Medea, Gal. *PHP* 4.6.19 (De Lacy 274,13–14 = K. 5.408), or Leontios, Gal. *PHP* 5.7.54–56 (De Lacy 350,8–13 = K. 5.494), in contrast to Odysseus, whose strong rationality prevails over his anger, Gal. *PHP* 3.3.8–9 (De Lacy 186,11–28 = K. 5.304–305).

49 Gal. *QAM* 10 (Müller 71,6–11 = K. 4.812.7–12).

anger, which is physically described as the "boiling of the innate heat,"[50] and in which the body "becomes hot and red and very tense."[51] If we assume that the consequences of increasing temperature in the brain after the consumption of wine are similar to those which occur during anger or shame, the spirited part can gain a strong influence over the rational part's volitions: by increasing the innate heat during an affection, spirit can enforce a shortcut in the rational process.[52] In his *Preservation of Health*, Galen explicitly states that the affections, including anger, "kindle fevers" (*pyretous anaptousin*)[53] within the organism, which of course implies an overheating also of the head. Moreover, the heat and dryness of the heart have general implications for a person's character and practical actions:

> **T3** θερμῆς καὶ ξηρᾶς καρδίας οἱ σφυγμοὶ σκληροὶ καὶ μεγάλοι, καὶ ταχεῖς, καὶ πυκνοί, καὶ αἱ ἀναπνοαὶ μεγάλαι τε καὶ ταχεῖαι, καὶ πυκνοί. ... εἰς δὲ τὰς πράξεις ἕτοιμοι καὶ θυμικοὶ καὶ ταχεῖς, ἄγριοι, καὶ ἀνήμεροι, καὶ ἰταμοί, καὶ ἀναίσχυντοι, καὶ τυραννικοὶ τοῖς ἤθεσι, καὶ γὰρ ὀξύθυμοι καὶ δύσπαυστοι.
>
> With a hot and dry heart, the pulses are hard and large, fast and frequent: and breathing is of large volume, fast and frequent … They are quick to action, spirited, and speedy; fierce, unkind, reckless, shameless; tyrannical in character; bad-tempered and implacable.
>
> Galen, *Ars medica* 11.1 (Boudon 305,9–306,7 = K. 1.334.12–335.4, tr. Singer)

From what we have seen so far, we can conclude that these characteristics are related to the degree of the innate heat. While the spirited part in the positive case is able to engage in helpful and spirited (*hetoimoi kai thymikoi*) practical actions, which support the activities of the rational part, in the negative case it directs its characteristics against the rational part. In a well-educated soul, the spirited part can be strong and supportive of the rational part, while the appetitive part, on the contrary, should be weak.[54] Whenever the movements of the spirited part are in accordance with nature (*kata physin*), it will try to support the voluntary actions of the rational part and fight as its ally against the immoderate movements of the appetitive part.[55]

We have shown how the spirited part can have an impact on the voluntary movements of the rational part of the soul. Even though it cannot be an independent physi-

50 Gal. *PHP* 7.3.2 (De Lacy 438,35 = K. 5.601).

51 *Ibid*. 2.7.16 (De Lacy 154,26–27 = K. 5.270).

52 This interpretation is strengthened by *PHP* 6.8.44 (De Lacy 416,21–24 = K. 5.574), in which Galen characterizes the power of the spirited part as energetic and fiery in such a way that it makes the angry person appear choleric and insane.

53 Gal. *San. Tu.* 1.8.16 (Koch 19,31–33 = K. 6.40.11–13).

54 Gal. *Mor*. (Kraus 42).

55 Gal. *PHP* 5.7.56 (De Lacy 350,14–16 = K. 5.494).

ological principle of voluntary motions, it can nonetheless influence the voluntary motions of the rational part by increasing the innate heat and the pneuma in the organism in such a way that these motions become involuntary since they do not occur on the basis of proper reasoning and rational decision.

## 3 Soul and body – body and soul: a circular model of causation

Up to now we have shown how the spirited part of the soul can influence the decisions of the rational part of the soul by means of a qualitative change in the vital and psychic pneuma. More precisely, through the boiling of the innate heat occurring in anger the pneuma is heated up. If we look at the causes of affections like anger, one general problem is finding the right starting point for our investigation: should we look at the condition of the body first, and then draw conclusions about the soul, or rather first consider the activities of the soul and look at the related changes in the body afterwards?[56] If we look at Galen's most materialistic and physicalist work *Quod animi mores corporis temperamenta sequantur* (*QAM*), the chosen perspective is clear: here, he gives plenty of examples to substantiate the main thesis of his treatise, namely that "*the capacities of the Soul depend on the mixtures of the body*," and aims to convince his recipients to consider the strong impact which the body has on the soul thoroughly. His argumentation culminates in the observation that extreme alterations of the body, for instance those towards excessive heat or cold, can even cause death. Strong bodily changes like that occur through heating and cooling drugs, as well as through the bites of certain animals.[57] Besides this, both the everyday consumption of food and drink as well as climatic alterations have a strong impact on the capacities of the soul. For instance, as we have seen above, an excessive consumption of wine has a negative influence on our rational ability to make the right decisions.[58] But we should not only look at the influence which the body has on the mind but rather consider a *vice versa* influence of body and soul by paying attention to a circular model of causality as it is presented in *QAM*. For the notion that the bodily mixtures have an impact on the capacities of the soul includes the option that we, again, can influence this mixture by means of our daily activities:

56 Both fields of expertise, the philosophical and the physiological, are closely related and one should have knowledge in both of them in order to meet the requirements for the care of people. Galen himself points out that just as the philosopher needs to have some knowledge of natural science in order to investigate the soul, so too does the physician need some knowledge of the soul if he wants to treat people correctly: Gal. *San. Tu.* 1.8.15 (Koch 19,26–30 = K. 6.40.6–10).

57 Gal. *QAM* 3 (Müller 41,9–15 = K. 4.779.7–13).

58 Gal. *QAM* 10 (Müller 71,6–11 = K. 4.812.7–12); cf. Plato, *Leges* 674a5–b9.

**T4** αἱ κράσεις δ' αὐταὶ τῇ τε πρώτῃ γενέσει καὶ ταῖς εὐχύμοις διαίταις ἀκολουθοῦσιν, ὥστε συναυξάνειν ἄλληλα ταῦτα. διὰ γοῦν τὴν θερμὴν κρᾶσιν <οἱ> ὀξύθυμοι γιγνόμενοι ταύταις πάλιν ταῖς ὀξυθυμίαις ἐκπυροῦσι τὴν ἔμφυτον θερμασίαν· ἔμπαλιν δ' οἱ σύμμετροι ταῖς κράσεσι συμμέτρους τὰς τῆς ψυχῆς κινήσεις ἔχοντες εἰς εὐχυμίαν ὠφελοῦνται.

And the mixtures themselves are consequent on the original formation and on well-humoured daily regimes, and these things mutually increase each other. So, to be sure, people who become sharp-spirited because of the hot mixture then fire up their innate heat by their sharpness of spirit; and those who are well-balanced in their mixtures, having balanced motions of the soul, are assisted towards good humour.[59]

Gal. *QAM* 11 (Müller 79,2–9 = K. 4.821.5–12, tr. Singer)

This relevant passage shows not only that the mixtures of the body bear an influence on the soul, but that the influence is reciprocal: just like those who are sharp-spirited by means of their warm innate nature increase the heat in their mixtures by their sharp-spiritedness, so too the well-balanced people, by means of the balanced mixtures of the soul, promote the good mixture in themselves. But how far might that very process count as real with respect to self-determination? The "virtuous circle"[60] as Singer calls it, turns out to be not really "reciprocal"[61] in the sense that the body influences the soul in a certain way and that, vice versa, the soul has its own impact on the body, but Galen rather describes a kind of reinforcing feedback: if the originally formed, i.e. natural, mixture is imbalanced, the motions of the soul become imbalanced, too, and as a further effect, again, influence our natural mixture in the same negative direction. But if the initial mixture is well-balanced, one can consider oneself blessed, since then the feedback between body and soul makes the mixture better and better. One might therefore argue that this process, which Galen reasonably calls "increasing" (*synauxanein*), rather emphasizes the tendency of a reinforcement of the natural, initial mixture than that it would show an independent, reciprocal influence of both nature and habit. Thus, in the end, the passage cited above is not at all "unusual in the context of the work":[62] it is not only in line with the overall thesis of *QAM*, but even *emphasizes* the danger that our inborn corporeal nature influence our habits, which again push the initial mixture in the same direction that nature already has predetermined. Therefore, Galen can reasonably conclude that neither the Stoic assumption that all children are naturally born

59 Reading with Singer and Bazou εὐχυμίαν as has been transmitted in the Latin and Arabic text instead of Müller's εὐθυμίαν. See Singer 2014, 409, nn. 168 and 424.

60 Singer 2014, 424.

61 *Ibid*.

62 Singer 2014, 408, n. 167.

virtuous nor the opposite, namely that all children are born naturally bad, is correct.[63] It rather is the case that we are born with an initial mixture that can be *either* good *or* bad, and that we have to pay special attention to the fact that this natural tendency – if we do not act against it – increases itself via the body-soul-body-relationship outlined above.

Besides the above mentioned influence of our soul by means of our daily regimen, there is another still more direct influence of the soul on the body: the affections of the soul. That these can be harmful to the body is shown in Galen's *Preservation of Health.* The affections of the soul, like anger or excessive worry, can cause fevers in the body by means of an increasing of the innate heat, while an impairment of both perception and the mind can harm the body by defect of nutrition and the diminution of the natural warmth.[64] Furthermore, *QAM* indicates that certain psychic affections have a cooling impact on the body, as the following passage suggests:

> **T5** Excessively moist animals, meanwhile, are more timid; for fear cools things down (ὁ γὰρ φόβος καταψύχει). Animals with this kind of mixture in their hearts, therefore, are naturally suited (προωδοποίηται) to this affection.
>
> Gal. *QAM* 7 (Müller 53,2–4 = K. 4.793.4–6, tr. Singer)

That fear causes cooling is in line with a passage from *PHP* saying that the body in fear turns "pale, cold and trembling."[65] Here, the psychic *pathos* itself is responsible for a bodily change, the cooling being the cause of timidity.[66] That someone can be "prepared in advance" (*proōdopoiētai*)[67] for the affection of fear, however, shows that also the (bodily) presupposition for the affection is a relevant factor. But since the bodily mixture alone is not a sufficient cause for the occurrence of an affection, we still need to fill a gap in the explanation of how exactly an affection comes to be.

As we know from *PHP*, the affections have their origin in the irrational parts of the soul. As we have seen, Galen rejects the Stoic doctrine that affections are erroneous judgments of the rational part of the soul.[68] He, by contrast, defines them as irrational capacities (*dynameis*), impulses (*hormai*) or movements (*kinēseis*), which can be opponents of the rational part and thus create conflicts in the soul.[69] But although to Galen affec-

63 Gal. *QAM* 11 (Müller 73,6–12 = K. 4.814.13–19); 11 (Müller 74,21–75,1 = K. 4.816.8–11).

64 Cf. Gal. *San. Tu.* 1.8.16–17 (Koch 19,31–20,1 = K. 6.40.11–15).

65 Gal. *PHP* 2.7.16 (De Lacy 154,23–25 = K. 5.270).

66 Also Singer 2014, 393, n. 94, notes this "interesting remark, giving causative power to the soul-state (fear) rather than – as is apparently the tenor of the passage as a whole, and of course as Galen wishes to take it – making such states dependent on bodily composition."

67 Cf. Singer 2014, 393, n. 95.

68 On this topic see especially Tieleman 2003a.

69 Cf. Gal. *PHP* 4.2.25–26 (De Lacy 242,33–36 = K. 5.371–372); 4.6.9–27 (De Lacy 272,9–274,39 = K. 5.405–410); 4.6.35–38 (De Lacy 278,1–9 = K. 5.412–413).

tions are not identical with wrong judgments, they are nevertheless based upon certain perceptions, imaginations (*phantasiai*), and rudimentary forms of judgment. Anger, for instance, arises when "the soul desires to avenge itself on the supposed wrongdoer."[70] From this perspective the actual trigger of the occurrence of anger is the valuation of a certain perceived situation as unjust.[71] Not only perceptions but also imaginations (*phantasiai*) are obvious candidates for what triggers our emotions. This can be inferred from *PHP* where Galen gives credit to Posidonius by stating that affections sometimes occur by means of an imagination or some kind of verbally described picture "that resembles a picture perceived by the eye."[72] The irrational parts of the soul can be aroused by words that cause an imagination (in the soul) without seeing something in reality: "Thus some persons fall victim to desire as a result of a verbal account, and when realistically ordered to flee the charging lion, even though they have not seen it, they are afraid."[73] Although *PHP* suggests that forming an imagination only belongs to the functions of the *logistikon*,[74] the passage gives rise to the suggestion that there is a different kind of imaginative faculty, in which the irrational parts of the soul can participate, too. This guess is borne out in *Character Traits* where we read that also little children and most animals can in their irrational souls have imaginations of certain things as well as of their efficient causes, which they can condemn as appropriate or inappropriate.[75] The best thing we can do, then, is to distinguish a purely rational kind of imagination from another sort, in which also irrational beings – including the irrational parts of the soul – can participate. We then avoid any problem by stating that according to Galen affections can occur in the irrational parts of the soul and at the same time by means of either a perception or an imagination, which, again, are evaluated as for instance fearful, unjust or delightful.

To sum up: besides the material causes of the affections there exist also formal causes.[76] On the one hand, certain bodily preconditions render people more prone to certain affections than others, while on the other hand, the affections find their actual triggers in certain rudimentary judgments about experiences, based on perceptions and imaginations. During an affection, again, the qualities of the body are changed and rendered warmer or colder or dryer or wetter, respectively. Due to these observations, a circular model of causation is attractive in order to explain the mutual influence of body

70 Gal. *PHP* 7.3.2 (De Lacy 440,1 = K. 5.601).

71 This definition of the cause of anger is in line with Plato and Aristotle. Cf. Pl. *Ti.* 70a7–c1; Aristotle, *Rhetorica* 1378a31–34; Aristotle, *De Anima* 403a30–31.

72 Gal. *PHP* 5.6.23–27 (De Lacy 330,22–31 = K. 5.473–474); esp. 5.6.26 (De Lacy 330,29 = K. 5.474).

73 *Ibid*.

74 Gal. *PHP* 7.3.2 (De Lacy 438,29–30 = K. 5.600).

75 Gal. *Mor.* (Kraus 45). Here imagination is very broadly defined as "every movement that comes about in the soul of the sort that happen in it when a change occurs in the body."

76 In the case of anger the physical side is the boiling of the innate heat and the formal sight is the desire for the revenge. Cf. Arist. *De an*. 403a30–403b1 and Pl. *Resp.* 440c7–8.

and soul. For instance, we can assume that a person who lately has been in a state of fear, and whose body is still cold, wet and trembling, will be much more prone and sensitive to estimating even an only slightly alarming situation as more fearful than normally. That is why also the way we perceive or imagine, and how we form our values about any given situation is never objective, but depends on our prior experiences as well as on the current constitution of our body and soul in certain situations. These observations lead to our final sections, which deal with the soul's tension (*tonos*) and the special habitual state of the *megalopsychos*.

## 4 Spirit's intrinsic function: tension of the pneuma and tension of the Soul

In the following section, I will concentrate on the special ambiguity of the term tension (*tonos*) and its relation to pneuma in Galen's texts. Let us first turn back to our central passage from section one above,[77] where Galen subsumes imagination (*phantasia*), memory (*mnēmē*) and recollection (*anamnēsis*), knowledge (*epistēme)*, thought (*noēsis*), and ratiocination (*dianoēsis*) under the intrinsic (*kath' heautēn*) functions of the soul's rational part. As we have seen, those of the spirited part are to provide the '*tone*' (*tonos*) of the soul, and to be constant (*monimon*) and unyielding (*aēttēton*) in the things that reason (*ho logismos*) commands; and that of the appetitive part is the enjoyment of pleasure (ἡ τῶν ἡδέων ἐστὶν ἀπόλαυσις). These intrinsic functions turn out be the most important functions with respect to the expression of our character – its virtues and vices.

In what follows, I aim to show that the spirited part's *kath' heautēn* function, i.e. the mentioned unyieldingness in the commands of reason and the provision of the (*tension*) *tonos* of the soul, can be interpreted in at least two different senses: on the one hand, this unyieldingness is due to the physiological structure of the heart, and implies the production of a certain physical strength connected to the innate heat and the vital pneuma, but on the other hand, it means that the spirited part *formally* supports the goals of the rational part insofar as it can strengthen the tension of the soul (*tonos tēs psychēs*).[78] In other contexts, Galen says that the essence of psychic strength is innate heat, which enables someone to act steadfastly.[79] Thus, a proper amount of heat in the organism benefits the soul: as a natural constituent of the bodily constitution it is a factor beneficial for the strength and firmness of a person's actions, while coldness leads to laziness, immobility and weakness.[80] Every organ, including the brain, has its own

77 Gal. *PHP* 7.3.2–3 (De Lacy 438,28–440,8 = K. 5.600–601).

78 On the problem of the *tonos* of the soul in Galen cf. Trompeter 2016, 83–92; 99–105.

79 Cf. Gal. *Mor.* (Kraus 27). We will come back to passage below.

80 Cf. Gal. *Mor.* (Kraus 27,13–9).

proper warmth, as Galen emphasizes against Aristotle, according to whom the brain has a cooling function.[81] An abundance of heat, however, harms the brain, and therefore we have to keep the moderate, natural warmth of the organism and the negative form of the boiling (*zesis*) of this warmth during an affection apart.[82] Accordingly, instead of identifying it with the boiling of the innate heat as some scholars do,[83] we have good reason to assume that the *tonos* of the soul (being itself a proper psychological function of the spirited part) is connected to the moderate and natural form of that heat. The boiling of the innate heat, however, being the unnatural and immoderate form of that heat, is connected to the affections: it provides the instrument by means of which the spirited part can manipulate the voluntary movements of the rational part, as we have seen.

Let me first highlight some interesting physiological implications of *tonos* in Galen, and then concentrate on certain similarities and differences to the Stoic account. In *Semen*, Galen shows the dangers of excessive sexual intercourse and mentions a 'vital tension' (*zōtikos tonos*), which is connected to the vital pneuma of the human being:

> **T6** οὐ μόνον δὲ τῆς θορώδους ὑγρότητος ἀφαιρεῖσθαι πᾶσι τοῦ ζώου τοῖς μέρεσι συμβήσεται κατὰ τοὺς τοιούτους καιροὺς, ἀλλὰ καὶ τοῦ πνεύματος τοῦ ζωτικοῦ· καὶ γὰρ καὶ τοῦτο ἐκ τῶν ἀρτηριῶν ἐκκενοῦται μετὰ τῆς σπερματώδους ὑγρότητος. ὥστε οὐδὲν θαυμαστὸν, ἀσθενεστέρους ἀποτελεῖσθαι τοὺς λαγνεύοντας ἀμετρότερον, ἀφαιρουμένου τοῦ σώματος ἅπαντος ἑκατέρου τῶν ὑγρῶν τὸ εἰλικρινέστατον, προσερχομένης δὲ καὶ τῆς ἡδονῆς, ἥτις αὐτὴ καθ᾽ ἑαυτήν ἐστιν ἱκανὴ διαλύειν τὸν ζωτικὸν τόνον· ὥστ᾽ ἤδη τινὲς ὑπερηδυσθέντες ἀπέθανον.
>
> And the loss that all of the parts of the animal undergo at such times will be not only of seminal fluid but also of vital pneuma; for this too is emptied from the arteries along with the seminal fluid. So it is not at all surprising that those who are less moderate sexually turn out to be weaker, since the whole body loses the

**81** Cf. Gal. *UP* 1.8.2 (Helmreich 446,5–453,9 = K. 3.615.9–652.11).

**82** During the natural process of digestion, which is also described as a kind of cooking, Galen does not use the term *zesis* but *pepsis*, cf. *UP* 1.4.8 (Helmreich 208,4–5 = K. 3.284.2–3).

**83** This is why I have some doubts concerning Schiefsky's suggestion that Galen identifies the *tonos* with the boiling of the innate heat. Moreover, Schiefsky concludes from this assumption that Galen's conception of *tonos* exemplifies his general tendency to understand psychological activities as physiological ones. "Galen's references to the 'tone' of the soul and the 'boiling' of the innate heat in connection with the spirited part reflects a tendency towards a physical understanding of psychological activities, despite his official agnosticism on the question of the substance (*ousia*) of the soul. The notion of psychic strength as tone (*tonos*) is ascribed to Chrysippus in *PHP* 4.6.1–11 (De Lacy 270,10–272,19 = K. 5.403–6); Galen appropriates the term but associates it with the innate heat rather than the Stoic pneuma" (Schiefsky 2012, 337, n. 27).

> purest part of both fluids; and there is besides an accession to pleasure which by itself is sufficient to dissolve the vital tension, so that before now some persons have died from excess of pleasure.
>
> Galen, *De Semine* 1.16.30–32 (De Lacy 138,23–140,6 = K. 4.588.5–15, text follows Kühn, tr. De Lacy with slight changes)

People who are having sex do not only lose seminal fluid but also vital pneuma (*pneuma zōtikon*) from their arteries. When a person is not sexually moderate enough, the loss of the purest liquids weakens the body. In addition to this weakening of the body, Galen emphasizes that excessive pleasure (*hēdonē*) in itself is a sufficient cause to dissolve the vital tension (διαλύειν τὸν ζωτικὸν τόνον). Though Galen does not elaborate on their connection here, it is striking that he uses both expressions, *pneuma zōtikon* and *zōtikos tonos*, in the same context. With regard to certain reports about the *pneuma psychikon*, we find more indications that pneuma and *tonos* are entangled: for example, in *On the Affected Parts* the *tonos* of the psychic pneuma is said to fall or sink (*katapiptontos*), i.e. to be diminished, through strong pains.[84] If there is a *tonos* of the psychic pneuma, it is not a huge leap to assume the existence of a *tonos* of the *pneuma zōtikon*, too. The expression "pneumatic tension" immediately recalls the Stoic account. Through the assumption of psychic pneuma psychic qualities are reduced to material changes in the pneumatic tension: in the Stoic account all psychic movements, in the end, *are* pneumatic changes.[85]

At first sight, one might assume that Galen's account of pneumatic tension is closely related to this, but there are important differences: later in the passage of *On the Affected Parts* the psychic pneuma is said to be the first instrument (*prōton organon*) of the soul transmitting sensation and motion to all bodily parts,[86] which implies that Galen – without elaborating on that point any further here – avoids to identify the psychic pneuma with soul. In a related passage in *PHP*, where it is said that the loss of psychic pneuma leads to the human being's loss of sensation and motion but not to death, this implication becomes more explicit: if the psychic pneuma really *were* the substance of the soul, its loss would lead to death. But since this does not happen, the psychic pneuma cannot be the substance of the soul.[87] Going back to our passage in *Semen* above, it is remarkable that here, too, Galen emphasizes that the loss of pneuma only *weakens* the body – which means that the soul does not somehow 'pour out' of it – while strong pleasure is considered a sufficient cause for the *dissolution* of the vital *tonos*, i.e. a sufficient cause for death. The same phenomenon is described in *On the Affected Parts*:

**84** Galen, *De locis affectis* 4.3 (K. 8.233.2–3).

**85** Cf. *SVF* 2. fr. 202; *SVF* 2. fr. 229, 389, 440–442, 447, 449, 458, 471, 473, 826; *SVF* 3. fr. 112, 459.

**86** Gal. *Loc. Aff.* 4.3 (K. 8.233.3–6).

**87** Gal. *PHP* 7.3.21–22 (De Lacy 444.4–11 = K. 5.606).

**T7** καὶ μὴν καὶ καθ' ἕτερόν τινα τρόπον, ἐπί τε στομαχικαῖς συγκοπαῖς, ἀλγήμασίν τε σφοδροῖς, καὶ φόβοις ἰσχυροῖς, ἡδοναῖς τε μείζοσιν, ἀποθνήσκουσί τινες· ὅσοις γὰρ ἀσθενής ἐστιν ὁ ζωτικὸς τόνος, ἰσχυρά τε πάθη ψυχικὰ πάσχουσιν ἐξ ἀπαιδευσίας, εὐδιάλυτος τούτοις ἐστὶν ἡ τῆς ψυχῆς οὐσία· τῶν τοιούτων ἔνιοι καὶ διὰ λύπην ἀπέθανον, οὐ μὴν εὐθέως ὥσπερ ἐν τοῖς προειρημένοις· ἀνὴρ δ' οὐδεὶς μεγαλόψυχος οὔτ' ἐπὶ λύπαις οὔτ' ἐπὶ τοῖς ἄλλοις ὅσα λύπης ἰσχυρότερα θανάτῳ περιέπεσον· ὅ τε γὰρ τόνος τῆς ψυχῆς αὐτοῖς ἰσχυρός ἐστι τά τε παθήματα σμικρά.

Some people again die in another manner from gastric syncope[88] and under very severe pain as a result of terrible fright or extreme pleasure. For in those persons who have a weak vital tension (*zōtikos tonos*) and suffer from strong psychic affections (*pathē psychika*) because of lack of education, the substance of the soul is easily dissolved (*eudialytos*). Some of these patients die of distress, but not as fast as those mentioned above. However, a great-souled man (*megalopsychos*) will not succumb to distress or to other affections stronger than distress, since his psychic tension (*tonos tēs psychēs*) is strong against them (*autois*) (*sc.* the affections), and his afflictions (*pathēmata*) are small.

Gal. *Loc. Aff.* 5.1 (K. 8.301.14–302.5, tr. Siegel 1973b, with changes)

It is fascinating that also in this passage[89] Galen makes psychic affections the sufficient cause for a human being's death. However, there are some differences between the two passages: while in *Semen* he talks about the *lysis* of the vital pneuma's *tonos*, in *On the Affected Parts* he talks about the easy dissolution (*eudialyein*) of the substance of the soul (*hē tēs psychēs ousia*). But, anyway, both phenomena indicate death. And while in *Semen* only strong pleasure (*hēdonē*) is mentioned, in *On the Affected Parts* also fear and distress (*lypē*) are brought up.[90] The striking similarity of both passages consists in the fact that mere psychic affections are said to be sufficient causes for the living being's death. Taking stock of these observations, it is clear that such a death by means of *pathos* does not occur through a quantitative loss of pneuma, but it is rather the case that the pneuma's tension is involved here. I want to argue that, when a person dies from strong *psychic* affections – for instance from great pleasure, distress or fear –, qualitative changes in

88 The described phenomenon might suggest *angina pectoris*: cf. Siegel 1973b, 217.

89 Some count this passage (needlessly, I think) among the fragments of Chrysippus, cf. *SVF* 2. fr. 876.

90 One question that arises here is whether *lysis* and *eudialeuein* refer to the same underlying process, and if so, whether we should read these terms rather in the sense of *dissolution* or even *decomposition* or in the sense of a separation from the body. The latter interpretation would only make sense in the case of an immaterial understanding of the substance of the soul. But if the vital *tonos* is connected to the vital pneuma it would make no sense to talk about its separation from the body.

the pneumatic tension are involved. In our passages from *On the Affected Parts* and *Semen* above, Galen does not elaborate any further on the question how precisely these changes occur, but from *QAM* we know that strong heating, cooling, drying and moistening of the body lead to death.[91] If we combine the ideas of all three treatises, it follows that strong changes in the elemental qualities (heat, cold, dryness and wetness) of the pneuma destroy the pneumatic tension and cause death. In *QAM,* Galen states hypothetically, that the substance of the soul, when it is understood as the form (*eidos*) of the natural (i.e. the homogeneous) bodies, *is* nothing else than that mixture.[92] In the light of our observations, this would lead to the consequence that strong affections cause death by means of the destruction of the mixture of the homogeneous parts of the brain. If the substance of the (rational) soul is identical with the mixture of the brain's homogeneous parts, and these parts themselves are the mixtures of the humours, which again are the mixtures of the four elements,[93] it is clear that the destruction of these mixtures would lead to the destruction of the soul. To sum up: strong affections can lead to death not insofar as they cause a loss of pneuma in terms of quantity, but insofar as they are accompanied by serious qualitative pneumatic changes. This leads to the consequence that a death from psychic affections is always also a death from qualitative physiological changes in the body. But even if we take these nexuses for granted, our interpretation can itself only be speculative, since, due to his agnosticism, Galen never definitely decides whether the substance of the soul is something material or immaterial.[94]

In the passage above we read further that only the "great-souled man" (*megalopsychos*) is protected from suffering strong afflictions (*pathēmata*). Galen appears to draw an implicit distinction between 'affection' (*pathos*) as an active cause, and the feeling or perception of the affection, here translated as 'affliction' (*pathēma*). We need this distinction to explain why the *megalopsychos* stays calm even then when he is confronted with things that normally *would* cause strong feelings. If the tension of his soul (*tonos tēs psychēs*) is strong, the things he suffers from, i.e. the afflictions, are small – even in the case of strong affections.[95] This can be explained by making recourse to a distinction between two different senses of *energeia*, and two senses of *pathos* that have been made by Hankinson:[96] according to this interpretation, one form of activity ($energeia_1$) can be defined as an active motion of something, one form of affection ($pathos_1$) as a passive suffering, while a second form of activity (*energeia*) is understood as an active motion which is in accordance with nature, and a second form of affection ($pathos_2$) as an active

**91** Gal. *QAM* 3 (Müller 38,5–7 = K. 4.775.5–7); 3 (Müller 39,10–12 = K. 4.776.17–19).

**92** Gal. *QAM* 3 (Müller 37,5–15 = K. 4.773.17–774.8). Also Singer interprets the natural bodies as being on the "homogeneous level of composition," cf. Singer 2014, 380, n. 36; cf. also Gal. *Loc. Aff.* 3.6 (K. 8.161).

**93** Cf. Galen, *De Elementis ex Hippocrate* (De Lacy 124,16–128,21 = K. 1.478.17–483.3).

**94** Cf. Gal, *QAM* 3 (Müller 38,4–39,20 = K. 4.775.4–777.8), and Ballester 2002, 119.

**95** Gal. *Loc. Aff.* 5.1 (K. 8.301.14–302.5 = *SVF* 2.876).

**96** With reference to Gal. *PHP* 6.1.14–15 (De Lacy 362,31–364,2 = K. 5.509).

motion that is runaway and immoderate, i.e. contrary to nature.[97] In the light of these observations, it comes clear how the *megalopsychos* can be exposed to the strong affections (in the sense of *pathos*$_2$) of the two irrational parts of the soul, while his rational part nonetheless suffers only from small affections in the sense of *pathos*$_1$.

We can conclude that there is a causal relation between the soul's tension (*tonos tēs psychēs*) and *megalopsychia*. Psychic stability is described as the consequence of a strong psychic *tonos*. His special resilience against the runaway affections of the irrational parts of the soul lead to the great effect that the *megalopsychos* is not in danger of dying from strong affections. After all, we would like to know why the *megalopsychos* does not suffer from strong affections, and how we can attain a promising resilience like this.

## 5 The resilience of the megalopsychos: innate heat and meditation

From the passages of *Semen* and *On the Affected Parts* cited in the first section above,[98] we have learned that the loss of vital pneuma only weakens the body, and that it is not a sufficient cause for death, while strong affections and the dissolution of the pneumatic tension are. Furthermore, we get an explanation, why the *megalopsychos* cannot die from psychic affections like strong distress: "His *tonos tēs psychēs* is strong against the affections, and his afflictions (*pathēmata*) are small."[99] If we ask how the strong *tonos tēs psychēs* is connected to the smallness of the afflictions, from what Galen tells us about the *megalopsychos*, it seems obvious that he derives his special protection against a death from affections from a strong soul. As we have seen, since the substance of the soul and the vital *tonos* are not dissolved but only weakened by a quantitative loss of the pneuma, this loss can neither be the cause of death nor can its opposite be a protection against it. From what we have shown in the last sections, it is obvious that death, i.e. the dissolution of the substance of the soul and the soul's *tonos*, occurs because of strong qualitative changes in the *tonos* of the pneuma. To prevent the body from those heavy changes, we need to have a strong tension of the soul (*tonos tēs psychēs).* The strong soul and not the strong body causes the invulnerability of the *megalopsychos*.

In order to explain how this special psychic resilience comes to be, we have to pay special attention to Galen's psychological works. As we have seen in *PHP* 7.3.2–3 (De Lacy 438,28–440,8 = K. 5.600–601) cited in section one above, the *tonos tēs psychēs* is explained in the context of the support of reason in order that it can "be constant and unyielding in the things that it commands," and is called an intrinsic work (*ergon kath*'

97 Hankinson 1993, 196–197.

98 Gal. *Sem.* 1.16.30–31 (De Lacy 138,23–140,6 = K. 4.588.5–15).

99 Gal. *Loc. Aff.* 5.1 (K. 8.302.4–5).

*heautēn*) of the *thymos*. This special description obviously mirrors the Platonic concept of *thymos*: according to the *Republic*, the *thymos* of a well-educated soul is defined as the ally (*symmachos*) of the soul's rational part.[100] In *Character Traits* Galen elaborates on that idea by stating that the rational part even *relies* on the support of a strong spirited part:

> **T8** The rational soul may act on its own, without help, as, (for example), when it knows the truth, and the agreement and disagreement of things. It cannot, however, restrain the appetitive soul from excessive movement without calling upon the spirited soul for help, for a person cannot prevent his desiderative soul moving at the wrong time or without due moderation unless there is strength and endurance in his spirited soul, which is his animal soul. The essence of this strength is, as far as I can see, innate heat, for the more powerful the movement of the innate heat, the more someone moves. Just as cold produces laziness, immobility and weakness, so heat produces energy, movement, and the strength to act.
>
> Gal. *Mor.* (Kraus 27,8–15, tr. Davies)

The rational soul alone is not able to succeed against the excessive movements of the appetitive part of the soul, but rather stands in need of the strength of the *thymos*. With respect to *PHP* we can add that the *tonos* of the soul is a work of the *thymos* in that it preserves and supports the rational part of the soul. As we have seen, this rational ability means making the correct rational decisions. The spirited part has to defend the rational part against the excessive and unnatural movements of the appetitive part, like strong pleasures deriving from sex or the immoderate consumption of food and drink.

There are two main causes of a strong psychic resilience: the proper amount of the innate heat in the organism, and the right psychological preparatory training. Let us first consider innate heat. The passage makes an interesting point about the essence of the strength of the spirited part by referring to the innate heat of the living being. We have seen that an unnatural acceleration of the innate heat in the organism, caused by the consumption of wine or exhausting sports or certain affections like anger and shame, goes along with immoderate movements of the irrational parts of the soul, and leads to overhasty decisions in the rational part of the soul. In the passage from *Character Traits* above, the innate heat in its natural form is said to support the strength, energy and movement of the spirited part, while "cold produces laziness, immobility and weakness." While the *tonos tēs psychēs* is connected to a well-balanced warmth in the organism, its unnatural acceleration and boiling has a negative effect on the soul. If the innate heat increases too much, the spirited part cannot fulfil its intrinsic work. In this case, it rather

100 Pl. *Resp*. 440a8–b7.

acts due to its *ergon kata pathos,* namely the boiling of the innate heat in the case of anger. But whenever the activity of the *thymos* is moderate and natural (*kata physin*) and fulfils its intrinsic work (*ergon kath' heautēn*), i.e. maintains the *tonos of the soul*, the sturdiness of the rational part's decisions is assured and the afflictions are kept in check. This also suggests that there are forms of anger or spiritedness that are neither immoderate nor rousing, but moderate and helpful for the support of reason.

From *On the Affected Parts* we know that the *megalopsychos* will not die from distress (*lypē*) because he does not suffer from strong *pathēmata*. Accordingly, the cause of the strong resilience of the *megalopsychos* cannot consist in natural heat only, but also has a sheer psychological side. This comes clear in *Avoiding Distress,* where Galen in his explanation of *megalopsychia* refers to himself as a proper example for this rare phenomenon:

> **T9** It was no great thing to avoid the madness of most people, since I cared little for life at the Imperial court, but not to be distressed at the loss of all my drugs, all my books, and, besides, the recipes of major drugs, as well as the writings on them I had prepared for publication along with many other treatises, any one of which by itself would have shown the great efforts I have put in gladly throughout my life, that is already a prime display of nobility and nigh on magnanimity. What led me to such magnanimity (μεγαλοψυχία) you already know first because you were brought up with me from the start and educated alongside me, but secondly there was what I derived in addition from my experience of events in Rome. For you are well aware that observation of politics is a good teacher by reminding us of the actions of chance.
>
> Galen, *De indolentia* 50a–52 (Boudon-Millot/Jouanna/Pietrobelli 16,9–17,1, tr. Nutton)

Here, Galen presents himself as a person who is not distressed because of the loss of those things that are most meaningful to him, and further describes the "observation of politics" as being a good master for *megalopsychia*, as it reminds us of those things that happen by means of mere chance or misfortune (*tykhē*). Citing Euripides, Galen then recommends a famous psychological technique that is commonly known as *praemeditatio malorum*:[101]

> **T10** As I once learned from a wise man, /I fell to considering disasters constantly, /Adding for myself exile from my native land, /Untimely deaths and

**101** On the techniques of ancient meditation cf. e.g. Rabbow 1954; Hadot 1981, Hadot 1995, and more recently Armisen-Marchetti 2008. An overview of the concept that can be found e.g. in Diogenes of Sinope, Philon of Alexandria, Seneca *et alii* is also given by Robertson 2010, 207–226.

> other ways of misfortune, /So that, should I ever suffer any of what I was imagining, /It might not gnaw at my soul because it was a novel arrival.[102]
>
> Gal. *Ind*. 52 (Boudon-Millot/Jouanna/Pietrobelli 17,4–9, tr. Nutton)

The principle of *praemeditatio malorum*, as "a systematic exercise, which is seen as a characteristic of the Stoic school,"[103] goes probably back to Anaxagoras, who, as is testified *inter alia* in *PHP*, replied after the sudden death of his son that he "knew that he had begotten a mortal,"[104] but can also be found in Pythagorean doctrine.[105] Because, as Chrysippus teaches, "the blow that has not been foreseen strikes harder,"[106] the essence of this technique consists in the permanent imagination of misfortunes with the goal of avoiding a painful surprise, if something bad should really come to pass. As life is never fully predictable, we need to repeat acts of prospective representation of misfortune in order to prevent the soul from experiencing distress or fear in real distressful or dreadful situations. While it obviously is the whole soul that benefits from this technique, it is a matter of debate whether the subject of imagination is the whole soul or the rational part or faculty only.[107] Even though Galen does not elaborate on the details of this method any further, with a view to his concept of *tonos*, we can assume that *praemeditatio malorum* works like this: after one has imagined a painful or dreadful situation, distress or fear occurs. As the quote from Euripides suggests, the idea is that if the previously trained situation occurs in reality, it does not bother the soul because it is novel. This, again, implies that novel impressions have a stronger impact on the soul than those one is used to, and that one can get used to these imagined situations up to the point that they do not bother the soul anymore. It further seems that the subject of the inurement is not only the rational part, but also that part (or those parts) of the soul productive of the affections, i.e. spirit, that is productive of anger, fear and distress.[108] If the spirited part, then, is strong and sturdy because it has trained the dreadful situation many times in advance, it will, when the situation actually should arise, not be aroused in any strong or unnatural way – and will not fire up the innate heat to an unnatural degree. As a consequence, the rational part of the soul will not have any disturbance of its rational processes whatsoever.

**102** Cf. Gal. *PHP* 4.7.10 (De Lacy 282,17–23 = K. 5.418), and Euripides fr. 814 Mette (fr. 964 Nauck).

**103** Armisen-Marchetti 2008, 104.

**104** Cf. Cicero, *Tusculanae disputationes* 3.30, 58; and Gal. *PHP* 4.7.9 (De Lacy 282,14–16 = K. 5.418).

**105** Iamblichus, *Vitae Phytagoras* 196–198 = DK 58D6.

**106** Cic. *Tusc*. 3.52, *quod provisum ante non sit, id ferire uehementius*; cf. Armisen-Marchetti 2008, 104.

**107** Armisen-Marchetti 2008, 104, sees it as a "spiritual exercise in Pierre Hadot's sense," by explaining that "the word 'spiritual' makes it clear that these exercises are the work not only of the intellect, but of the individual's entire psychological structure." Cf. Hadot 1981, 14.

**108** Cf. Gal. *PHP* 3.6.8 (De Lacy 212,1–4 = K. 5.335). The discussion of the role of appetite in this process must be postponed to a later occasion.

## 6 Conclusion

Even though Galen ascribes the ability for voluntary motion to the rational part of the soul only, we have seen how the spirited part of the soul can influence the process of rational decision making through the manipulation of the pneuma by means of innate heat, up to the point that the rational part's decisions can be reduced to what spirit wants. Moreover, I have shown how the affections can even be life-threatening: whenever the soul is severely imbalanced and excessive pleasure, distress or other strong psychic affections occur, these strong affections can be sufficient causes of a person's death. A quantitative loss of pneuma, however, that occurs for instance during immoderate sexual activity, only *weakens* the body without being a sufficient cause of death. That the loss of pneuma is only a reinforcing but by itself not a sufficient factor for the death from affections is in line with Galen's statement that the pneuma is not the substance of the soul, but its first instrument. Furthermore, I have argued that this death from psychic affections occurs by means of a strong qualitative change leading to the dissolution of the tension of the pneuma. The *megalopsychos*, however, will not die from strong affections at all. The explanation for his special resilience lies in a strong tension of the soul (*tonos tēs psychēs*). According to Galen, the *megalopsychos* is not prone to any affections whatsoever: being a person with a strong psychic tension, which is preserved by the spirited part of the soul, his decisions are always rational and correctly made. This special protection leads to the fact that he does not suffer from strong afflictions (*pathēmata*) and benefits from psychic sturdiness. To make this happen, a well-trained spirited part must itself both be moderate and able to defend the rational part against the excessive movements of the appetitive part of the soul, i.e. strong pleasure. Since the rational part alone is not able to keep the appetitive part in check, it depends on spirit as a strong and reliable ally. In order that spirit can be strong and powerful, it needs a proper amount of innate heat – but at the same time not too much of it as the negative result would be that the innate heat starts boiling. This would make the spirited part prone to excessive anger, its movements would become unnatural and affective, and it could only be an ineffective and weak fighter against the appetites. Having taken a closer look at the role of the spirited part of the soul during the process of *praemeditatio malorum*, we could reasonably assume that spirit is actively trained by this technique. Generally, the pneuma plays an important role in the unity of the organism, as it is present in the whole body and connects the bodily parts, including those in which the parts of the soul are located. We have seen that the loss or pouring out of pneuma (that we may not identify with the substance of the soul) cannot be a sufficient cause of death. But with regard to our present observations it is clear that *qualitative* changes in the pneuma, like extreme heating and cooling, can cause lethal alterations in the body's mixture, and in the soul.

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# Proclus on the Pneumatic Ochema

## Summary

The Neoplatonists link the Aristotelian concept of *pneuma* with the Platonic notion of the vehicle of the soul (*ochema*). This article focuses on Proclus' take on the issue. Proclus in trying to systematize the position of his Neoplatonic predecessor distinguishes between two distinct vehicles of the soul and, through this, tries to solve problems encountered by his predecessors, of how soul and body are linked, how the interactions works and how each, body and soul still retain their specific qualities.

Keywords: ochema; vehicle of the soul; pneuma; Proclus; matter; soul

Das aristotelische Konzept von *pneuma* wurde von neuplatonischen Philosophen mit Platons Konzept des Seelenwagens (*ochema*) verbunden. Dieser Aufsatz beschäftigt sich mit Proklos' Position zu dem Thema. Proklos' Ziel ist es, die Positionen seiner Vorgänger zu systematisieren. Er unterscheidet dafür zwischen zwei verschiedenen *ochemata*. Durch diese Unterscheidung will Proklos verschiedene Probleme seiner Vorgänger lösen, die mit der Verbindung und Interaktion von Körper und Seele zu tun haben, sowie der Frage, wie beide, Körper und Seele, trotz dieser Verbindung ihre jeweiligen Qualitäten behalten.

Keywords: ochema; Seelenwagen; Pneuma; Proklos; Materie; Seele

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## 1 Introduction

The concept of a "vehicle of the soul" (VOS) is found in several Neoplatonic discussions about how the soul and the body are joined. Originally, it seems the aim of these discussions was to account for the interaction[1] of the body, which is material, perishable and changeable, and the soul which is immaterial, eternal and unchangeable.[2] But over time, these discussions became more refined, and their focus shifted to questions concerning which set of faculties could be accounted for by the VOS and how it could account for them.[3] In the context of these later discussions, Proclus introduced a distinction between two kinds of vehicle of the soul: a luminous and a pneumatic.[4] What I want to do in this essay is to examine why Proclus introduces this distinction and what problems he thinks it can solve.[5] As I will show, Proclus' distinction offers an interesting perspective on the tradition of Neoplatonic discussions of the VOS: not only does he discuss the issue of the VOS in a systematic way, but one can, by looking at his understanding of pneuma and the pneumatic VOS, see how his discussion of the VOS goes beyond the interaction problem and offers a unique account of how particular faculties of the soul are mediated by pneuma in the union of soul and body.

1 The term "interactionist" covers a wide range of questions linked to the problem of how body and soul can be joined together, including the ontological status of each, body and soul, as well as how body and soul interact.

2 Porphyry in his *Vita Plotini* mentions that a question that was often discussed in the circle of Plotinus was "how the soul can be in a body" (πῶς ἡ ψυχὴ σύνεστι τῷ σώματι) at Porphyry, *Vita Plotini* (Henry/Schwyzer 13,11). Cf. Plotinus, *Enneades* 4.3.22.

3 There is significantly more research done on who first introduced the notion of a VOS than on its purpose and function. Cf. Kissling 1922; Dodds 1933, 313–321; Halfwassen 1994; Bos 2007. Pasquale Barbanti 1998 is helpful in this respect although her focus is not on the "materiality" of the vehicle(s) but rather on psychic faculties and religious aspects. Griffin 2012 concentrates on the luminous vehicle. Gersh 2009 remarks in his review of Baltzly's translation and commentary on Proclus' commentary on the *Timaeus*: "[T]here have been basically two kinds of scholarship devoted to Proclus (...) There is the approach reading him as a source of ideas about how to interpret Plato's own text, or as a body of information about earlier Greek philosophy (…). On the other hand, there is the approach reading him as evidence for philosophizing in the Platonic (or Neo-platonic) manner during the fifth century of the Common Era (...). An ideal study of Proclus would combine these approaches. Now, Baltzly's introduction and notes can be rated highly for their implementation of the first but less so for the second." Gersh mentions in this context specifically the relationship of whole and parts that is so important for understanding the human soul and the purpose of the vehicles.

4 Πνευματικὸν ὄχημα, cf. e.g. Proclus, *In Platonis Timaeum commentarii*, Diehl 3.234,11; 3.237,25; Proclus, *In Platonis Rem publicam commentarii* Kroll 2.349,4. Αὐγοειδὲς ὄχημα cf. e.g. Procl. *In R.* Kroll 2.154,25–26; Procl. *In Ti.* Diehl 3.355,16–17. Proclus also talks about a third vehicle by which he means the outer body, see below. This paper focuses mainly on pneumatic and luminous VOS.

5 Many modern discussions of the VOS talk generally about the ὄχημα-πνεῦμα (*ochēma*-pneuma, VOS-pneuma), although the connection with pneuma encompasses only parts of the Neoplatonic theory of the VOS, namely the substrate that the soul uses when descending into this world. Cf. Kissling 1922 but also, more recently, Pasquale Barbanti 1998. The latter encompasses many different theories of the ὄχημα. She focuses on that of the pneumatic vehicle in connection with φαντασία (*phantasia*).

This essay will focus on Proclus's commentary on the *Timaeus*, which offers the most extensive treatment of the topic; it will, however, occasionally refer to his *Institutio theologica* and his commentary on the *Republic*. For context, I will begin with a discussion of the sources Proclus himself draws from, namely Plato and Aristotle, how they were interpreted by his predecessors Atticus, Albinus and Porphyry, and the problem Proclus saw with their interpretation. I will then turn to the distinction Proclus introduced between luminous and pneumatic vehicles of the soul, which he believed could resolve this problem.[6] Finally, I will show how Proclus used Plato and Aristotle to support this distinction, and how he understood the relation of each VOS to the soul and the body.

## 2 Sources of the pneumatic VOS

In formulating his view on the VOS, Proclus draws on two sources: Plato and Aristotle. What is surprising about Proclus's sources, however, is that only Plato speaks explicitly about a VOS. Aristotle, by contrast, while he discussed the role of pneuma in living things, never specifically identified it with the soul's vehicle. In this section, I discuss what Proclus' Neoplatonist predecessors found useful in Aristotle's discussions of pneuma for understanding Plato's notion of a vehicle of the soul.

In Plato's works one can find three discussions of a VOS. The first is in the *Phaedrus*: there Plato describes the soul as a union of a charioteer and two winged horses (ἐοικέτω δὴ συμφύτῳ δυνάμει ὑποπτέρου ζεύγους τε καὶ ἡνιόχου, Pl. *Phdr*. 246a6–7).[7] The second is in the *Timaeus*, where the process of the soul's coming into being is described. At *Timaeus* 41d–e, Plato claims that the *dēmiourgos* used the mixing bowl again from

6 Philoponus does so, too, in the prooemium of his *In Aristotelis De anima libros commentaria* (Hayduck 18), but ascribes different purposes to the two vehicles, cf. Kissling 1922, 322. Bos 2007 questioned whether Proclus really posits two VOS. He holds that there are not really two vehicles but that the different descriptions Proclus uses refer to different modalities of one vehicle rather than to two vehicles. For evidence Bos 2007, 32, n. 8 points to Porphyry's *Sententiae* 29 (Lamberz 19,2–15) where four levels of *ochēma* are mentioned. He goes on to say that the vehicle "connects the soul-vehicle with the substance of the astral sphere, and, inasmuch as it is also called 'pneumatic', with the sphere of the sublunary elements" (Bos 2007, 37). So, Bos suggests that there is one vehicle to which other kinds of materials – first from the astral sphere, then the sublunary elements – are added. Bos 2007 makes this point only in passing (his goal in this article is to prove that Aristotle is the originator of the concept of the VOS) but what one can see from this, is that even though Proclus on several occasions explicitly talks about two vehicles it is not clear what he is talking about exactly. Griffin focuses on the luminous vehicle and clearly states: "this reflects Proclus' position that there are two vehicles, a luminous vehicle for the rational soul, and a pneumatic vehicle for the irrational soul," Griffin 2012, 17. Cf. Also Bos 2007 32, n. 8.

7 Cf. also Pl. *Phdr*. 247b2. Plato does not actually use the word ὄχημα in this passage, but he does use the word ζεῦγος (a vehicle) and compounds of the word ἡνίοχος, which is a chariot driver. Here Plato is using the image of a vehicle being driven to talk about the soul and its faculties.

which the world soul was created and from an inferior mixture[8] made the human souls and assigned each to a star.[9] The creation of the soul from an inferior mixture is the beginning of the connection of soul to body (Pl. *Ti.* 42d–e).[10] Also important, especially in connection with what Proclus has to say about eschatology and the role *ochēma* plays in it, seems the third passage in Plato, namely in the *Phaedo* (113d4–6), where in the myth the dead arrive at the place of judgment and are assigned an *ochēma* to travel the Acherusian lake and consequently be punished and cleansed according to the life they have led. In these contexts, Plato uses the term *ochēma*[11] to refer to the mediator between soul and body.

While it is clear that these images refer to the connection between body and soul, it is not quite clear how they relate to each other. In the *Timaeus,* Plato seems to refer to the connection between body and soul in general, while in the *Phaedrus*, he is more specific when it comes to the different faculties of the soul (rational and bodily). How to interpret the image of the charioteer and the two horses and what the role of the carriage actually is, has been discussed at length among the Neoplatonists. None of these passages from Plato mention pneuma in connection with the VOS. Many ancient Platonists trace the notion of pneuma in connection with the VOS back to Aristotle.[12] Even though modern scholarship has questioned this connection,[13] ancient Platonists were very clear about this.[14] Proclus himself not only assumes a pneumatic VOS for

**8** See on this Cornford 1945, 142–143.

**9** Pl. *Ti.* 41d8–e2; this description is the reference point for the notion of an astral body.

**10** The imagery that is used to describe this connection of soul and body is the origin of the later Latin tradition where the connection between body and soul is described as a garment (*indumentum*): cf., e.g. on Marsilio Ficino, Corrias 2012.

**11** Or a similar term, cf. n. 7.

**12** Bos 2007, 36, states "the doctrine of the 'soul-vehicle' connected elements taken from Plato's philosophy with others taken from Aristotle, and for the latter specifically the doctrine of vital *pneuma.*"

**13** Most notably Kissling 1922 starts off his paper by saying: "The theory of the ὄχημα-πνεῦμα as met with in the Neo-Platonic writers, represents the reconciliation of Plato and Aristotle on a subject which the former never taught and the latter was incapable of defining intelligibly." Cf. also Dodds 1933, 315, who does not see any passage in Plato's oeuvre that supports this theory but points to one passage in the *Leges* (898e) where Plato speaks of a "fiery aerial body" as some kind of connection. Blumenthal 1996, 98, holds the opposite position, stating that the theory of the VOS has less in common with Aristotle and more to do with Plato whose strict separation between body and soul makes such a connection necessary. Other scholars support the ancient Platonists, e.g. Bos 2007, 42: "Aristotle was in fact the only Greek philosopher who had sound theoretical reasons for introducing the doctrine of the mediating soul-body."

**14** It was not Plotinus who made this connection, cf. Kissling 1922, 322. The earliest passage in which pneuma and *ochēma* are connected is most likely Galen's *De placitis Hippocratis et Platonis* 7.7.25–26 (De Lacy 474,22–29 = K. 643–644). For a short overview over this connection cf. Kissling 1922, 316–322. Cf. also Ps.-Plutarch, *De Homero* 2.128 on this: "Plato and Aristotle used to think the soul is non-corporeal, since it is always in a body and it is bound to this like a vehicle" (Πλάτων δὲ καὶ Ἀριστοτέλης τὴν ψυχὴν ἀσώματον εἶναι ἐνόμισαν, ἀεὶ μέντοι περὶ σῶμα εἶναι καὶ τούτου ὥσπερ ὀχήματος δεῖσθαι). Ps.-Plutarch connects the *ochēma* in what follows with pneuma: "for this reason, when (the soul) escapes the body, the pneumatic (vehicle) is often dragged along" (διὸ καὶ ἀπαλλασομένην τοῦ σώματος τὸ πνευματικὸν ἐφέλκεσθαι πολλάκις).

Plato but claims that Aristotle also assumed such a pneumatic *ochēma*.[15] Which passage in Aristotle Proclus is referring to is not quite clear.[16] But some of the faculties and properties Proclus ascribes to the pneumatic *ochēma* are the same properties Aristotle ascribes to pneuma, e.g. the bringing of life (see below).

Dodds states that the Neoplatonic "doctrine appears as a modification of the cruder view according to which the soul itself is πνεῦμα"[17] and that the *ochēma*-theory "offered a compromise, on the one hand, between Plato's conception of the soul as separable form its earthly body and Aristotle's insistence that it can exist only as the ἐντελέχεια (actualisation) of some organism."[18] Dodds claims that the *ochēma*-theory is also a compromise "between the immaterialist psychology of both Plato and Aristotle and the Stoic πνεῦμα-psychology." It seems that the Neoplatonists wanted to stress the important role of pneuma without necessarily adopting Stoic materialism.

According to Baltes the terminology regarding the ὄχημα τῆς ψυχῆς, the VOS, was not used consistently among Platonists and Neoplatonists. In use were, among other things, the following terms:[19] σῶμα πρῶτον (first body), συμφυές (innate) / πρόσφυες (connate) σῶμα (body) / ὄχημα (vehicle), αὐγοειδές (luminous) / πνευματικὸν ὄχημα (pneumatic vehicle), πνευματικὸς χιτών (pneumatic garment)[20], σωματοειδὲς ὄχημα (bodily vehicle). Also used instead of *ochēma* was the term περίβλημα, some kind of garment.[21] Some of these terms – like ὄχημα τῆς ψυχῆς (VOS) – refer to the ontological place of the vehicle (it is and has to do with soul) or is – σωματοειδὲς ὄχημα (bodily vehicle) – a body in some way, others – like αὐγοειδές (luminous) / πνευματικὸν ὄχημα (pneumatic vehicle) – specify in some way specific features of the VOS. Proclus, as we will see, uses the latter distinction to explain differences in property.[22] This distinction has to do with the original problem of interaction of something immaterial and eternal (soul) with something material and changeable (body) but also accounts for different faculties which have to do with the different stuff the VOS are made out of. It is problematic to speak of materiality in connection with the VOS because both VOS are introduced to prevent anything material to get into contact or directly interact with the eternal soul but since Proclus does explicitly talk about one VOS as luminous

**15** Procl. *In Ti.* Diehl 3.238,20–21: "another vehicle is the pneumatic, e.g., as Aristotle also assumed" (ὄχημα ἄλλο πνευματικόν, οἷον καὶ Ἀριστοτέλης ὑπέλαβε).

**16** Passages in Aristotle, *De motu animalium* (cf. 703a9–b2) seem the more likely point of reference since the functioning of the pneumatic vehicle for Proclus conforms more with what is said there by Aristotle about the role of pneuma in moving the body which is responsible for the nutritive and the sensitive functions and also *phantasia*. Cf. Bos 2007, 38: The "fine-material soul-body (has) a specific role in the vegetative function, locomotion (as vehicle, *ochēma*), perception, and emotionality of the *living* creature."

**17** Dodds 1933, 316.

**18** Dodds 1933, 316–317.

**19** Cf. for sources Baltes 1986, 253.

**20** Cf. Dodds 1933, 308.

**21** Cf. Bos 2007, 44, n. 60.

**22** Cf. Porphyry, *Sententiae* (Lamberz 33,32).

and the other as pneumatic there seems to be a difference in their degree of kinship to materiality.

Some passages on the VOS mention the relative lightness or heaviness of the vehicle (λεπτὸν σώμα).[23] The vehicle is sometimes referred to as being a garment of some kind (πνευματικὸς χιτών, περίβλημα) and ὄχημα itself, originally a vehicle in the literal sense, is a term that suggests a certain kind of connection or functional relationship (locomotion). Most important in connection with Proclus' discussion of the two VOS, as we will see, is the distinction between innate (συμφυές) and connate (πρόσφυες) VOS where the connate VOS is associated by Proclus with pneuma. Often, as remarked before, the "stuff" of the connate vehicle is identified as some kind of pneuma,[24] that of the innate with light. The notion of light and pneuma in connection with the VOS was not always kept apart, e.g. Galen speaks about the light-like pneuma (φωτοειδὲς πνεῦμα). Galen says the soul is either like a αὐγοειδές τε καὶ αἰθερῶδες σῶμα or incorporeal (ἀσώματος οὐσία) but in possession of a first vehicle (πρῶτον ὄχημα).[25] Proclus separates these notions by introducing two VOS.

The different ways of speaking about the vehicle indicate conceptual disagreement regarding the properties of the VOS.[26] Proclus outlines some of these conceptual difficulties in a passage in his commentary on the *Timaeus* where he gives an overview over what his predecessors have said in regard to the VOS:[27] The ones like Atticus and Albinus, according to Proclus, destroyed the whole non-rational life (ἄλογον ζωὴν σύμπασαν, Procl. *In Ti.* Diehl 3.234,11) as well as the pneumatic VOS (τὸ πνευματικὸν ὄχημα τῆς ψυχῆς, *ibid.* 3.234,11–12) saying that the pneumatic VOS perishes together with the body in death. Others like Porphyry and his followers, says Proclus, held a more balanced position (μετριώτεροι ... καὶ πρᾳότεροι, *ibid.* 3.234,18–29) saying that the VOS of the non-rational soul consisted of mixtures (φυράματα, *ibid.* 3.234,23) of elements from the heavenly spheres (οὐρανίων σφαιρῶν, *ibid.* 3.234,23) which the soul collected on its descend. This mixture in bodily death dissolved not immediately after bodily death but

23 For sources, see Siorvanes 1989, 131–133.

24 It is clear that it is not the Stoic idea of pneuma that is taken up here because nowhere is – as is the case in the Stoic concept – the soul equated to pneuma, nor is pneuma the giver of life. And the Stoic soul is material, cf. e.g. Nemesius, *De natura hominis* 78,7–79,2 (LS 45C = *SVF* 1.158).

25 Gal. *PHP* 7.7.25–26 (De Lacy 474,22–29 = K. 643–644).

26 Halfwassen 1994, 118: "Bezüglich der Sterblichkeit oder Unsterblichkeit des Seelenwagens sowie bezüglich der Temporalität oder Permanenz seiner Verbindung mit der Geistseele waren die späteren Platoniker verschiedener Meinung." Halfwassen does not comment on materiality and functionality here but these interconnect with the question about temporality and mortality.

27 The relevant passage can be found at Procl. *In Ti.* Diehl 3.234,8–235,11. Cf. for a much shorter overview of the development also Heraclides Ponticus fr. 97 Wehrli = Iamblichus, *De anima* apud Stobaeum 1.49.39 (Wachsmuth 1.378,11–18). Plotinus is not mentioned. Cf. on Plotinus who never uses the term ὄχημα but can be interpreted to have some sort of concept of a VOS (cf. *Historisches Wörterbuch der Philosophie*, vol. 9, 112 s.v. "Seelenwagen"). Plotinus uses ἠμφιέσθαι which can also be found in Plato in reference to the incarnated soul.

soon after into its elements which returned into the spheres again whence they came from (ἀναστοιχειοῦσθαι ... καὶ ἀναλύεσθαί ... εἰς τὰς σφαίρας, *ibid*. 3.234,21–22).[28]

This debate is the starting point for Proclus to develop his own concept that he thinks deals with the ἀπορίαι that the concepts of his predecessors create.[29] In his criticism of his predecessors it becomes clear what kind of properties Proclus associates with the pneumatic vehicle. It is not that Proclus creates a new concept of the vehicles: ideas of a connection of the VOS to pneuma, to light, to a connection to the stars and a fifth element and that they have to have different properties in accordance with the part of the soul they are connected to and the part they are connecting it to have been around before.[30] But Proclus is the first to state clearly the opinion that there have to be two vehicles. As a source for his view, he names Syrianus.[31] It is in the wake of thinking about what properties the vehicles have and need to have to fulfill their purpose that Proclus talks about their respective ways to function as a medium for the soul and its faculties.

### 2.1 Proclus on the VOS, the luminous and the pneumatic

So Proclus introduces two vehicles to solve the *aporia* he sees in the solutions his predecessors offer: the luminous VOS provides a vehicle for the rational soul; the pneumatic VOS provides a vehicle for the non-rational parts of the soul, while preserving a commitment to Platonic eschatology. The aim is to account for the connection and the interaction between soul and body in a way that preserves the essence of the eternal soul without conceiving of it as a material thing. To achieve this, Proclus adopts the notion of pneuma from Aristotle to account for the connection between the soul and body, and does so by introducing a concept of degrees of materiality for both VOS.

**28** For Iamblichus' view on the issue cf. Finamore 1985.

**29** Ἀπορία: Procl. *In Ti.* Diehl 3.238,23. For the report of the views of his predecessors cf. Procl. *In Ti.* Diehl 3.234,8–235,11 and *In Ti.* Diehl 3.299,13–22.

**30** Cf. for literature on this n. 6.

**31** It seems rather certain that Proclus takes over at least parts of this theory from Syrianus but since Syrianus' commentary on the *Timaeus* is not transmitted to say which part of the theory belongs to Syrianus and which to Proclus can only be achieved when Proclus gives explicit credit to his teacher, as he does in *In Ti.* Diehl 3.233,14 and 236,32, where Proclus talks about the theory of "our teacher" (ὁ ἡμέτερος διδάσκαλος) which most certainly is Syrianus; cf. on this Griffin 2012, 27, n. 7. For more information on Syrianus' work cf. the collection of fragments by Klitenic Wear 2011.

### 2.2 Properties of the luminous VOS

Soul for Proclus is incorporeal (ἀσώματος)[32], indestructible (ἀνώλεθρος) and imperishable (ἄφθαρτος)[33] and does not depend on anything else for its existence (ἡ ψυχὴ ... ἔξω παντὸς ὑποκειμένου);[34] body, however, is not capable of independent existence (ὑποκειμένου δεόμενον) and is composite (σύνθετον), which means it is changeable and perishable.[35] Proclus stresses[36] it is important to make sure that no substantial change (κατ'οὐσίαν) occurs in the soul through the interaction with body.[37] This is why he and other Neoplatonists posit a mediator, the ὄχημα.[38] Because it is incorporeal, the soul requires a medium to be able to move through time and space which it. This is because the soul belongs to a different, heavenly sphere in its pure form and is without extension and matter.[39] So first, the soul in its descent needs a place in the world – a principle which Proclus stresses on several occasions: "for everything mundane has a seat and order in the world, and gives completion to a part of it."[40] The luminous vehicle, as Griffin has shown,[41] provides such a place for the soul. Proclus says, according

**32** Proclus, *Elements of Theology*, prop. 186 (Dodds 162,13). All translations of the *Elements of Theology* are drawn from Dodds 1933.

**33** Procl. *ET* prop. 187 (Dodds 162,24); cf. also *ET* prop. 49 (Dodds 48,11–15).

**34** Procl. *ET* prop. 187 (Dodds 162,29–30).

**35** *Ibid*. 48 (Dodds 48,5–10); cf. on this topic also *ET* prop. 187 (Dodds 162,26).

**36** Procl. *ET* prop. 191 (Dodds 168,3–10).

**37** *Ibid*. (Dodds 168,6–8): "Accordingly it remains that every soul must be eternal in one regard and participate time in the other. Either, then, it is eternal in respect of its existence and participates in time in respect of its activity, or the reverse. But the latter is impossible" (λείπεται ἄρα τῇ μὲν αἰώνιον εἶναι ψυχὴν πᾶσαν, τῇ δὲ χρόνου μετέχουσαν. ἢ οὖν κατ' οὐσίαν αἰώνιός ἐστι, κατ' ἐνέργειαν δὲ χρόνου μέτοχος· ἢ ἔμπαλιν. ἀλλὰ τοῦτο ἀδύνατον). Cf. Procl. *ET* prop. 209–211 (Dodds 182,16–184,20) and Blumenthal 1971, 174.

**38** For an overview of the research on the Neoplatonic theory of the *ochēma*, see Bos 2007, 35, n. 21; for the source texts Halfwassen 1994, 123.

**39** Even gods, for Proclus, have vehicles, only the visible ones, though: "Während die göttlichen Seelen nur das Lichtochema besitzen, haben die Dämonen auch den pneumatischen S(eelenwagen) und die Menschen beide S(eelenwagen) sowie den fleischlichen Körper" (while the divine souls have only the luminous *ochēma* of the soul, demons have also the pneumatic *ochēma* and humans both *ochēmata*, as well as the fleshy body) (*HWPh*, vol. 9, 113 s.v. "Seelenwagen"). The reference in HWPh is to *In Ti.* 3.298,12ff. and 3.236,31ff.

**40** Procl. *In Ti.* Diehl 3.235,25–30: "Now also, he generates the vehicle from the Demiurgus. For it is he who causes the soul to ascend into its vehicle, according to the similitude of divine souls. For how could it be possible for the soul to be mundane, except by having a vehicle in the universe? For everything mundane has a seat and order in the world, and gives completion to a part of it" (καὶ νῦν ἀπὸ τοῦ δημιουργοῦ τὸ ὄχημα γεννᾷ· αὐτὸς γάρ ἐστιν ὁ εἰς ὄχημα ἐμβιβάζων τὴν ψυχὴν καθ' ὁμοιότητα τῶν θείων ψυχῶν. καὶ πῶς γὰρ ἂν ἄλλως εἴη δυνατὸν ἐγκόσμιον εἶναι τὴν ψυχὴν ἢ ὄχημα ἔχουσαν ἐν τῷ παντί; τὸ γὰρ ἐγκόσμιον πᾶν ἕδραν ἔχει καὶ τάξιν ἐν τῷ κόσμῳ καὶ μόριον αὐτοῦ συμπληροῖ). Translations of *In Ti.* by Taylor (Baltzly's translation of vol. 3 of the commentary was not available to me). One reviewer remarked helpfully that the notion of ascent should here in no way be understood ontologically: it is not the case that the demiurge assists in ascending to a higher level of being.

**41** The following discussion of the luminous vehicle is indebted to Griffin's article on the topic (Griffin 2012). Griffin draws some very interesting points about Proclus' theory of the VOS from a passage in Simplicius' commentary on Aristotle's *Physica* in which Simplicius quotes Proclus.

to Griffin, that the luminous vehicle is similar to τόπος[42] or χώρα,[43] the concept which Plato introduces in the *Timaeus.*[44] Plato "identifies light with cosmic place"[45] and Proclus takes this up to explain how the soul – unextended and without matter – comes into this world which has both, extendedness and matter.[46]

Proclus – in accordance with earlier Platonists[47] – ascribes to light the property or potential of different degrees of density. At some point the light comes to be or to have a bodily essence (σωματικὴ οὐσία).[48] The vehicle as a "graded scale of light"[49] makes possible a gradual progression from soul (immaterial) to body (material) since light is "stretched on a continuum from incorporeality to corporeality"[50]. Light, for Proclus, can be the mediator between the hypostases (i.e. levels of being) because light is "the activity of one hypostasis directed into the next."[51] While body is not a hypostasis, it is a link in the chain of being and thus receives the powers of the higher hypostases in a gradually diminished form.[52] Light is, therefore, the perfect mediator between (rational) soul and non-rational soul because it is capable of different degrees of "materiality" and it can transmit powers of higher entities. Proclus makes the first vehicle ἄϋλον, ἀδιαίρετον, and ἀπαθές.[53] The vehicle or the rational soul whose substrate is the vehicle is thus the carrier of the indestructible principles.[54] But since the whole purpose of the VOS was to provide a mediator between body and soul, if the first vehicle has essentially the same properties as soul itself, how is mediation achieved? This can be seen by looking at the properties Proclus ascribes to pneuma and the pneumatic VOS.

**42** Griffin 2012, 2: "*topos* is conceived as a mediator between soul and body."

**43** Griffin 2012, 4–5.

**44** Pl. *Ti.* 52a8–b5; 52d3. The notion of χώρα is disputed among scholars; some, Griffin among them, think that it can be construed as a predecessor to Aristotle's notion of matter.

**45** Griffin 2012, 4.

**46** Griffin 2012, 7: "[S]oul, which is unextended, and body, which is extended, must be joined by an intermediary principle," an "entity that participates in some properties of both extreme terms"; and "the sensible body (*sôma*) is inseparable from matter, located in place and time, and extended, while intelligible soul is separable and immaterial, eternal, and unextended. Platonic space or 'place', then, must be a principle that participates partly in both of these two groups of characteristics. It is separable and eternal, on the one hand, but extended in three dimensions on the other."

**47** Griffin 2012, 7–14.

**48** Procl. *In R.* Kroll 2.195,8–14.

**49** Griffin 2012, 8; Procl. *In Ti.* Diehl 2.8,22–25.

**50** *Ibid*., 7–8.

**51** *Ibid*., 14 with reference to Procl. *Theol. Plat.* 2.7, Saffrey/Westerink 44,17–45,13, cf. also Griffin 2012, 31, n. 35.

**52** Cf. e.g. Procl. *In Ti.* Diehl 3.82,4–12. Cf. comprehensively Bergemann 2006.

**53** Procl. *ET* prop. 208 (Dodds 182,4–5): "The vehicle of every particular soul is immaterial, indivisible in respect of its existence, and impassible" (Πάσης μερικῆς ψυχῆς τὸὄχημα ἄϋλόν ἐστικαὶἀδιαίρετον κατ'οὐσίανκαὶἀπαθές).

**54** "Träger der unzerstörbaren Prinzipien" (ἀκρότης) *HWPh* vol. 9, 113.

### 2.3 The pneumatic VOS as solution to an eschatological *aporia*

There are only a few passages in which Proclus describes the pneumatic vehicle.[55] Nevertheless, from these passages we can reconstruct some of the properties Proclus ascribed to pneuma.[56] Pneuma, for Proclus, is associated with humidity: wet air (ἔνικμος ἀήρ), he says, makes the pneumatic VOS more humid (ὑγρότερον).[57] The reference to air is consistent with another of Proclus' statements that the pneumatic VOS consists of the four sublunary elements of which air is one.[58]

Furthermore, Proclus thinks the pneumatic vehicle also makes the souls heavier (βαρύνοντα δὲ τὰς ψυχάς).[59] Sometimes, Proclus more generally talks about manifold garments (παντοδαπῶν χιτώνων) that make the souls heavier.[60] These garments[61] are described in their composition in the following way: ἀπὸ τῶν στοιχείων ἄλλους καὶ ἄλλους χιτῶνας, ἀερίους ἐνυδρίους χθονίους.[62] So humidity as well as heaviness are both associated with pneuma and the pneumatic VOS.

Aside from its physical characteristics, pneuma also has a vital function for Proclus. On several occasions he associates pneuma and the pneumatic *ochēma* with a life-giving property: according to *In Ti.* Diehl 3.233–234 the pneumatic *ochēma* is where mortal life begins.[63] In his commentary on the *Oracula Chaldaica* Proclus states that pneuma

**55** There seem to be only five instances in Proclus' whole oeuvre in which he explicitly uses the term πνευματικὸν ὄχημα or some inflected form of this expression (Procl. *In R*. Kroll 2.349,4; *In Ti.* Diehl 3.234,11; 3.237,25; 3.238,20; 3.331,7).

**56** All of which, especially the notion of heaviness, raise the questions how the *ochēma* can still be immaterial; see below for a critical discussion of Proclus' ambiguous concept.

**57** Procl. *In R.* Kroll 2.349,4–5: "the soul's pneumatic vehicle coming to be more humid because of the wet air" (τὸ πνευματικὸν ὄχημα τῶν ψυχῶν ὑγρότερον γιγνόμενον διὰ τὸν ἔνικμον ἀέρα).

**58** Cf. below and n. 62. One of the reviewers for my article, both of which I have to thank for their careful reading of my article and the very thorough remarks and suggestions, commented that it remains unclear how the pneumatic *ochēma* can be associated with air as well as the four sublunary elements of which air is only one. At this point of my article I am merely listing different notions which Proclus mentions in connection with the pneumatic *ochēma*. Why Proclus would mention only one component, namely air, in the *Republic* passage, is a matter which would indeed require further study.

**59** Procl. *In Ti.* Diehl 3.298,1–2. Cf. also Procl. *In R.* Kroll 2.349,10: "the pneuma making (the soul) heavier" (βαρύτερον τὸ πνεῦμα ποιοῦντας).

**60** Procl. *In Ti.* Diehl 3.298,1: "composed from manifold garments" (ἐκ παντοδαπῶν δὲ χιτώνων συγκείμενον).

**61** Later, in the Middle Ages, the vehicle becomes the *indumentum* (garment), the body being like a kind of clothing for the soul (there are, as we saw, some passages earlier which refer to the vehicle as a χιτών, a garment), cf. Bos 2007, 44, n. 60.

**62** Procl. *In Ti.* Diehl 3.297,22–23.

**63** Procl. *In Ti.* Diehl 3.233,32–234,5: "for every *ochēma*, with which its own peculiar vital and rational soul has been attached, is always eternal in substance, since, in fact, both are produced from the *dēmiourgos* (...). Therefore, he sows the soul when generating as the father of λόγοι, but he begins the process when generating the vehicle, since this is already the starting point of mortal life"(πᾶν γὰρ ἀεὶ τὸ ὄχημα μετὰ τῆς οἰκείας αὐτοῦ ζωῆς καὶ τῆς λογικῆς ψυχῆς, ἧς ἐξήρτηται, κατ' οὐσίαν ἀίδιόν ἐστιν. ἄμφω γοῦν ἀπὸ τοῦ δημιουργοῦ γεννᾶται (...). σπείρει μὲν οὖν τὴν ψυχὴν γεννῶν ὡς λόγων πατήρ, ὑπάρχεται δὲ τὸ ὄχημα παράγων· τοῦτο γὰρ ἀρχή ἐστιν ἤδη τῆς θνητοειδοῦς ζωῆς).

is the one that imparts the warm life.[64] This vital property, in the sense of biological processes, is also visible in another feature associated with pneuma and the pneumatic *ochēma*: hair and fingernails, Proclus observes, grow even after death, not indefinitely but only for a short period of time. That suggests that vitality does not reside in the fleshly body (alone) but also in the pneumatic vehicle.[65] However, Proclus makes quite clear that the pneuma associated with these descriptions is not matter in the way the outer body (which Proclus sometimes calls the shell-like ὄχημα[66]) is matter; for him, the pneuma is still without matter (ἄϋλον) in some way.[67]

Proclus associates not only such basic vital functions with the pneumatic VOS. For him, the arational faculties of the soul, i.e. *thymos* and *epithymētikon*, also reside in the pneumatic *ochēma*,[68] as does *phantasia* – essentially all properties of living things below the level of (rational) human beings. Consequently, Proclus locates the individuality of a person in the pneumatic *ochēma*. By associating the pneumatic vehicle with a person's individuality, Proclus addresses another problem he saw with the account of the *ochēma* given by his predecessors, who dispose of the pneumatic VOS after bodily death.[69] How, he asks, would it be possible for souls to be punished or purified after death,[70] how would souls retain their individuality (ἡ ἰδιότης αὐτῶν)[71] which is the basis for their judgment and for the choosing process of the next life?[72] In other words, how does the soul (which is essentially unchangeable) retain predicates associated with body or materiality such that it can be judged at all? Proclus' concern with eschatology is one of the reasons he posits a second VOS: to avoid problems concerning our judgment after death which would cause trouble for Neoplatonists' commitment to the transmigration

**64** Procl. *Art. Hier.* Bidez 205,14–15.

**65** Siorvanes 1989, 132.

**66** Ὀστρεῶδες, cf. Procl. *In Ti.* Diehl 3.298,27–29; 3.320,16–18.

**67** Procl. *In Ti.* Diehl 3.297,25: "from the immaterial pneuma to this body" (ἀπὸ τῶν ἀΰλων πνευμάτων εἰς τόδε τὸ σῶμα). This is the only passage in which Proclus talks about πνεῦμα being ἄϋλον. What exactly he means by this is not easy to determine.

**68** Procl. *In Ti.* Diehl 3.235,11–15, cf. on this Pasquale Barbanti 1998, 234.

**69** Cf. Dodds 1933, 306, for an overview of the Neoplatonic positions on the (im)mortality of pneuma.

**70** Shaw 1995, 105: "[O]nly the divine body was immortal whereas the pneumatic body had a limited immortality relative to its degree of purity." Cf. on this Gertz 2011. One reviewer suggested that the distinction of different *ochēmata* might be due not so much to systematic considerations on the part of Proclus but might rather be motivated by exegetical considerations, i.e. in interpreting the myth in the *Phaedo* the notion of punishment associated with the pneumatic *ochēma* would be very prominent whereas in the *Phaedrus* there is more focus on the ascent of the soul and therefore Proclus comments more extensively on notions of the (luminous) VOS associated with that ascent. I would tend to think that a systematic thinker like Proclus would be trying to bring together both systematic and exegetical considerations, but the issue needs further thought.

**71** Cf. Procl. *In Ti.* Diehl 3.234,26. Proclus makes a longer argument proving that each vehicle stays with the same soul and is composed individually. Cf. Procl. *In Ti.* Diehl 3.267,19–27.

**72** Proclus makes a lot of horoscopes and star constellations at birth and associates the materiality of the VOS with this which has effects on what kind of life one leads, at least regarding the starting conditions (cf. Procl. *In Ti.* Diehl 3.275,31–276,30).

of souls. Proclus is using the theory of *metempsychosis* which was shared by Neoplatonists in one form or another[73] as a point of agreement to motivate his criticism of his predecessors.

The pneumatic vehicle, thus, is the subject (*hypokeimenon*) for processes of change, as the origin and the seat of vitality, as the vehicle of the non-rational soul, and as a structure that is closely linked to a person's individuality. Its fate is closely bound to the soul it belongs to:

> **T1** [T]hey undergo all manner of changes in sympathy with the soul's activities and accompany them everywhere: when the souls suffer passion, they suffer with them; when they have been purified, they are restored with them; when they are led upwards, they rise with them.
>
> Procl. *ET* prop. 209 (Dodds 182,30–32)

As seat of the non-rational faculties, the pneumatic VOS is also connected to the reversal and ascent (ἐπιστροφή) of the soul back to its origin although it is shed in the process. This Proclus elaborates on in the course of his discussion on the different kinds of the movement of the soul: if the soul directs its activity towards, the sensible world it and its vehicles' movements are rectilinear, if the soul directs its activity, as it should, towards the intelligible, the movements are circular.[74]

### 2.4 The VOS as solution to an ontological *aporia*

Proclus achieves this difference in properties of the vehicles not only by their respective "materiality" – the first vehicle, as we saw, is closely linked to light – but also through their means of coming into being. While the first vehicle is created by the δημιουργός the second vehicle is created by the young gods (νέοι θεοί). By positing an origin of the second vehicle different from the first vehicle (and the soul itself) Proclus achieves what, in his opinion, his predecessors did not: they cannot sufficiently explain how the two categorically different entities connect and interact while leaving the *ousia* of the

73 Cf. *HWPh* vol. 9, 114–115, s.v. "Seelenwanderung."

74 Cf. Pasquale Barbanti 1998, 227: "Questi ὀχήματα, che si muovono ora di moto circolare aro di moto rettilineo a seconda che l'anima si volga verso il sensibile o verso l'intelligibile, accompagnono l'anima durante il processo di acquisizione delle varie vite e fungono da strumenti dell'anima nell'esplicazione delle sue funzioni e delle sue attività (these ὀχήματα – which move one moment by a circular motion another by a straight motion, depending on whether the soul turns towards the perceptible or towards the intelligible – accompany the soul during the process of acquiring different lives and they function as instruments of the soul in the execution of its functions and its activities)." This aspect of different movement of the soul according to occupation with different objects – sensible or intelligible – would merit a longer discussion but the issue cannot be pursued here.

soul unchanged. Proclus makes this point explicit: the soul would become mortal if connected directly to the body.[75] It is important, therefore, that it is not the *dēmiourgos* creating the pneumatic vehicle because like creates like. If the pneumatic VOS were created by the *dēmiourgus* as well it would have the same attributes as the *dēmiourgos*. The (rational) soul, for Proclus, is *logos* out of *logoi*. It is, just like children from a father, produced by the *dēmiourgos* who is responsible for producing wholes (and also produces the first *ochēma*).[76] These wholes correspond to the immortal things: "all that is immortal, which it possesses according to an imitation of wholes." Proclus goes on to say: "but the addition (i.e. the pneumatic VOS) pertains to a second, or mortal-formed life."[77] It is not the *dēmiourgos*, but the young gods (whom Proclus also calls encosmic gods[78]) which produce the life (ζωή) in the *ochēma* which is mortal.[79]

## 3 Connection of the two vehicles to the soul

The two VOS have a different kind of connection with soul, as a consequence of their different coming into being and with regard to the stuff they are made of. As we have seen, Proclus assumes that the pneumatic *ochēma* survives bodily death for some time. Still, it is shed at some point in the ascent,[80] while the luminous *ochēma* remains with the soul longer. The pneumatic vehicle is made out of elements from the sublunary realm, and is therefore dissoluble even though not immediately whereas the connection between first VOS and soul is a longer lasting one (but also not eternal: the soul at some point returns to its original state[81]). This difference in the duration of the two *ochēmata* has its origin and justification in the different kind of connection each *ochēma* has with the (rational) soul.[82] Proclus calls the luminous VOS "innate" (συμφυές), while he calls the pneumatic vehicle "connate" (πρόσφυες).[83]

**75** Procl. *ET* prop. 196 (Dodds 170,18–30).

**76** Proclus mentions this fact on several occasions in his *Timaeus* commentary (Procl. *In Ti.* Diehl 3.237,18–24).

**77** Procl. *In Ti.* Diehl 3.237,23–24.

**78** Ἐγκόσμιοι θεοί, cf. e.g. Procl. *In Ti.* Diehl 3.203,25–26.

**79** Procl. *In Ti.* Diehl 3.233,26–30; Procl. *In Ti.* 3.236,14–17. On this, cf. Opsomer 2006.

**80** What happens to the pneumatic *ochēma* after its separation from the rational soul and its luminous VOS is a matter of dispute among Neoplatonists, cf. on this *HWPh*, vol. 9, 113 s.v. "Seelenwagen."

**81** When having obtained purification (cf. Procl. *In Ti.* Diehl 3.237,5).

**82** Concerning the connection with the second VOS the metaphor of weaving (ὑποφαίνω or προσυποφαίνω) is very important in explaining how body and soul come together, e.g., Procl. *In Ti.* Diehl 3.219,5–7; 3.237,13–14; and 3.237,22. Cf. also the reference text, Plato's *Timaeus*, e.g., at 72c. The metaphor seems to bring up the following: to bring things together that can be rather different but now form a whole and something new. The different components can be separated again but stick together for a longer amount of time (although not eternally).

**83** The terms go back to Plato: πρόσφυτος shows up twice in the *Timaeus*: 42c6 and 45a2–3. On 42c6, Cornford 1945, 144, n. 2 notes: "The word *prosphunta* recalls the comparison of the incarnate soul

The meaning of "innate" (συμφυές) for Proclus which characterises the first VOS is detectable mainly in his descriptions of how the second VOS which is πρόσφυες differs from the first: in an illuminating passage in his *Timaeus* commentary[84] Proclus talks about how the second VOS is foreign to the first, and compares it (the second) to an unruly mass, a mob (ὄχλος) which is put together out of manifold garments (ἐκ παντοδαπῶν δὲ χιτώνων συγκείμενον). The pneumatic VOS is an addition (πρόσφυσις, which is just the noun to the adjective "connate," πρόσφυες) and Proclus explains this further: it is an addition from outside (τὴν ἔξωθεν περίθεσιν) and later. Meanwhile, Proclus is sure, that words such as 'mob' and 'manifoldness' cannot have been intended as descriptions of the first VOS.[85]

The terminology[86] and also Proclus' explanations suggest that one, the luminous VOS, is an outgrowth of the (rational) soul itself while the other psychic faculties associated with the non-rational part of the soul are a later and not so closely linked external addition of "layers". This more loose connection of the pneumatic VOS with soul is also seen in the fact that the notion of the VOS as a garment is more often linked with pneuma (e.g., πνευματικὸς χιτών) than with the luminous VOS. The connection between non-rational life and its vehicle is not as strong as the one of soul with its first vehicle. Rather than explain what makes these layers join with the soul, Proclus argues that the soul needs this addition to be part of the world of becoming.

The connection between soul and vehicle refers to their cosmological place, Proclus states: "the innate vehicle makes the soul encosmic (τὸ ... συμφυὲς ὄχημα ποιεῖ αὐτὴν (*sc.* ψυχήν) ἐγκόσμιον), the second, connate VOS makes it a citizen of the world[87] (more precisely: of generation – γενέσεως πολῖτιν) and the third (i.e. the outer body, τὸ ὀστρεῶδες) makes it earthen."[88]

Siorvanes elaborates on this:

> With the vehicles, the soul becomes a citizen of the physical cosmos. The realm of space, time and body has various (sub)levels: that of pure space, the celestial, that of generation, etc.[89]

to the image of Glaucus encrusted with shells and seaweed (*prospephukenai*, Rep. 611d)." At *Ti.* 45a2–3, Plato is talking about the offshoots of arms and legs. The term σύμφυτος shows up at Pl. *Phdr.* 246d2 to describe the relationship between the soul and body in an immortal god, although Plato denies gods can be unions of soul and body. In Plato's seventh letter, generally regarded as not authentic, the word προσφυής is also used in the sense of "naturally belonging to."

**84** Procl. *In Ti.* Diehl 3.297,26–300,20.

**85** *Ibid*. Diehl 3.299,22–24.

**86** Cf. LSJ s.v. A and A.II.

**87** He even speaks of the outer body (or the last body: ἔσχατον σῶμα, cf. Procl. *In Ti.* Diehl 3.300,7) as the third vehicle.

**88** Procl. *In Ti.* Diehl 3.298,27–299,9. Interestingly, Proclus calls the pneumatic VOS here a middle (μέσον).

**89** Siorvanes 1989, 133.

In connection with the individuality mentioned above, however Siorvanes goes on:

> A soul can be naturalised at these different grades. So each soul acquires only those vehicle-bodies that are relevant to her destined incarnation. Human are souls with luminous, pneumatic and fleshy bodies (...). Souls are as individual as the particular bodies in which they live.[90]

Not only is the terminology "innate" / "connate" used for the two VOS interesting, but the metaphors used for bringing about this connection are illuminating as well: the connection between soul and the first vehicle is described using the Platonic expression ἐμβιβάζειν which, translated in a neutral way, means only "put into" or "put onto." In Plato's *Timaeus* it is the *dēmiourgos* assigning each of the souls a star and putting them onto their respective star.[91] Proclus takes up this expression in his *Timaeus* commentary for the first VOS:

> **T2** καὶ νῦν ἀπὸ τοῦ δημιουργοῦ τὸ ὄχημα γεννᾷ· αὐτὸς γάρ ἐστιν ὁ εἰς ὄχημα ἐμβιβάζων τὴν ψυχὴν καθ'ὁμοιότητα τῶν θείων ψυχῶν.[92]
>
> Now also, he generates the vehicle from the Demiurgus. For it is he who causes the vehicle to ascend into its vehicle, according to the similitude of divine souls.
>
> Procl. *In Ti.* Diehl 3.235,25–27

The verb is also used in connection with naval endeavour, indicating the soul embarking onto its vehicle being its captain or master. Thus, the verb indicates a functional relationship between soul and its first vehicle: all properties and direction are coming from soul while the first VOS provides primarily locomotion. The image of the chariot from Plato's *Phaedrus* and how it is interpreted by many Neoplatonists points in a similar direction: the soul here moves through different spheres of the heavens using a vehicle.[93]

While there is a difference in composition of the luminous and pneumatic vehicles, in their connection with the soul, and in how this connection is brought about, the two vehicles still serve a common purpose: to explain the interaction between body and

90 Siorvanes 1989, 133.

91 Pl. *Ti.* 41d8–e2.

92 Cf. also Procl. *In Ti.* Diehl 3.268,15–16.

93 *Phdr.* 246a6–b4. The focus here, though, is not as much on the vehicle, the word ὄχημα is not used, but on the one driving the vehicle, ἡνίοχος referring to the charioteer. Proclus sometimes, as mentioned before, refers to the outer body as the third VOS, giving back some of the original meaning of the word *ochēma* that refers to a means of transportation. Cf. Dodds 1933, 306 for an overview of the Neoplatonic positions on the (im)mortality of pneuma.

soul. Proclus describes the process of how faculties are transmitted from soul to body thus:

> **T3** ἡ δ'οὖν ἐν ἐκείνῳ μία αἴσθησις καὶ ἀπαθὴς ἐν τῷ πνευματικῷ ὀχήματι μίαν αἴσθησιν ἀπογεννᾷ παθητικήν, αὕτη δὲ τὰς ἐν τῷ ὀστρεώδει σώματι πολλὰς καὶ παθητικάς, καὶ ἡ ἐν ἐκείνῳ μία δύναμις ὀρεκτικὴ τὰς ἐν τῷ πνεύματι παρήγαγε πλείους ὀρεκτικὰς δυνάμεις ἐχούσας τι χωριστὸν ἀπὸ τοῦ ὀστρεώδους σώματος καὶ παιδεύεσθαι δυναμένας, αὗται δὲ τὰς ἐν τῷδε τῷ σώματι τελευταίας καὶ ἐνύλους.
>
> If therefore, in the (ethereal) vehicle (i.e. the first vehicle), there is one impassive life, this will generate in the pneumatic vehicle, one passive sense; and this latter will generate in the testaceous (or this outward) body, many and passive senses. The orectic power likewise, in the ethereal vehicle will produce many orectic powers in the pneumatic vehicle, which will possess something separate from the testaceous body, and capable of being disciplined. And these will produce in this outward body, ultimate and material orectic powers.[94]
>
> Procl. *In Ti.* Diehl 3.237,24–31

So the one faculty (μία δύναμις) for perception in the luminous vehicle (ἐν ἐκείνῳ) which is ἀπαθής (impassive, not affected) creates in the pneumatic *ochēma* one faculty for perception with is able to be affected (παθητική). This faculty, in turn, creates many faculties in the outer body, all παθητικαί. Proclus states that the *dēmiourgos* when placing the souls onto their vehicle gives them a beginning (or principle, ἀρχή) of their own organs / instruments (ὄργανα).[95] Those many faculties that Proclus speaks of are, according to him, enmattered (ἔνυλοι) in the outer body. So the differences discussed before between the two VOS translate into a difference in function (impassive in the luminous VOS, passive, that is: able to be affected, in the pneumatic VOS) that still makes possible an interaction. It is the pneumatic VOS in which all functions associated with the non-rational parts of the soul are located.

While Proclus thus distinguishes clearly between the first and the second VOS and their respective functionality, he also distinguishes between the outer body and the non-rational parts of the soul and the pneumatic VOS saying that the point where all sense perception comes together cannot itself have its seat in body in a material way since it is the connection to the immaterial:

**94** Cf. also Procl. *In Ti.* Diehl 3.286,20–29; cf. also Procl. *In Ti.* Diehl 3.288,21–27.

**95** Procl. *In Ti.* Diehl 3.267,9–11.

**T4** μήποτε οὖν κάλλιον οὕτω λέγειν, ὥσπερ ὁ ἡμέτερος διδάσκαλος, τὰς μὲν ἀκρότητας τῆς ἀλόγου ζωῆς τὸ πνεῦμα περιέχειν καὶ εἶναι ταύτας μετὰ τοῦ ὀχήματος ἀιδίους ὡς ἀπὸ τοῦ δημιουργοῦ παρηγμένας, ταύτας δὲ ἐκτεινομένας καὶ μεριζομένας ποιεῖν τὴν ζωὴν ταύτην, ἣν προσυφαίνουσιν οἱ νέοι θεοί, θνητὴν μὲν οὖσαν διότι τὸν μερισμὸν τοῦτον ἀποτίθεσθαί ποτε τὴν ψυχὴν ἀναγκαῖον, ὅταν ἀποκαταστῇ τυχοῦσα καθάρσεως, πολυχρονιωτέραν δὲ τῆς τοῦ σώματος τούτου ζωῆς.[96]

Will it not therefore be better to say with our preceptor, that the spirit, (or pneumatic part of the soul), comprehends the summits of the irrational life, and that these exist perpetually, together with the vehicle, as being produced by the Demiurgus? And that these being extended and distributed into parts, make this life which is woven by the junior Gods, and which is mortal, because it is necessary that the soul should lay aside this distribution, when having obtained purification it is restored to its pristine state of felicity?

Procl. *In Ti.* Diehl 3.236,31–237,6

This place where all sense perceptions come together, the *aisthētērion*, can already be found in Aristotle.[97] Pneuma here, in being the place where bodily signals come together and are transmitted to the (rational) soul, is assigned a mediating role between material and immaterial. The distinction of the two VOS and the way Proclus conceives of their relationship not only solves the *aporia* raised by his predecessors' interpretations, but also shifts the discussion to a discussion of the conditions required for different levels of body-soul interaction, i.e., different soul faculties.

## 4 Assessing Proclus' account

The body-soul question of how two categorically different entities interact is a problem that Platonism faces in general and can be traced back to Plato's mixing bowl in the *Timaeus*. Proclus wants to solve this problem by introducing two VOS. The two VOS act on the one hand as a mediator that transmits faculties from soul to body on the other hand they are Proclus' solution to bring together the postulates that the (rational) soul is immortal but the individual must, after death, be in a condition to be judged for its actions.

96 Cf. on this passage Klitenic Wear 2011, 196–199.

97 Siorvanes 1989, 132. Aristotle's *aisthētērion*, one should keep in mind, is different because it is material.

The idea seems to be that the VOS, at least the pneumatic VOS, is something a little like the one and a little like the other (i.e. soul and body) – but how can something be a little material and a little immaterial? The Proclean concept of how soul and body are connected seemingly solves some problems – namely, the problem of how rational and non-rational faculties interact by positing two vehicles of (1) different origin, (2) different material make-up and, relatedly (3) different degrees of materiality and density.

But the concept of two vehicles also poses problems with regard to the "materiality": while light is described as a in some way continuous scale from immateriality to materiality the relationship of light to pneuma remains unclear. If pneuma is some denser, more humid form of light and pneuma is consequently just another step on the continuous scale, then the problems of demarcation which keep the *ousia* of the soul intact arise. If, on the other hand, the "materiality" of the two vehicles, light and pneuma, is completely separate, then the question of how interaction is possible arises again. Whichever way one puts it, the original problem of the connection between soul and body remains basically the same.[98]

Also, if body is another thing, a third vehicle and not to be identified with the pneumatic vehicle than it seems that soul which is connected with either the first or the second vehicle, then it seems that soul is not resident in the outer body at all. So how does soul interact with body, in the sense of the outer body then? Plato held soul to be completely separate and different from body.[99] Aristotle applied serious criticism to Plato's theory of the soul. His solution of soul as *energeia* of the body solves the problem of how soul and body interact, something which Aristotle claims Plato could not solve. Maintaining both, the theory of the separate soul and a theory of how soul gives life to body, one either seems to stretch the notion of separateness very thin making soul very like body (which does not seem to be what Proclus and other Neoplatonists want to do)[100] or face problems that have been discussed under the heading of interactional dualism.[101] In my opinion, the problem of interaction is not solved by positing more mediators between soul and body. Barbotin suggests that Aristotle merely shifted the

**98** Griffin 2012, 16, claims that the luminous vehicle is one vehicle in Proclus, the other is an ethereal vehicle according to the threefold division of the Porphyrian *aithēr* that Proclus makes, namely into luminous, empyrean, and ethereal. Proclus' claim that the pneumatic vehicle consists of the four sublunary elements (*In Ti.* Diehl 3.297,27–28) suggests otherwise.

**99** Pl. *Phd*. 78b4–84b8.

**100** Whereas Stoics draw this consequence, e.g. Nemes. *Nat. hom*. 78,7–79,2 (LS 45C = *SVF* 1.158) says that only body can interact with body and since soul interacts with body (Nemesius names blushing and turning pale as examples) it must be a body of some kind.

**101** A position which holds that body and soul are separate but interact causally. See on this also the discussion connected with the so-called Bieri trilemma. In short, the trilemma says the following: only two of the following sentences can be true at once: (1) mental phenomena are non-physical phenomena; (2) mental phenomena are causally effective in the physical world; (3) the field of physical phenomena is causally closed; cf. Bieri 1981.

problem when he assumed an opposition not between body and soul but between soul and *nous*.[102] It seems that Proclus does not shift, so to speak, from low to high but further in deep. The final problem of how bodily and psychic functions interlink and interact remains unsolved, even though the introduction of two VOS, one luminous and one pneumatic, offers an interesting solution for other problems Proclus found more pressing. In the end, it is Proclus himself who states that the problem of soul and body might be beyond human reach:

Concerning the soul, then, what part of it is mortal, what part immortal, and where and with what companions and for what reasons these have been housed apart, only if God concurred could we dare to affirm that our account is true:

> **T5** Τὰ μὲν οὖν περὶ ψυχῆς, ὅσον θνητὸν ἔχει καὶ ὅσον θεῖον, καὶ ὅπῃ καὶ μεθ'ὧν καὶ δι' ἃ χωρὶς ᾠκίσθη, τὸ μὲν ἀληθὲς ὡς εἴρηται, θεοῦ συμφήσαντος τότ' ἂν οὕτως μόνως διισχυριζοίμεθα.
>
> So, as for our questions concerning the soul – to what extent it is mortal and to what extent divine, where its parts are situated, with which organs they are associated, and why they are situated apart from one another – that the truth has been told is something we could affirm only if we had divine confirmation.
>
> Pl. *Ti.* 72d

**102** Barbotin 1954, 220.

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Petros Bouras-Vallianatos

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

## Summary

This chapter offers the first critical examination of *On the Activities and Affections of the Psychic Pneuma and the Corresponding Regimen*, written by the late Byzantine practising physician John Zacharias Aktouarios (ca. 1275–ca. 1330). It shows that John identified four distinct pneumata and introduced an innovative theory in which each of the four pneumata is correlated with two primary qualities (unnamed, 'gastric' pneuma: cold and moist; natural pneuma: warm and moist; vital pneuma: warm and dry; psychic pneuma: cold and dry). Ultimately, he made a direct connection between the quality of pneuma and one's daily regimen, including diet, physical exercise, bathing, and sleep, thus providing a systematic introduction of the qualitative change in pneuma as an object of treatment.

Keywords: Byzantine medicine; John Zacharias Aktouarios; Joseph Rhakendytes; pneuma; regimen; diet

Dieser Beitrag bietet eine erste kritische Auswertung des Werks *On the Activities and Affections of the Psychic Pneuma and the Corresponding Regimen* von John Zacharias Aktouarios (ca. 1275–ca. 1330), einem praktizierenden Arzt in Byzanz. Gezeigt wird, dass John vier ausgeprägte pneumata identifizierte und eine innovative Theorie einführte, in der jedes der vier mit zwei primären Qualitäten korreliert wird (unbenanntes, ‚gastrisches' Pneuma: kalt, feucht; natürliches Pneuma: warm, feucht; vitales Pneuma: warm, trocken; psychisches Pneuma: kalt, trocken). Schließlich stellte er eine Verbindung her zwischen der Qualität des Pneuma und der täglichen Lebensweise inklusive Ernährung, körperlicher Ertüchtigung, Baden und Schlafen, wodurch er die qualitative Veränderung des Pneuma als eine Behandlungsweise etablierte.

Keywords: byzantinische Medizin; John Zacharias Aktouarios; Joseph Rhakendytes; Pneuma; Lebensweise; Diät

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*On the Activities and Affections of the Psychic Pneuma and the Corresponding Regimen* (abbr.: *On Psychic Pneuma*, Greek title: Περὶ Ἐνεργειῶν καὶ Παθῶν τοῦ Ψυχικοῦ Πνεύματος καὶ τῆς κατ' αὐτὸ Διαίτης) by John Zacharias Aktouarios (ca. 1275–ca. 1330) is the most extensive medieval treatise dealing with pneuma and arguably one of the most innovative Byzantine medical works,[1] and one which has been largely neglected by historians of medicine to date.[2] This chapter presents for the first time a critical analysis of this work from a medico-historical point of view, focusing on John's ideas on psychic pneuma and other kinds of pneumata. I aim to show that John's significant advance involves the identification of four, rather than three, distinct pneumata and the correlation of each of them with two primary qualities. Consequently, he made a direct connection between the quality of pneuma and a person's daily regimen, including diet, physical exercise, bathing, and sleep. This chapter consists of six main sections. In the first three parts, I provide a brief introduction to the contents and audience of John's work and a discussion of John's conceptual framework with respect to the soul. The next deals with the formation of the various kinds of pneumata. The last two sections focus on the psychic pneuma and its dependence on bodily mixtures, accompanied by an analysis of John's model for the preservation of high-quality psychic pneuma through the regulation of various elements of the daily regimen.

1 John is also the author of two other long medical works. A uroscopic treatise, *On Urines* (Ideler 2.3–192) in seven books and a partly edited (Books 1–2) medical handbook, *Medical Epitome* (Ideler 2.353–463) dealing with all aspects of medicine from diagnosis to therapy. The last four books are only accessible in a sixteenth-century Latin translation (Mathys 2.153–563). For an overview of John's life and works, see Hohlweg 1983; and Kourousis 1984–1988, 101–140, 338–361. For the first comprehensive study of John's corpus, see Bouras-Vallianatos 2020.

2 There are two earlier studies available on John's *On Psychic Pneuma* by Hohlweg 1996, and Kourousis 1984–1988, 416–476, both Byzantine philologists, who present John's work only from a philosophical point of view, attempting to relate his theories to the writings of Neoplatonic philosophers and the Church Fathers, and thereby omitting John's medical contributions. See also Hohlweg 1997, who proposed some textual emendations. Putscher 1973, 50–55, 110–11, provides a descriptive brief synopsis of John's work. Moreover, Kakavelaki 2018 recently published her doctoral thesis on the role of pneuma in the works of Greek and Byzantine authors from a philosophical point of view. There is a special section on John's work, 333–369, in which the author points to some additional philosophical sources not previously mentioned, such as John Philoponos' commentary *On Aristotle's on the Soul*. Kakavelaki 2016, has also published a revised version of the chapter on John from her doctoral thesis in the form of an article, in which she proposed some useful new readings of corrupted passages in Ideler's edition (see n. 3 below), informed by her own consultation of manuscripts. In a personal communication, she confirmed that she is currently preparing a Modern Greek translation of John's *On Psychic Pneuma*.

## 1 Contents

*On Psychic Pneuma* consists of two books, is 74 printed pages long,[3] and was written in the late 1320s.[4] As in the case of John's treatise *On Urines*,[5] this is a work which shows a large degree of originality and limited use of verbatim quotations. Table 1 presents a brief synopsis of the contents of the work. The first book includes introductory sections on the soul, its capacities and its connection to the body through the pneuma. These are followed by a detailed discussion of the production of the different kinds of pneumata. Finally, a significant part of the first book is devoted to the activities (ἐνέργειαι) of the various kinds of pneumata, although the main focus is on the psychic pneuma and how problems with its distribution are connected to sensory impairment. The second book provides a detailed discussion on how modifying certain elements of one's daily regimen can help avoid the creation of harmful mixtures (δυσκρασίαι), thus ensuring physical and spiritual health; the vast majority of its contents focus on diet, including a long list of various foodstuffs and their qualities. Lastly, John provides brief chapters with diagnostic indications based on the examination of the pulse, urine, excrements, and other secretions. The work concludes with a useful synopsis in which John briefly presents the main concepts discussed throughout the treatise.

## 2 Audience

The treatise was written at the request of Joseph Rhakendytes (lit. 'wearer of rags'), also known as Joseph the Philosopher (ca. 1260–ca. 1330), an intellectual and monk from the Latin-occupied island of Ithaca. In order to understand John's intentions in writing this treatise, it is worth looking briefly at Joseph's background. Joseph had spent time in Thessalonike and on Mount Athos before arriving in Constantinople around 1308 in order to join the intellectual circles of the capital.[6] He is an intriguing figure in the

3 The treatise is available in Ideler's edition (Ideler 1.312–386). The work enjoyed a large textual circulation in the Byzantine and post–Byzantine period. There are about 35 surviving manuscripts dating between the fourteenth and sixteenth centuries. For a list of codices, see Diels 1906, 108–109; and http://pinakes.irht.cnrs.fr/notices/oeuvre/3998/ (visited on 9/07/2019). It is the only work by John to have appeared in Greek in an early printed edition (Goupyl 1557) and it was also translated into Latin (von Neustein 1547). It was also disseminated widely in the West, going through several editions (Choulant 1828, 97) under the title *De actionibus et spiritus animalis affectibus eiusque: nutritione Lib. II*. A further Greek edition was published by Fischer 1774.

4 On the dating of John's works, see Kourousis 1984–1988, 362–379; and Bouras-Vallianatos 2020.

5 On John's innovative uroscopic theories, see Bouras-Vallianatos 2020. For a study of John's unique case histories as they feature in his *On Urines*, see Bouras-Vallianatos 2016.

6 On Joseph, see Treu 1899; Conticello 1995; Gielen 2011, 205–215, and Gielen 2016, lxxi–lxxiv.

| Book and reference to the edition | Contents of each thematic unit |
|---|---|
| Book 1<br>(Ideler 1.312,1–314,8) | Proem. |
| Book 1<br>(Ideler 1.314,9–321,25)<br>5 chapters | Discussion of the soul and its connection with the human body through the psychic pneuma; further details on the capacities of the soul. |
| Book 1<br>(Ideler 1.321,26–325,8)<br>1 chapter | The formation of the four pneumata. |
| Book 1<br>(Ideler 1.325,9–340,30; 344,7–349,37)<br>12 chapters | Different forms of psychic pneuma and its activities; further details on the role of the psychic pneuma in sense perception. |
| Book 1<br>(Ideler 1.340,31–341,36)<br>1 chapter | Activities of the natural pneuma. |
| Book 1<br>(Ideler 1.342,1–344,6)<br>1 chapter | Activities of the vital pneuma. |
| Book 2<br>(Ideler 1.350,1–22) | Proem. |
| Book 2<br>(Ideler 1.350,22–358,33; 375,24–376,37)<br>5 chapters | Human digestion and harmful mixtures (*dyskrasiai*). |
| Book 2<br>(Ideler 1.358,34–375,23)<br>7 chapters | List of various kinds of foodstuffs and their qualities, including other elements of the daily regimen, such as exercise and bathing. |
| Book 2<br>(Ideler 1.377,1–382,19)<br>4 chapters | Details of the diagnosis of bodily mixtures and humoral imbalances through the examination of the pulse, urine, excrements, and other secretions (e.g. sweat). |
| Book 2<br>(Ideler 1.382,20–386,38)<br>1 chapter | Synopsis of John's theories on pneuma. |

**Tab. 1** Summary of contents of John's *On Psychic Pneuma*.

early fourteenth-century Byzantine intellectual life, who lived in accordance with Christian Orthodox monastic values, as indeed his name suggests: wearing rags, renouncing possessions, living modestly, and refusing any secular office.

Joseph believed that the ascetic life of the monks and the study of theology (καθ' ἡμᾶς) were not sufficient to achieve the necessary spiritual elevation to a virtuous life, but that they also had to be combined with secular learning (θύραθεν παιδεία). This is most obvious in his ambitious project, the so-called *Synopsis Variarum Disciplinarum*, which aimed to provide contemporary students with a wide range of advanced knowledge, including works on rhetoric, logic, physics, anthropology, physiology, ethics, theology, and the four traditional subjects of the *quadrivium*, i.e. arithmetic, music, geometry, astronomy.[7] At the beginning of his *Synopsis* Joseph echoes the Aristotelian modes of living of βίος θεωρητικός (contemplative life) and βίος πολιτικός (political life) as presented in the *Nicomachean Ethics*.[8] He states that he had chosen the life of contemplation at an early stage because the 'political' life did not usually involve reason as a guide and often remained attached to worldly pleasures.[9] Joseph believed that rhetoric and logic would lead to reason, while the study of natural philosophy was equally significant, since nature (φύσις) was the instrument of the creation (ὄργανον τεχνουργίας) of the cosmos and essential to understanding it.[10] He then described the study of the *quadrivium* (τετρὰς μαθημάτων) as a ladder (κλίμακος)[11] bridging worldly and spiritual

7 The work is preceded in manuscripts by two dodecasyllable verses, which seem to serve as title for the entire work: Μέλημα καὶ φρόντισμα καὶ γλυκὺς πόνος | οἰκτροῦ πιναροῦ Ἰωσὴφ Ῥακενδύτου. See Gielen 2016, lxxiv–lxxv, who informs us that the Latin title might have been inspired by the title of Joseph's prose introduction: Τοῦ σοφωτάτου καὶ λογιωτάτου Ῥακενδύτου κυροῦ Ἰωσὴφ σύνοψις ἐν ἐπιτομῇ εἰς τὰ κατ' αὐτόν. On the manuscript tradition of the *Synopsis*, see R. Criscuolo 1974; Gielen 2016, lxxii–xcix. On the 'encyclopaedic' nature of the project and its contents, see Gielen 2013, 260–276, and Gielen 2016, lxxv–lxxviii, respectively. The greater part of the *Synopsis* remains unedited. For an edition of the proem and the accompanying introductory text in iambic dodecasyllables, see Treu 1899, 34–42. The part on rhetoric is available in Walz 1834, 478–569. Gielen 2016, 35–78, has recently provided a critical edition of the part on virtue. Judging from the manuscript tradition of Joseph's work, in which we cannot identify a constant transmission of all texts together – only three manuscripts contain all the texts – Joseph did not in the end realise his goal; see Gielen 2013, 275, and 259, n. 2, where she lists 23 manuscripts which contain parts of the treatise. Gielen 2016, cxxii, states that "it is even quite likely that there never has been a definitive version, finished off completely and approved by the author himself".

8 Aristotle, *Nicomachean Ethics* 1.5, 1095b16–19. On the contemplative life in Byzantium, see *ODB*, s.v. *vita contemplativa*. See also the study on this concept in early Christianity by Mason 1961.

9 Joseph Rhakendytes, *Brief Epitome of the Most Wise and Erudite Joseph Rhakendytes* (Treu 34.7–35.27). See also the very useful entry on Joseph Rhakendytes by Stiernon 1974, and the discussion of Joseph's spiritual model in Kourousis 1984–1988, 206–208, 238–239.

10 Joseph's inclination for philosophy is also praised in various places in John's work. See John Zacharias Aktouarios (= JZA), *On Psychic Pneuma* 1.pr.6 (Ideler 1.313,25–28); *ibid.* 2.7.18 (Ideler 1.369,10–12); and *ibid.* 2.17.26 (Ideler 1.386,14–17).

11 The ladder metaphor comes from the Neoplatonic tradition and is found more prominently in Iamblichos (ca. 245–325 CE) *Protrepticus* 1 and 21 (Des Places 41,17–21 and 132,7–13); and *On General Mathematical Science* 1 (Klein and Festa 10,7–24).

concerns, which could lead any potential student away from material concerns. The ultimate aim is assimilation with the divine (Θεοῦ θεωρίας).[12]

Interestingly, in his proem to his *On Psychic Pneuma*, John argues that philosophical contemplation resembles ladders and bridges (κλίμαξί τισι καὶ γεφύραις), which direct the mind (νοῦν) from humble things to more honourable ones (ἀπὸ τῶν ταπεινοτέρων ἐπὶ τὰ τιμιώτερα).[13] This might be seen as an allusion to Joseph's mode of life. John attempts to maintain a direct form of communication with his addressee throughout the treatise by the use of second-person singular verbs and pronouns or references to their recent meetings.[14] In fact, John starts his work by referring to the recent philosophical discussions that he had had with Joseph (φιλοσόφοις θεωρήμασι συνουσίαις) on the psychic pneuma.[15] He then proceeds to describe the theory that he will develop throughout his treatise:

> **T1** ... you (i.e. Joseph) also added in your account that you considered it worthwhile that I should publish a treatise for you concerning the psychic pneuma within us, on how this (*sc.* psychic pneuma) can remain pure with the help of the (medical) art (ἐπικουρίᾳ τέχνης), and what kind of regimen (διαίταις) is fitting for this purpose; thus, it would not be fair if we did not comply with your requests. We thus wrote this treatise for you as part of your advice, so you will be able to know easily what regimen (διαίταις) it is necessary to follow for the health of your body (σώματι τῆν ὑγίειαν) and which might give you a purified mind (διάνοιαν) through the psychic pneuma."
>
> JZA, *On Psychic Pneuma* 1.pr.1 (Ideler 1.312,7–15, tr. mine)

John's aim is to provide all the necessary details as to how Joseph, by regulating his regimen, could keep his physical health in good condition and purify his psychic pneuma, a prerequisite for spiritual health.[16] Later on, John further clarifies his intentions by adding that the purification (κεκαθαρμένον) of the psychic pneuma enables human

Similar references are also found in Nikomachos of Gerasa's (*fl.* ca. 100 CE), *Introduction to Arithmetic* 1.3.6 (Hoche 7,22–8,5); in the *Commentary on Porphyry's Introduction* by Ammonios (ca. 435/445–517/526 CE), (Busse 13,4–7), and Elias (sixth century CE), (Busse 28,13–15) respectively; and in David's (sixth century CE) *Introduction to Philosophy* 19 (Busse 59,19). For the resurgence of interest in Neoplatonism in late Byzantium, see Meyendorff 1974, 114–15; Fryde 2000, 203, 208–210; and Bydén and Ierodiakonou 2018.

12 Joseph Rhakendytes, *Iambic Verses* (Treu 39–42).

13 JZA, *On Psychic Pneuma* 1.pr.4 (Ideler 1.313,8–12).

14 Among the numerous examples, see, for example, JZA, *On Psychic Pneuma* 1.pr.1, (Ideler 1.312,1–15); *ibid*. 1.20.9 (Ideler 1.348,32–349,8); *ibid*. 2.5.19 (Ideler 1.361,11–17); and *ibid*. 2.17.22 (Ideler 1.385,32–37).

15 JZA, *On Psychic Pneuma* 1.pr.1 (Ideler 1.312,1–2). Cf. *ibid*. 1.pr.3 (Ideler 1.313,7–8).

16 Cf. JZA, *On Psychic Pneuma* 2.pr.2 (Ideler 1.350,7–15).

beings to succeed in spending their lives in contemplation of realities (βίος ἐπὶ θεωρίαν τῶν ὄντων).[17] When considering the involvement of the soul in bodily activities through the medium of the psychic pneuma – which, as we will see below, John describes as the vehicle and first instrument of the soul – the purified state of this pneuma, achieved through an appropriate regimen, is essential to the attainment of spiritual virtue (ἀρετῆς ψυχῆς),[18] as befits Joseph's mode of life.

There are many places throughout the work, in which John provides his addressee with specialised details and takes into consideration the individual characteristics of a pious Christian monk. For example, in discussing the qualities of various foodstuffs, John refers to Joseph's special dietary requirements, including long periods of fasting, abstinence from meat, regular abstinence from drinking water, and frequency of meals.[19] Judging from the textual tradition of Joseph's *Synopsis*, it seems that the *On Psychic Pneuma* was intended to be included in it, although there is no direct mention of this in either John's work or Joseph's prologue. In fact, John's work is included in four manuscripts which contain texts of the *Synopsis*,[20] in which it appears in the form of two letters corresponding to the two books.[21] John's treatise may have served as a practical set of advice

**17** JZA, *On Psychic Pneuma* 1.3.2 (Ideler 1.317,35–318,3). See also Hohlweg 1996, 519.

**18** JZA, *On Psychic Pneuma* 2.4.26 (Ideler 1.358,19–29). Cf. *ibid*. 2.20.13 (Ideler 1.349,23–31); and *ibid*. 2.16.11 (Ideler 1.382,5–10). In turn, this might allude to the essential predisposition towards *theōsis* or deification, which is described by the Church Fathers as a process of spiritual and bodily purification. Deification is the condition in which one is as much like God and in union with God as possible, i.e. the ultimate goal of Joseph and also of every Orthodox Christian. For a brief account of deification (θέωσις), see *ODB*, s.v. *theosis*. See also the study by Russell 2004; and Finlan and Kharlamov 2006. There is no explicit mention in John's text of deification. One might look at a striking reference in which John expresses his desire to be able to reach a condition in which he will be inspired (Lampe 1961, s.v. ἐπίπνοια 1) by the Holy Spirit (θείου δ' ἐπιπνεύσαντος πνεύματος), who in patristic literature is said to have the power to deify (see, for example, some primary sources discussed by Russell 2004, 210–212, 222, 251–252); JZA, *On Psychic Pneuma* 1.20,14 (Ideler 1.349,34–36). In another case, the θεῖον pneuma is mentioned in connection with the psychic pneuma, but their exact relationship throughout the text is not elaborated; see *ibid*. 1.pr.1 (Ideler 1.312,4–5). In Christian terms, the human soul and consequently the human pneuma are something created and not to be confused with the Holy Spirit. The Orthodox theologian Kallistos Ware 1979, 61, states that "the created spirit of man is not to be identified with the uncreated or Holy Spirit of God, the third person of the Trinity"; on the development of the concept of Holy Spirit in early Christianity, see the recent volume by Frey and Levison 2014. I would like to thank Fr. Maximos Constas and Fr. Georgios Metallinos for their helpful bibliographical suggestions and useful discussions on theological matters respectively.

**19** JZA, *On Psychic Pneuma* 1.15.8 (Ideler 1.341,28–34); *ibid*. 2.5.5 (Ideler 1.359,18–22); *ibid*. 2.6.28 (Ideler 1.366,36–367,4); *ibid*. 2.8.4 (Ideler 1.369,33–370,2); *ibid*. 2.10.1–3 (Ideler 1.372,33–373,15); *ibid*. 2.11.7 and 2.11.10 (Ideler 1.374,15–23 and 374,32–375,6); and *ibid*. 2.17.12 (Ideler 1.384,22–32).

**20** Florentinus Riccardianus gr. 31 (fourteenth century); Parisinus gr. 3031 (fourteenth century); Vaticanus gr. 111 (fourteenth century); and Marcianus gr. 529 (coll. 847) (fifteenth century).

**21** In Florentinus Riccardianus gr. 31, f. 275r, Vaticanus gr. 111, f. 298v, and Marcianus gr. 529, f. 405r, Book 1 is entitled: "τοῦ ἀκτουαρίου κυροῦ Ἰωάννου τοῦ Ζαχαρίου ἐπιστολὴ πρὸς τὸν κῦριν Ἰωσήφ, περιέχουσα ἰατρικὰ θεωρήματα" ("Epistle, containing medical theories, by *aktouarios kyr* John Zacharias to *kyr* Joseph"); while on ff. 290r, 315r,

to those persons following Joseph's educative project and by extension spiritual/ethical model.[22]

Ideally, John presupposes his readers to have an elementary medical background in order to be able, for example, to identify bodily mixtures.[23] Joseph himself seems to have acquired some basic medical knowledge. He used to meet John and discuss his medical inquiries with him. According to John, he was also able to perform phlebotomy.[24] However, there is no real evidence that Joseph ever practised medicine, and thus he should most probably be considered a *philiatros* ('friend of medicine' or 'amateur physician').[25]

While bearing in mind the strong connection between John's writing intentions and Joseph's request, we must also consider a wider audience consisting of physicians, who wanted to have a concise view of the theories on pneuma and how they related to an individual's regimen and the quality of human life. In fact, the details on human physiology (Book 1) are not covered in such detail in any part of John's *Medical Epitome*, and the same applies to the part dealing with foodstuffs and their associated capacities (Book 2). The presence of the work in about thirty medical codices,[26] most of them including John's other two medical works, shows that the treatise was most widely disseminated in medical circles.

and 421v respectively, Book 2 is entitled: "τοῦ αὐτοῦ πρὸς αὐτόν" ("by the same author (i.e. John) to him (i.e. Joseph)", tr. mine). On this, see Gielen 2016, cxxiv–cxxv, n. 197. Interestingly, John's work is also copied in two manuscripts with a strong theological focus: Vaticanus gr. 429 (fourteenth century); and Sofiensis Centri 'Ivan Dujčev' gr. 156 (first half of the fifteenth century).

22 Joseph's spiritual model was also appraised by many contemporary Byzantine scholars, including Theodore Metochites, Nikephoros Choumnos, Constantine Akropolites, Nikephoros Kallistou Xanthopoulos, Manuel Gabalas, Thomas Magistros, Michael Gabras, and Nikephoros Gregoras. See the study by Polemis 2007. For references to Joseph by Palaiologan scholars, see Treu 1899, 47–63.

23 JZA, *On Psychic Pneuma* 2.12.7 (Ideler 1.376,16–22). See also the last chapters of the second book, *ibid*. 2.13–16 (Ideler 1.377,1–382,19), in which John gives brief details on how someone with an elementary medical background may diagnose through the examination of urine, excrements, and the pulse.

24 JZA, *On Psychic Pneuma* 1.20.9 (Ideler 1.348,32–349,8). See also *ibid*. 1.12.7 (Ideler 1.333,13–19).

25 See Pentogalos 1970, 5–12, who argued that Joseph had both theoretical and practical knowledge of medicine. However, his argument is based on an over–interpretation of the available evidence, deriving mainly from a letter showing that Joseph had sent a medicine to his friend Michael Gabras, *Epistle* 293 (Fatouros 2.453–454); cf. Hohlweg 1984, 126, n. 51. On *philiatroi*, who were able to identify, describe and treat minor illnesses where there were no physicians available or judge a physician's opinion where there was a disagreement, see the study by Luchner 2004. There are two notable examples of Byzantine medical handbooks dedicated to *philiatroi*: a) Oribasios, *For Eunapios* and b) John Zacharias Aktouarios, *Medical Epitome* for Alexios Apokaukos. On these two cases, see van der Eijk 2010, 525–532, and Bouras-Vallianatos 2020, respectively.

26 See n. 3 above.

## 3 The soul and its capacities

John stresses the intense interaction between medicine and philosophy in the areas of pneumatic physiology and psychology, already in his proem. He emphasises to his reader that the theory of psychic pneuma, in which the capacities of the rational soul are reflected, constitutes a limiting factor in the medical theory (ἰατρικῇ θεωρημάτων πέρας); he then confirms that knowledge of medical theory with respect to pneuma is essential for those concerned with the intelligible cosmos (τὸν νοητὸν διάκοσμον πολιτευομένων ἀνδρῶν), by which he most probably means contemporary intellectuals interested in the study of science and philosophy.[27] He notes, nonetheless, that before proceeding to the main topic of the book, he will give a brief introduction for those who have not the same background in philosophy as Joseph or other intellectuals, perhaps implying those who were about to start following a higher education curriculum or less highly educated people.[28] Hence, John starts his work by providing some essential philosophical knowledge in order to be able to discuss the union of soul and body through the pneuma. This part of his work does not contain any innovative contributions, but it is important in order to get a first glimpse of John's intellectual context.

John distinguishes between a rational and an irrational element in the soul along Aristotelian lines; thus, man has a different kind of soul from animals, since man has a rational principle, which gives him the ability to think.[29] The next step in his account is related to how the soul may be connected to the body so one can be assisted by the art of medicine (τέχνης βοηθήμασιν).[30] The discussion then focuses on the capacities of the soul, where John follows Aristotelian terminology and echoes the categorisation and analysis put forward by John Philoponos (ca. 490–ca. 570 CE) in his commentary *On Aristotle's on the Soul*.

John refers to the soul as simple (ἁπλῆ) as regards its substance, but complex (ποικίλη) in capacity (τῇ δυνάμει).[31] The first rational capacity is the intellect (νοῦς), then comes

27 JZA, *On Psychic Pneuma* 1.pr.3 (Ideler 1.313,2–6). The use of νοητὸς διάκοσμος in relation to those interested in philosophy echoes Neoplatonic philosophers, such as Proklos (ca. 410–485 CE), for example, in his *Commentary on Plato's Timaeus* (Diehl 1.308.13–14) and Damaskios (ca. 462–ca. 550 CE), for example, in his *Difficulties and Solutions of First Principles* (Westerink 3.167,11), who used it to refer to the intelligible cosmos/order/arrangement, and is consistent with the aforementioned revival of Neoplatonic philosophy in late Byzantium.

28 JZA, *On Psychic Pneuma* 1.pr.6 (Ideler 1.313,20–28). See also *ibid*. 1.6.2 (Ideler 1.321,34–35), in which he starts his account of the formation of the various kinds of pneumata right after the end of the section on philosophy, stating that this is the "beginning and the first chapter of this treatise", indicating the introductory nature of the preceding chapters (tr. mine).

29 *Ibid.* 1.1.2 (Ideler 1.314,17–25). Aristotle, *Nicomachean Ethics* 1102a26–1103a3. Cf. Aristotle, *On the Soul* 414b28ff.

30 JZA, *On Psychic Pneuma* 1.3.8 (Ideler 1.318,26–35).

31 *Ibid.* 1.4.1 (Ideler 1.319,10–14). My observation on the resemblance of John's account with that of John Philoponos has also been recently noted by Kakavelaki 2018, 339–341.

discursive thinking (διάνοια), and thirdly opinion (δόξα).[32] John then proceeds to the non-rational capacities, i.e. imagination (φαντασία), which he calls passive intellect (παθητικὸς νοῦς), a term used as far back as Aristotle,[33] but which was explained and elaborated by John Philoponos,[34] and finally sense perception (αἴσθησις).[35] However, some of the soul's capacities are more divine and purer, i.e. intellect, discursive thinking, and opinion,[36] while others are more submissive and active in the body, i.e. imagination and sense perception. The soul is joined through the latter, the non-rational ones, with the psychic pneuma within the human body.[37] John is consistent in calling the psychic pneuma a vehicle/carrier (ὄχημα) of the soul, thus adopting the Neoplatonic notion of the pneumatic body (*ochēma*-pneuma).[38] This is very significant, in that John provides a tangible carrier, i.e. psychic pneuma, for the soul in the body in contrast to Galen, who was never completely confident about identifying the soul's 'substance'. Finally, John's spatial subdivision of the various functions of the mind follows the localisation and terminology of Posidonius of Byzantium (end of the fourth century CE), as they survive in Aetios of Amida (first half of the sixth century CE).[39] Thus, he assigns imagination (φανταστικόν) to the anterior ventricles of the brain, reasoning (λογιστικόν) to the middle ventricle, and memory (μνημονευτικόν) to the posterior ventricle of the brain,[40] un-

32 Cf. John Philoponos, *On Aristotle's on the Soul* (Hayduck 1,10–12 and 2,21–24).

33 Aristotle, *On the Soul* 430a23–25. Although imagination and passive intellect are closely related in Aristotle, there is still a separation between the two. See the comments by van der Eijk 2005, 119, n. 71, and Blumenthal 1996, 159–160.

34 John Philoponos, *On Aristotle's on the Soul* (Hayduck 5,34–6,10). Cf. *ibid*., *On Aristotle's on the Soul* (Hayduck 11,5–11); and John Philoponos, *On the Intellect* 4 (Verbeke 13,1–4). On this being John Philoponos own 'new line of interpretation', see van der Eijk 2005, 2.

35 JZA, *On Psychic Pneuma* 1.5.1–9 (Ideler 1.320,11–321,18).

36 See John Philoponos, *On Aristotle's on the Soul* (Hayduck 162,13–16), who argues that *nous* does not require an intermediary between itself and its objects unlike sense perception which is served by the pneuma, its organ and vehicle.

37 JZA, *On Psychic Pneuma* 1.4.2 (Ideler 1.319,13–17). Cf. John Philoponos, *On Aristotle's on the Soul* (Hayduck 12,14–21 and 18,34–19,3). On John Philoponos' views on the soul and his influence throughout the Byzantine era, see Bydén and Ierodiakonou 2018.

38 JZA, *On Psychic Pneuma* 1.5.10 (Ideler 1.321,18–21). Cf. *ibid*. 1.14.6 (Ideler 1.340,5–7). See also Hohlweg 1996, 522–523. Cf. Kourousis 1984–1988, 426–441. By identifying Plato's *ochēma* with Aristotle's pneuma, Neoplatonists such as Porphyry, Iamblichos, and Proklos argued that the soul acquired a pneumatic body (*ochēma*-pneuma) as it descended through the heavens, which allowed the incorporeal soul to join the body and after death accompanied it again on its return journey. This was a significant departure from ancient Greek theories and was developed to explain how something immaterial and eternal like the soul can be joined to something material and perishable like the body. On the theory of the pneumatic body, see the chapter by Bohle in this volume; Kissling 1922; Pasquale Barbanti 1998; and Zambon 2005. On the reception and development of ancient theories on pneuma in late antiquity, see Verbeke 1945, 351–510.

39 Aetios of Amida, *Tetrabiblos* (= *Libri medicinales*) 6.2 (Olivieri 2.125,16–20). On the development of the concept of ventricular localisation, see Manzoni 1998. Cf. Rocca 2003, 245–247; and Gäbel 2018, 327–328.

40 JZA, *On Psychic Pneuma* 1.20.1 (Ideler 1.347,29–35). John also says that he is unable to locate δόξα and διάνοια. See also JZA, *Medical Epitome* 1.35 (Ideler 2.388,27–389,29).

like Nemesios of Emesa (late fourth century CE), who localised the διανοητικόν within the middle ventricle.[41]

## 4 Formation of pneumata

### 4.1 Earlier theories

Before I discuss what John has to say about the formation of various kinds of pneumata, it is necessary to present a very brief background to Galenic pneumatology and, in particular, the origin and localisation of the various pneumata and the development of Galenic theories in the period from Galen's death to John's day. Galen not only assessed earlier views on pneuma but always tried to test his theories by undertaking anatomical demonstrations.[42] In his opinion the production of pneuma was merely a process which took place inside the human body in several stages of elaboration.[43] The outer air enters the lungs where it receives its first elaboration, and it then proceeds to the heart and arteries in which it is fully elaborated into vital (ζωτικόν) pneuma through the action of the body's innate heat (ἔμφυτον θερμόν).[44] The vaporisation (ἀναθυμιάσεως) of the humours in the arteries contributes further pneumatic matter to the vital pneuma.[45] The vital pneuma then enters the brain and is further elaborated in the retiform plexus (δικτυοειδὲς πλέγμα) and lastly in the choroid plexuses (χωριοειδὴ πλέγματα) in the ventricular system, which is the final repository of the psychic pneuma.[46] It is noteworthy that Galen accepts that the psychic pneuma is also nourished from the air inhaled through the nostrils directly into the brain.[47] The psychic pneuma enters the nerves, giving sensation and voluntary motion, although Galen never provided any details on exactly how this happened.[48] Furthermore, there is an overall uncertainty in Galen's theory on the role of the vital pneuma in contrast to that of the psychic pneuma.

Galen is also uncertain about the exact relation between soul and pneuma. Since a loss of psychic pneuma does not bring about death but only sensory and motor im-

41 Nemesios of Emesa, *On the Nature of Man* 13 (Morani 69,16–24). See van der Eijk 2008.

42 On Galen's anatomical demonstrations, see von Staden 1995. For a discussion of Galenic dissections in connection with the brain's anatomy and physiology, see Rocca 2003, 50–58.

43 On Galen's medical pneumatology, see Temkin 1951; Manzoni 2001; Rocca 1998 and Rocca 2003.

44 Galen, *On the Usefulness of the Parts* (= *UP*) 7.8 (Helmreich 1.393,23–394,6 = K. 3.541.15–542.1).

45 Galen, *On the Doctrines of Hippocrates and Plato* (= *PHP*), 7.3.27–29 (De Lacy 444,29–446,10 = K. 5.608.1–609.1). Cf. Galen, *On the Use of Breathing* (= *Ut. Resp.*), 5 (Furley/Wilkie 122,9–124,2 and 126,18–128,11 = K. 4.503.17–504.4 and 506.14–507.10 ); and Galen, *Method of Medicine* (= *MM*) 12.5 (K. 10.839.16–17).

46 On this, see the discussion by Rocca 2003, 208–224, who provides a large number of relevant passages from the Galenic corpus.

47 Gal. *Ut. Resp.* 5 (Furley/Wilkie 124,2–4 = K. 4.504.4–6). See also Rocca 2003, 226–234.

48 See, for example, Gal. *PHP* 7.4 (De Lacy 448,4–18 = K. 5.611.6–612.7).

pairments, he is reluctant to identify it with the soul.[49] However, he generally settles for calling the psychic pneuma as the soul's first instrument (ὄργανον).[50] Galen follows Plato's tripartite division of the soul. The rational capacity is located in the brain, the spirited in the heart, and the desiderative in the liver.[51] He did not describe precisely how the vital and psychic pneumata act in the interests of the rational and spirited capacities. Even more problematic is the existence of the natural pneuma. Galen accepts a connection between the desiderative capacity and nutrition and pleasure,[52] but he is very reluctant to accept the existence of the natural pneuma, although he seems to admit such a possibility and that – if there were such a thing – it would be located in the liver and the veins.[53]

Galen did not make his dual system of medical pneumatology correspond to the tripartite nature of the soul. There are two surviving references to the tripartite pneumatic system in an axiomatic way, both connected with the scholastic environment of late antique Alexandria.[54] In the first case, the notion of three pneumata appears in the *Commentary on Book VI of Hippocrates' Epidemics* by John of Alexandria (ca. sixth/ seventh century):

> **T2** But we should remind the more advanced student of what we have said on numerous occasions, namely that our body is composed of solids, fluids and pneumata; that the pneumata are the psychic (ψυχικῶν), natural (φυσικῶν) and vital (ζωτικῶν).
>
> John of Alexandria, *Commentary on Book VI of Hippocrates' Epidemics* fr.42 (Duffy 102,1–6, tr. Duffy slighly modified)

A significant part of the text, referring to the psychic pneuma, is omitted in the Greek original and the current version is derived from an addition by the editor on the basis of the Latin tradition of the text. However, it would be odd if the Greek original had indeed omitted such an important kind of pneuma. The second mention of this threefold

**49** See, for example, Gal. *PHP* 7.3.19–24 (De Lacy 442,36–444,15 = K. 5.605.18–607.2).

**50** See, for example, Gal. *Ut. Resp.* 5 (Furley/Wilkie 120.20–21 = K. 4.502.1–2); and *Causes of Symptoms* (= *Caus. Symp.*) 2.5 (K. 7.191.9–16); cf. Gal. *PHP* 7.7.25 (De Lacy 474,26–27 = K. 5.643.17–18). See also the corresponding commentary in De Lacy 2005, 675.

**51** See further the chapter by Trompeter in this volume. Gal. *PHP* 7.3.2–3 (De Lacy 438,28–440,8 = K. 5.600.12–601.13).

**52** Gal. *MM* 9.10 (K. 10.635.10–16). On Galen's third part of the soul, see De Lacy 1988, 43–63; cf. Hankinson 1991, 218–231.

**53** Gal. *MM* 12.5 (K. 10.839.17–840.1). On Galen and natural pneuma, see the recent study by Rocca 2012. Perhaps Galen's hesitation can be ascribed to the fact that he lacked a method to prove such a theory through anatomical demonstration.

**54** On medical commentators in late antique Alexandria, see the study by Overwien 2018.

division of pneuma is found in the treatise *On Differences of Fevers* attributed to Stephen (ca. sixth/seventh century) and Theophilos (seventh or ninth century):

> **T3** Thus, there is the psychic (ψυχικόν) pneuma, which is located in the brain and the nerves; for this psychic pneuma is an instrument (organon) of the soul, and that is (the reason) why it is called psychic. But, there is also the vital (ζωτικόν) pneuma, which is contained in the heart and the arteries and is dispersed throughout the body like a beam, and gives life, that is the innate heat (ἔμφυτον θερμασίαν). There is, however, the natural (φυσικόν) pneuma, which is produced from food and is contained in the liver.[55]
>
> Stephen and Theophilos, *On Differences of Fevers* 8 (Sicurus 17,4–11, tr. mine)

This passage, which has been overlooked by scholars working on the history of medical pneumatology,[56] provides – apart from the clear tripartite distinction – details about the localisation of each pneuma.[57] The most noteworthy reference is that to the natural pneuma which originates from the liver as a product of the digestion of food. Although no similar passage is known from other Greek texts, the tripartite dogma is presented here as self-evident.[58]

The aforementioned passage shares many similarities with a chapter from the introductory medical handbook *Medical Questions* (*Masāʾil fī al-ṭibb*) by the famous Nestorian Christian physician and translator Ḥunayn ibn Isḥāq (d. 873). In addition to the reference to three pneumata and their respective places of origin in the brain, heart, and liver, Ḥunayn provides a precise correspondence between each pneuma and the three capacities of the soul, i.e. the psychic, vital, and natural, respectively.[59] The discursive form (*Mudkhal fī al-ṭibb*) of Ḥunayn's text was subsequently translated into Latin by

55 Cf. Stephen and Theophilos, *On Differences of Fevers* 2 (Sicurus 7,17–18), in which there is a reference to the vital, psychic, and natural [capacities] in connection with pneumata, but without any explicit reference to each kind of pneuma or any exact correspondence. This text has not been critically edited and the current edition is based on Laur. Plut. 86.20 (fifteenth century). Several parts of the text coincide with the treatise *On Fevers* (= *De feb.*) attributed to the late antique scholar Palladios (Ideler 1.107–120). On the complicated textual transmission of the above mentioned treatises on fevers, see Garofalo 2003, 149–164.

56 This is mentioned neither by Temkin 1951, 180–189, nor by Rocca 2012.

57 Cf. Ps.-Galen, *Introduction, or Physician* 13 (= *Int.*) (Petit 45,13–22 = K. 14.726.6–14).

58 We should note that we know very little about the theories of the so-called Pneumatist sect, which was founded by Athenaeus of Attaleia in the first century BCE. Perhaps this theory is based on a now lost treatise by some medical author belonging to this ancient school of medical thought. On the Pneumatist sect, see the chapter by Coughlin and Lewis in this volume; Wellmann 1895; Kudlien 1968.

59 This text is available in English translation: Ḥunayn ibn Isḥāq, *Medical Questions* 1, tr. Ghalioungui 1980, 5.22–32.

Constantine of Africa (died before 1098/1099), and became known as the *Isagoge*;[60] the text formed part of the *Articella*, an important collection of medical texts that served as a textbook in the late medieval and Renaissance West. Lastly, the tripartite pneumatology also appears in the work *Book on Fevers* (*Kitāb al–ḥummayat*) of the Jewish philosopher and physician Isḥāq ibn Sulaymān al–Isrā'īlī (d. ca. 932).[61]

### 4.2 John's theory of pneuma

I now turn to John's model for the formation of the various kinds of pneumata. He argues, like Galen, that the production of pneuma takes places within the human body. There are, however, three notable differences, which result in a significant departure from Galenic medical theories on the topic. First, John considers not only two or three, but four distinct kinds of pneumata. Secondly, he says that the production of pneuma is directly connected with the process of digestion, while he says nothing about whether any kind of external air could contribute to this process.[62] Moreover, each pneuma is assigned two primary qualities (see Table 2), which allows John to easily correlate various kinds of pneumata with the mixtures (κράσεις) of each part of the body and of the body as a whole. John also provides a clear correspondence between the three parts of the soul and a particular organ and the relevant pneuma, although as we shall see below, the system does suggest a deficiency as regards the fourth pneuma.

From the very beginning of his introductory account of the formation of pneumata, John makes an explicit connection between the production of pneumata and humours, which are the result of the digestive process.[63] He then proceeds to discuss three different cases related to the digestive process and the production of pneuma. The first case relates to foodstuffs that can produce healthy humours (τροφῆς ... εὐχύμου) resulting in the creation of very little or no pneuma.[64] Any pneuma thus produced makes its way either upwards or downwards. Some vapours (ἀτμοειδής ... ἀναθυμίασις) that go to the head and have the ability to moisten its dried parts (τὰ αὐχμῶντα) are also produced.[65]

60 See Newton 1994, 34, who provides a discussion of the relevant passage in the *Isagoge*. The tripartite model is also found in the *Pantegni*; see Burnett 1994, 115. On medical pneumatology in the medieval Latin West, see Bono 1984.

61 See Burnett 1994, 104. A special treatise *On the Difference between Spirit and Soul* (*Risāla fī al-Faṣl bayna al-rūḥ wa al-nafs*) was written by Qusṭā ibn Lūqā (ca. 820–ca. 912/913), although he refers only to two pneumata. On Qusṭā ibn Lūqā, see Wilcox 1987; on the aforementioned treatise, in particular, see Wilcox 1985.

62 It is worth mentioning that there is no explicit discussion of the role of respired air in the process of pneumatic elaboration in John's corpus. Cf. JZA, *Medical Epitome* 1.36 (Ideler 2.389,30–395,9).

63 JZA, *On Psychic Pneuma* 1.6.2 (Ideler 1.321,34–322,6).

64 No name is given to this pneuma in the text nor is there any information as to where it goes after it has been produced. John is most probably referring to the fourth kind of pneuma, which is produced in the stomach.

65 *Ibid.* 1.6.3 (Ideler 1.322,6–18).

| Pneuma | Place of origin | Qualities |
|---|---|---|
| unnamed ('gastric') pneuma | stomach | cold and moist |
| natural pneuma | liver | warm and moist |
| vital pneuma | heart | warm and dry |
| psychic pneuma | brain | cold and dry |

**Tab. 2** Kinds of pneumata according to John's theory.

In the second case, the foodstuffs are again good (ἀγαθά), but the stomach suffers either from an ongoing *dyskrasia* or some lingering humours, resulting in incomplete digestion and the production of thick and foggy vapours (ἀτμοὶ παχεῖς τε καὶ ὁμιχλώδεις), which – if they become chronic – can thicken the pneuma in the body.[66] There is no explicit reference to what kind of pneuma this is, but thickening is considered a harmful condition for any pneuma. The third case deals with foodstuffs, which can produce harmful humours (σιτία ... κακόχυμα), which results in outcomes similar to those in the second case.[67] Lastly, it is clearly stated that if any organ/part of the body suffers from *dyskrasia* or is dominated by harmful humours and vapours, this results in a corresponding alteration (ἀλλοιώσεις) to the pneuma associated with this,[68] a notion which I will discuss in the next section.

John starts by referring first to the natural (φυσικόν) pneuma, showing no indication of doubting its existence or any sort of hesitation, such as is found in Galen, and thus he seems to be in line with the late antique medical commentators on this. The natural pneuma, in which the desiderative (ἐπιθυμητικόν) part of the soul is displayed, is born out of the best humour (ἀμείνων πάντων χυμός) that has reached the liver and is warm and moist.[69] Thus, the natural pneuma is seen as a product of the particular stage of the digestive process that takes places in the liver, but there is no explicit mention of how the 'best' humour produces the natural pneuma. From John's preliminary discussion of the role of digestion, as I have shown above, we can deduce that the actual quality of foodstuffs or the potential harmful mixture in the liver can directly affect the production of the natural pneuma and the ones produced after that, since John emphatically states that the 'best' humour constitutes the substance of the creation of all pneumata

66 *Ibid.* 1.6.4 (Ideler 1.322,18–23).
67 *Ibid.* 1.6.5 (Ideler 1.322,23–27).
68 *Ibid.* 1.6.6 (Ideler 1.322,27–31).
69 *Ibid.* 1.6.8–9 (Ideler 1.323,2–14); and *ibid.* 2.17.2 (Ideler 1.383,3–4).

(ὕλη καὶ ἀρχὴ τοῖς ἐν ἡμῖν γίνεται πνεύμασιν), most probably referring to the vital and the psychic ones too.[70]

Later on, John refers to the blood which enters the vena cava from the liver and then reaches first the right and then the left ventricle of the heart. The vital (ζωτικόν) pneuma, the instrument of life (ὄργανον ζωῆς) as it is called, is produced by the blood in the heart and is dispersed via the arteries throughout the entire body.[71] It is worth recalling that in Galen's model the vapours (ἀναθυμιάσεις) arising from humours constitute only part of the matter of vital pneuma. Although John states on one occasion that the vital pneuma is produced after the natural pneuma,[72] which is dispersed via the veins,[73] he does not clarify whether the natural pneuma, or any quantity of it, is transformed into vital pneuma. The spirited capacity of the soul is displayed in the vital pneuma.[74] There is no detailed description of how the vital pneuma is elaborated in the brain before it is transformed into psychic pneuma, although John clearly states that it can be transformed into psychic pneuma.[75] He mentions that the psychic pneuma is produced in the ventricles and then enters the nerves. Furthermore, in his own words, John unhesitatingly acknowledges the psychic pneuma as the first instrument (πρῶτον ὄργανον) of the soul.[76]

John's model recalls both Galen's and Erasistratos' (third century BCE)[77] ideas about the refinement of pneuma inside the body. Unlike in John, Erasistratos believed all the pneuma to be derived from the external air through respiration. However, in contrast to most of his medical predecessors (though in some ways like Asclepiades), John refers to a process by which each successive kind of pneuma produced is finer and less moist than the previous one, with the psychic pneuma being the finest; it resembles the soul in terms of fineness (λεπτότητι) and is dry and cold. In terms of warmth, the pneumata that originate closer to the heart, i.e. the natural and the vital, are warmer, while the psychic pneuma is colder.[78] As we shall see in the next section, John's notion of thickness/thinness of the pneuma seems to align more closely with Neoplatonic concepts of the quality of pneuma.

**70** *Ibid.* 1.6.8 (Ideler 1.323,2–3).

**71** *Ibid.* 1.6.16–17 (Ideler 1.324,6–15); and 1.16.1 (Ideler 1.342,2–7).

**72** *Ibid.* 1.6.20 (Ideler 1.324,26–27).

**73** *Ibid.* 1.15.1 (Ideler 1.340,32–34).

**74** *Ibid.* 2.17.3 (Ideler 1.383,9–12).

**75** *Ibid.* 1.6.19 (Ideler 1.324,23–25).

**76** *Ibid.* 1.6.21–22 (Ideler 1.324,30–325,4); and JZA, *Medical Epitome* 1.33 (Ideler 2.384,22–24). See also *On Psychic Pneuma* 1.6.1 (Ideler 1.321,32), in which John mentions that the psychic pneuma always (ἀεί) flows in and out of the human body.

**77** On Erasistratos' theories on pneuma, see the chapter by Leith in this volume; Wilson 1959; Martini 1964, 43–44; Harris 1973, 225; von Staden 2000, 92–96; Rocca 2003, 63–64. In particular on fineness (λεπότητα) and thickness (παχύτητα), see Galen's view of Erasistratos' theory in *UP* 7.8 (Helmreich 1.392,23–393,2 = K. 3.540.8–11).

**78** In his conclusion John clarifies that all the pneumata are naturally warm and moist. When he calls one pneuma 'cold,' this is not because it has a tendency to make something cold, but simply because it is less warm compared to other pneumata; the same applies to a pneuma that is characterised as 'dry,' by which he means less moist. See JZA, *On Psychic Pneuma* 2.17.1 (Ideler 1.382,25–28).

Meanwhile, John refers to one more pneuma which is produced in the stomach and is cold and moist. Although John does not name this pneuma and does not provide a specific chapter on its activities, as he does with the other three, he clearly refers to it in his first account of pneumatology, but only after having introduced the natural pneuma:

> **T4** But it seems that another pneuma is produced (γεννώμενον) in the stomach, which is different from the others, and through this (*sc.* pneuma) we partly experience sensations relating to the object of appetite ... and this pneuma is cold and moist in contrast to those (pneumata which are produced) after it. It is the vehicle (ὄχημα) of the appetitive (ὀρεκτικῆς) capacity (existing) within us (related to) the particular food (consumed) on each occasion. This (i.e. the appetitive capacity) is succeeded by the capacity found in the liver (i.e. the natural capacity), which is a stronger and much more all-embracing (capacity) and the origin of greater appetites and desires.
>
> JZA, *On Psychic Pneuma* 1.6.11–12 (Ideler 1.323,20–33, tr. mine)

This pneuma is related to the appetitive capacity of the soul.[79] It is a sort of local pneuma that is produced during the digestion of foodstuffs in the stomach, and there is no direct statement confirming the direction of flow of this pneuma any further from the stomach or whether it is connected directly with the production of the natural pneuma or any others.[80] There is no other explicit reference in the whole of John's work to this sort of 'gastric' pneuma, unlike for the other three pneumata, apart from in his conclusion where he clearly refers to four pneumata and reconfirms its existence, relevant qualities,

79 Aristotle, *On the Soul* 432b4–8, considers that the appetite (ὄρεξις) is found in all three parts of the soul. John Philoponos in his commentary *On Aristotle's on the Soul* (Hayduck 1,11–13; 5,34–36; 18,34–35), refers to the appetitive (ὀρεκτικαί) capacities of the non-rational soul. According to Galen, *On Mixtures*, (= *Temp.*) 3.1 (Helmreich 91,1–7 = K. 1.654.4–10), every bodily part that is nourished has four capacities, i.e. attractive (ἑλκτική), retentive (καθεκτική), alterative (ἀλλοιωτική), and expulsive (ἀποκριτική). In the *On the Identification of the Affected Parts* (= *Loc. Aff.*) 6.3 (K. 8.400.17–18), it is specified that the attractive (ἑλκτική) capacity of the stomach is also called appetitive (ὀρεκτική). Cf. Gal. *UP* 9.11 (Helmreich 2.33,2–5 = K. 3.727.14–16).

80 See also JZA, *On Psychic Pneuma* 1.6.15 (Ideler 1.324.4–5); and n. 64 above. Cf. *ibid*. 1.6.20 (Ideler 1.324,27–29). Also in *ibid*. 1.14.8 (Ideler 1.340,21–22) where John starts his discussion on the activities of the pneumata, he refers only to the three pneumata (natural, vital, psychic) and their place of production (liver, heart, brain) without mentioning the pneuma in the stomach. In his *On Urines* 5.3.11 (Ideler 2.115,30–116,4) John refers to a pneuma which is produced during the first digestion in the stomach and it can appear in the urine sample in the form of bubbles. In Ps.-Aristotle's *On Pneuma* 483a20–22, a pneuma derived from respiration is supplied to the stomach, and in a passage in the Anonymus of London, *On Medicine* (Manetti 50) some kind of pneuma seems to reach the stomach, in contrast to John's case where it is clearly produced in the stomach and there is no relation to the outside air. For discussion of the above cases, see the chapter by Gregoric in this volume; Gregoric, Lewis and Kuhar 2015, 114–117; Lewis and Gregoric 2015, 143.

and its connection with the appetitive capacity.[81] Furthermore, there is no evidence to suggest that John carried out any kind of anatomical dissections.[82] John's introduction of the fourth pneuma makes his theory of the correspondence between each pneuma and its two primary qualities complete. His conceptualisation recalls the traditional connection between each humour and two primary qualities.[83] As we shall see below, his theory will help him to introduce a detailed analysis of the role of a particular regimen in the regulation of the quality and flow of each pneuma in the human body.

## 5 Psychic pneuma: function and dysfunction

John devotes a considerable number of chapters in his work to discussing the role of the psychic pneuma in sense perception.[84] John's physiology of sensory activity in his *On Psychic Pneuma* is often influenced by Galen,[85] although he never quotes Galen by name, as indeed he generally does for all his major sources throughout his corpus. He also acknowledged the direct role of the psychic pneuma in hegemonic activity and corresponding impairments,[86] following the post-Galenic development of the localisation

**81** JZA, *On Psychic Pneuma* 2.17.1 (Ideler 1.382,22–34): "Thus, we have discovered four different pneumata in this treatise. One pneuma appears in the stomach and seems to be cold and moist … and it is clear that it is this (pneuma) that carries the appetitive capacity. … we see that this capacity (i.e. appetitive) suffers more from dryness and hotness than from the opposite qualities" (tr. mine). This capacity is not mentioned in the relevant section of John's *Medical Epitome* 1.5 (Ideler 2.360,20–33).

**82** See JZA, *On Psychic Pneuma* 1.9.1 (Ideler 1.3.328,14–25), in which John refers once to an anatomical demonstration where by one may attest the fundamental role of the luminous (αὐγοειδές) pneuma in the sense of vision if one dissects the relevant nerves, the so-called canals or tubes of pneuma (ἀγωγοὶ τοὺ πνεύματος). However, this passage most probably derives from Galen's account in Gal. *PHP* 7.4 (De Lacy 448,25–29 = K. 5.612.14–613.2; cf. Gal. *PHP* 7.4.13 (De Lacy 450,18–22 = K. 5.614.14–18).

**83** The explicit connection made between humours and qualities is already present in Galen; see, for example, Galen, *On the Different Kinds of Diseases*, (= *Morb. Diff.*) 12 (K. 6.875.9–11). On Galen's humoral theory, see Hankinson 2016, 30–34. On the development of the role of the humours in understanding and treating the human body in the Middle Ages, see Nutton 1993.

**84** A discussion of sense perception, motor functions, and impairments, although in an abridged version due to the nature of the work, is found in John's *Medical Epitome* 1.33–35; 2.6 (Ideler 2.384,4–385,29; 442,31–443,34).

**85** See, for example, John's account of vision, *On Psychic Pneuma* 1.8–9 (Ideler 1.327,1–329,30). Cf. Gal. *PHP* 7.4–5 (De Lacy 448,4–462,19 = K. 5.611.6–628.15). See also n. 83 above. On Galen's theory of sight, see Boudon-Millot 2012; and Ierodiakonou 2014. See also Siegel 1970, 46–47, and Siegel 1973, 137–139.

**86** JZA, *On Psychic Pneuma* 1.19.1–4 (Ideler 1.346,19–32) mentions, for example, how the imagination is affected by the pollution of the psychic pneuma (μολυνομένου πνεύματος), due to *dyskrasiai* or vapours from corrupted humours, which could lead to disturbing visions (θεάματα θορυβώδη) during sleep. In his *Medical Epitome* 1.33 (Ideler 2.386,6–22), John also mentions impairments, such as κάρος, λήθαργος, κῶμα, and μώρωσις. Interestingly, the psychic pneuma is twice called hegemonic (ἡγεμονικόν) in John's treatise: JZA, *On Psychic Pneuma* 1.6.19 and 1.16.16 (Ideler 1.324,25 and 344,4).

of the functions of the mind in the brain.[87] What makes John's approach significantly different from that of his predecessors is his notion that the degree of the pneuma's fineness is directly affected by diet and other elements of a person's daily regimen. The alteration (ἀλλοιώσεις) of psychic pneuma can cause various symptoms in the body (σώμασι συμπτώματα).[88] The psychic pneuma must be fine in order to be distributed and function properly.[89] When the psychic pneuma becomes thick (παχύτερον), it moves more slowly. Since it is cold and dry, it functions properly in conditions of mild dryness and coldness,[90] which make the pneuma very mobile (εὐκίνητον) and light (κοῦφον); an increase in wetness and warmth makes it unstable (ἀστατεῖν δὲ μᾶλλον) and its corresponding activities disappear (τελουμένα ... διαρρέοντά τε καὶ ἀφανιζόμενα) accordingly.[91]

The psychic pneuma may be altered and its qualitative balance disturbed (ἠλλοιῶσθαι καὶ τῆς συμμετρίας ἐκτετράφθαι),[92] which can be the outcome of a local *dyskrasia* during its production or its flow.[93] John also accepts that the production of foggy vapours as by-products of digestion, due to a local *dyskrasia* in the stomach or due to the existence of corrupted humours, can also affect the quality and distribution of the psychic pneuma.[94] The third reason for disturbance is related to the accumulation of a thick humour, which blocks the flow of psychic pneuma through the nerves.[95] In all cases, the pneuma will not be able to function properly and this may result in some

**87** See nn. 39 and 41 above. See also Nemesios of Emesa, *On the Nature of Man* 6 (Morani 52,2–4). Galen does not connect hegemonic activities directly with the psychic pneuma; impairments in such activities are related to an unnatural change in the mixture of the substance of the brain. See Siegel 1973, 147–153; Julião 2018, 235–243.

**88** JZA, *On Psychic Pneuma* 1.5.10 (Ideler 1.321,21–24). The term 'symptom' seems to be used here in a broader sense embracing any unnatural change in the body. On this term, see Johnston 2006, 25–26. Alteration/qualitative change (ἀλλοίωσις) of the pneuma due to, for example, an ongoing *dyskrasia*, should not be confused with the subsequent changes (ἀλλοίωσις) of the pneuma to form the luminous (αὐγοειδές) pneuma in the eye or the airlike (ἀερῶδες) pneuma in the ear; see JZA, *On Psychic Pneuma* 1.9.2–7 (Ideler 1.328,25–329,23).

**89** JZA, *On Psychic Pneuma* 1.20.13 (Ideler 1.349,23–31).

**90** Cf. Gal. *Ut. Resp.* 5 (Furley/Wilkie 124,8–126,5 = K. 4.505.3–18), who in contrast to John's theory, states that, if the psychic pneuma is too hot, it moves better.

**91** JZA, *On Psychic Pneuma* 1.17.4–7 (Ideler 1.344,27–345,7).

**92** *Ibid.* 1.12.1–2 (Ideler 1.332,16–30).

**93** See *ibid.* 2.2.17 (Ideler 1.353,14–18), where unusual mixtures can result in a violent disturbance of the psychic pneuma. See also n. 67 above. Furthermore, see the case of the natural pneuma, *ibid.* 1.15.6 (Ideler 1.341,23–26); and *ibid.* 1.14.6 (Ideler 1.340,1–4).

**94** *Ibid.* 1.12.5 (Ideler 1.333,3–10); *ibid.* 1.19.3 (Ideler 1.346,28–30); *Medical Epitome* 1.34 (Ideler 2.387,1–2); and n. 66 above. See Pormann 2013, 240, who informs us that in Arabic medical commentaries "the idea of a vapour rising to the brain and impairing the psychic pneuma appears as early as the eleventh century".

**95** See, for example, the case of the senses of hearing and touch respectively, JZA, *On Psychic Pneuma* 1.13.1 and 1.13.9 (Ideler 1.333,35–334,3 and 334,37–335,4). John agreed with Galen, who refers to cases in which the psychic pneuma cannot flow or arrives in certain areas of the brain only in small amounts because of deposits of a particular humour. See, for example, Gal. *Loc. Aff.* 3.9 and 4.2 (K. 8.173.11–15 and 218.3–12), in the cases of epilepsy and impairment of sight respectively. See also the discussion by Rocca 1997, 235–236.

deficiency in a sense or even be connected with medical impairments, such as apoplexy (ἀποπληξίαι) and epilepsy (ἐπιληψίαι).[96]

Galen rarely refers to the alteration of pneuma (πνεύματος ἀλλοίωσις) due to harmful humours, without ascribing any particular qualities to the pneuma or providing any further details.[97] John's theory of the role of diet and other elements of one's daily regimen as factors affecting the production and quality of pneuma due to the ongoing *dyskrasiai* seems also to have been influenced by the works of some Neoplatonic authors. These authors were the first to make an explicit connection between regimen and the healthy condition of the psychic pneuma. However, they never provided a detailed medical theory on the subject.

Synesios of Cyrene (370–413 CE),[98] for example, in his *On Dreams* attributed ethical connotations to a thick (παχύ) and moist (ὑγρόν) psychic pneuma, which he said was connected with a κακοδαίμων and ποιναῖος βίος.[99] He also accepted the use of ritual theurgy (τελετῶν)[100] and the importance of regimen (διαίτης)[101] for the purification of the pneuma, although he did not provide any further details on this. The closest terminological parallels to John's theory are found in the references to the thickening (παχυνθέντος) of the pneuma due to a harmful regimen (διαίτης) mentioned in John

**96** JZA, *On Psychic Pneuma* 1.13.16–18 (Ideler 1.335,35–336,16); and JZA, *Medical Epitome* 1.34 (Ideler 2.386,30–387,11).

**97** Gal. *MM* 12.5 (K. 10.840,14–16). On the notion of alteration (ἀλλοίωσις), i.e. making a substance similar to the part being altered in Galen's physiology, see the brief entry by Johnston 2006, 38. See also Gal. *UP* 10.5 (Helmreich 2.72,24 = K. 3.783.15–16), who refers to the psychic pneuma as λεπτότερον and κουφότερον, but he does not correlate the notion of fineness of pneuma with its qualities.

**98** There is a debate as to whether Synesios of Cyrene was born into a Christian family or whether he was later converted; see the most recent study on this by U. Criscuolo 2012.

**99** Synesios of Cyrene, *On Dreams* 7.3 (Lamoureux and Aujoulat 280,17–281,5). Cf. *ibid*., 10.4–5 (Lamoureux and Aujoulat 287,17–288,20). On Synesios' psychology and pneuma, see Bregman 1982, 145–154; Lamoureux and Aujoulat 2004, 208–214, 249–252; Toulouse 2016, 672–674. Although it seems that John's views on the fineness of the pneuma being achieved through an appropriate regimen are consistent with those of Synesios, I cannot see any further notable similarities between John's work and Synesios' *On Dreams*. Thus, I disagree with the idea that John depended heavily on Synesios' theories, as has been proposed by Kourousis 1984–1988, 466–471. In my opinion this view is merely based on Kourousis' unconvincing attempt to prove that the three anonymous philosophical Byzantine dialogues *Hermippos*, *Hermodotos*, and *Mousokles* were actually written by John, cf. Hohlweg 1995.

**100** Synesios of Cyrene, *On Dreams* 6.2 (Lamoureux and Aujoulat 278,13–22). On the purification of the soul by means of theurgy in the Neoplatonic tradition, see Shaw 1995, 45–57; and Addey 2014, 47–50. On purification of the soul in the tradition of the Chaldean oracles, see Lewy and Tardieu 1978, 213–226. Synesios' treatise witnessed a notable revival in Palaiologan Byzantium thanks to the commentary by Nikephoros Gregoras. Instead of the use of ritual theurgy, Gregoras, *Commentary on Synesios' on Dreams* (Pietrosanti 32,14–25), suggests that the imagination (φαντασία) could be purified through self-restraint (σωφροσύνη), righteousness (δικαιοσύνη), vigils (ἀγρυπνία), and fasting (νηστεία) in line with the Christian mode of living. On Gregoras' reception of Synesios' text with the emphasis on the relationship between philosophy and theology in late Byzantium, see Kolovou 2012.

**101** Synesios of Cyrene, *On Dreams* 16.1 (Lamoureux 300,17–301,6). Cf. *ibid*. *On Dreams* 6.3 (Lamoureux in 278,22–279,4). See Kissling 1922, 326–328.

Philoponos' commentary *On Aristotle's on the Soul*. In this passage, John Philoponos appears, in fact, to be criticising accounts by some other philosophers, who had argued that a light (λεπτοτέρας) and dry (ξηροτέρας) regimen (διαίτης) was the most appropriate for keeping the pneuma as fine as possible (διὰ τὸ μὴ παχύνεσθαι τὸ πνεῦμα, ἀλλὰ λεπτύνεσθαι).[102] John Philoponos does not name his source and Robert Todd has suggested that versions of Philoponos' account may be found in the works of Porphyry (234–ca. 305 CE) and Proklos (ca. 410–485 CE), although there is no explicit reference to regimen in the passages concerned.[103] Thus, although our author was inspired by Galenic medical physiology, he seems to have combined Galen's ideas with Neoplatonic views on the role of regimen in connection with the different states of the pneuma in terms of fineness and thickness.

John recapitulates his views on the quality of various pneumata in the conclusion of his work, in which a model for the balance of various pneumata in the human body is put forward. One pneuma can predominate over others depending on the particular mixtures in the body. John states:

> **T5** Once it (i.e. the psychic pneuma) is set on the right course, advances towards what is best, and prevails (κατακυριεύει) over the other (pneumata). … we see some who abstain from (eating) too many and thick foodstuffs … so that the (*sc.* psychic) pneuma can neither become thickened (παχύνοιτο) in this way nor may any other kind of pneuma, and, in particular, the natural pneuma, predominate (ἐπικρατείαις), because of their thicker diet. For this (i.e. the natural pneuma) is the opposite of the psychic pneuma in both its qualities and capacities, and the psychic pneuma is enslaved (*sc.* by the natural pneuma) and is dragged along (behind it).
>
> JZA, *On Psychic Pneuma* 2.17.10 (Ideler 1.384,13–22, tr. mine)

The verb ἐπικρατῶ ('to prevail over' or 'to predominate/achieve predominance'), or its cognates (ἐπικράτεια, ἐπικρατήσασα, ἐπικρατοῦσα), is used only once in connection with a pneuma, but there are many references throughout the treatise in connection with the 'prevalence' or 'predominance' of a certain quality or a certain humour over others.[104] This might suggest that the 'prevalence' of a certain pneuma refers to a quantitative abundance of one over the other, but this is never specified in the treatise. The main focus of the treatise and Joseph's own chief concern is on the good quality of the

**102** John Philoponos, *On Aristotle's on the Soul* (Hayduck 19,22–20,4). Cf. *ibid*. (Hayduck 239,8–10).

**103** Todd 1984, 109 and n. 65, in which the closest parallel is identified as being in Porphyry, *The Cave of the Nymphs in the Odyssey* 11 (Nauck 64,9–25). Cf. Lautner 2013, 390.

**104** See, for example, JZA, *On Psychic Pneuma* 1.14.4 (Ideler 1.339,25); *ibid*. 1.17.8 (Ideler 1.345,9–11); *ibid*. 2.pr.3 (Ideler 1.350,16).

psychic pneuma. Nevertheless, John is eager to stress that Joseph should not neglect to take care of the other pneumata in his attempts to keep the psychic pneuma in good condition so that he might avoid the consequences connected with the lack of each pneuma's proper flow and its corresponding activities.[105] Ultimately, he emphasises that the healthy condition of each pneuma depends on the condition of the others, and thus their 'health is restored jointly' (συναποκαθίστανται ταῖς ὑγείαις).[106]

## 6 Diet and other elements of daily regimen

Interestingly, John does not hesitate to call the second book of his work an account of the preservation of health (ὑγιεινὴν πραγματείαν).[107] This reference echoes Galen's treatise *On the Preservation of Health* (Περὶ ὑγιεινῶν),[108] and shows John's intention to discuss a broad spectrum of the ideal daily regimen (see table 3). It indicates, moreover, his intention to make a connection between the purity (καθαρότητι) and health (ὑγιαίνειν) of the psychic pneuma, on the one hand, and the overall health of the body, on the other.[109] As we have seen, digestion is important both in the production of pneuma and also in ensuring that the pneuma does not lose its qualitative balance or become blocked due to the formation of *dyskrasiai*[110] and harmful humours respectively. John gives explicit advice on the best regimen to follow in order to keep each pneuma in good condition. For example, the vital pneuma, which is warm and dry, is stirred up (διεγείρουσι) by intense exercise and a diet consisting of warm and dry agents,[111] while for the psychic pneuma, which is colder and drier than the other pneumata, one should follow a moderately cold and dry diet.[112]

At the very beginning of the second book, John makes it clear that his advice will be brief, since he is not aiming to offer a therapy for every single affection.[113] According to him, digestion could be affected by various factors, including the quality and quantity of food, the harmful humours remaining in the stomach, and exercise.[114] He also gives

**105** See, for example, *ibid*. 1.16.6 (Ideler 1.342,28–33).

**106** *Ibid.* 2.17.18 (Ideler 1.385,16–20).

**107** JZA, *On Psychic Pneuma* 2.16.12 (Ideler 1.382,12–13). Cf. *ibid*. 2.11.13 (Ideler1.375,17–21).

**108** Galen, *On the Preservation of Health* (= *San. Tu.*) (Koch 3–198 = K. 6.1–452). See Wilkins 2016, 413–431, who provides a fresh discussion of Galen's preventive medicine in light of the above-mentioned treatise.

**109** JZA, *On Psychic Pneuma* 2.pr.3 (Ideler 1.350,19–21); and *ibid*. 2.16.12 (Ideler 1.382,17–18).

**110** There is one ideal mixture, the *eukrasia*, and eight kinds of *dyskrasiai* (bad mixtures), in which one quality or a pair of qualities dominates. In his *On Psychic Pneuma* John does not provide a discussion on the bodily mixtures, but in his *Medical Epitome* 1.3 (Ideler 2.358,22–27) he clearly refers to nine different mixtures, thus following the Galenic theory on the subject. See Gal. *Temp.* 1.8 (Helmreich 31,27–32.4 = K. 1.559.2–9). See also van der Eijk 2015, 675–681.

**111** JZA, *On Psychic Pneuma* 2.17.3 (Ideler 1.383,14–17).

**112** *Ibid.* 2.17.6 (Ideler 1.383,23–29).

**113** *Ibid.* 2.3.11 (Ideler 1.355,13–16).

**114** *Ibid.* 2.1.1 (Ideler 1.350,23–28).

| Book and reference to the edition | Contents of each thematic unit |
|---|---|
| Book 2<br>(Ideler 1.358,34–372,22)<br>5 chapters | foodstuffs arranged in the following categories: a) cereals and pulses, b) vegetables and fruits, c) various kinds of meat, d) wine, water, milk, eggs, honey, various kinds of oil, vinegar, and other kinds of potions. |
| Book 2<br>(Ideler 1.372,23–373,15)<br>2 chapters | quantity and frequency of eating. |
| Book 2<br>(Ideler 1.373,16–375,23)<br>1 chapter | sleep, exercise, and bathing. |

**Tab. 3** Summary of contents of the daily regimen in John's *On Psychic Pneuma*.

handy advice to his reader on how to immediately diagnose the dominant quality in the stomach. For example, in the case of dryness, one may feel it on the tongue and treat it with the use of foodstuffs of the opposite quality.[115] The last part of the second book also includes details on how one can diagnose the predominance of a particular humour and the current mixture in the body through the examination of urine, excrement, the pulse, and secretions. John thus tries to provide his readers with a complete set of instructions from diagnosis to therapy.[116] The very brief and abridged nature of these instructions suggests his treatise was designed primarily for those with very little expertise on the subject of diagnosis with the aim of equipping them with the tools required for easy self-diagnosis.[117]

As I have already briefly mentioned in the context of John's example on the diagnosis of dryness, he is consistent throughout his treatise in urging his readers to treat *dyskrasia* by using the well-established ancient therapeutic approach of treatment by means of opposites (ἐναντία τῶν ἐναντίων ἰάματα).[118] Thus, every *dyskrasia* formed in the stomach should be primarily balanced with the consumption of foodstuffs of the opposite quality.[119] The order of the various foodstuffs (i.e cereals and pulses, vegetables and fruits, meat, liquids) shows many similarities with that of Galen and Paul of Aegina in

**115** *Ibid.* 2.2.3 (Ideler 1.351,16–21).

**116** *Ibid.* 2.13–16 (Ideler 1.377,1–382,19).

**117** John also makes cross-references to his works *On Urines* and *Medical Epitome*, for those who prefer to consult a more detailed account on uroscopy and the examination of pulse respectively: *On Psychic Pneuma* 2.13.8 and 2.15.9 (Ideler 1.378,4–9 and 380,4–14).

**118** Among the various references, see JZA, *On Psychic Pneuma* 1.13.25 and 1.16.13 (Ideler 1.337,7–12 and 343,29–32).

**119** JZA, *On Psychic Pneuma* 2.2.1 and 2.12.1 (Ideler 1.351,11–12 and 375,25–27).

*On the Powers of Foodstuffs* and *Epitome* respectively, although there are no verbatim quotations from the above authors.[120] John follows the qualities traditionally associated with each foodstuff. For example, barley (κριθή), is naturally cold and thus good for those who are suffering from fever and extreme warmth.[121] Some foodstuffs might have a stronger or a medicinal (φαρμακώδης) effect, such as radish (ῥαφανίς), which can be used as a cutting (τέμνουσα) and thinning (λεπτύνουσα) agent with a direct effect on humours accumulating in the stomach.[122] John also recommends sleeping immediately after the consumption of food, since this revives (ἀνακαινίζειν) the entire body and the natural, vital, and psychic pneuma.[123]

Diet may be assisted by the use of drugs, blood-letting, exercise, or bathing according to each patient's individual characteristics. For example, in discussing an excess of blood, John simply suggests removing it by means of venesection, a commonly used method with a long tradition in the Graeco-Roman and Byzantine period.[124] If there is an excess of yellow bile in the stomach, John suggests the use of purgative drugs, such as aloe (ἀλόη).[125] However, in cases of bilious excess accompanied by intense fevers, which cannot be treated by means of diet, one can use stronger drugs made, for example, from roses (ῥόδων) and sugar (σάχαρ).[126] This potion recalls recipes for sugar-based medicaments, such as juleps and syrups, that were introduced into Byzantine pharmacology from the Islamic world from the eleventh/twelfth century onwards and gradually

**120** Galen's treatise *On the Powers of Foodstuffs* (= *Alim. Fac.*) is almost 300 printed pages in Kühn's edition (K. 6.453–748) compared to the relevant sections in Paul of Aegina, *Epitome* (*Ep.*) 1.73–96 (Heiberg 1.52,11–66,26) and John, which are both around 15 printed pages long. For a brief introduction to Galen's aforementioned work and its contents, see Wilkins 2003, ix–xxi. On ancient dietetics, see Lonie 1977; Craik 1995; Wilkins 2015.

**121** JZA, *On Psychic Pneuma* 2.5.18 (Ideler 1.361,7–11). Cf. Galen, *On the Powers of Foodstuffs* 1.1 (Wilkins 19,11–14 = 6.474.3–6). On the Byzantine diet, see Dalby 2010; Anagnostakis 2013. See also Koder 1993, who provides a useful study on the availability and use of a variety of vegetables in Byzantium.

**122** JZA, *On Psychic Pneuma* 2.6.8 (Ideler 1.363,22–28). There are other foodstuffs with a similar action, such as asparagus, *ibid*. 2.6.14 (Ideler 1.364,15–25). Galen wrote a special treatise *On the Thinning Diet* 1 (= *Vict. At.*, Kalbfleisch 433,16–18), in which he clarifies that its name is derived from its effect on the thick humours of the body; see also Wilkins 2002. On the use of foodstuffs as drugs, see the recent inspiring paper by Totelin 2015. See also JZA, *On Psychic Pneuma* 1.13.28 and 1.13.33 (Ideler 1.337,23–28 and 338,17–24), in which John suggests the use of drugs with a cutting and thinning effect (τέμνων/τμητικοῖς, λεπτύνων/λεπτυντικοῖς) for those whose hearing and taste are affected as a result of an accumulation of humours.

**123** JZA, *On Psychic Pneuma* 2.11.1 (Ideler 1.373,17–23). See, for example, Gal. *Alim. Fac.* 1.2 (Wilkins 29.20–22 = K. 6.487.5–7), who refers to the beneficial role of sleep in the process of digestion.

**124** JZA, *On Psychic Pneuma* 2.12.6 (Ideler 1.376,14–16). See Bouras-Vallianatos 2015, 112–121, who discusses Byzantine therapeutic approaches, including blood-letting techniques.

**125** Aloe was a well-known purgative in the ancient and medieval world; see Scarborough 1982; Dalby 2003, 6. The use of drugs, and, in particular, antidotes, in combination with a warm diet is also recommended in the case of an excess of phlegm and black bile, JZA, *On Psychic Pneuma* 2.12.5 (Ideler 1.376,11–14), and, *ibid*. 2.3.10 (Ideler 1.355,10–13) respectively.

**126** *Ibid.* 2.12.4 (Ideler 1.376,2–11).

replaced honey-based drugs.[127] John provides a long list of sugar-based potions in the pharmacological part of his *Medical Epitome*.[128] The references in his *On Psychic Pneuma* show John's particular interest in investing his work with new material and in line with contemporary demand. However, the most remarkable advice for the use of a drug is that of the well-known theriac of Andromachos, a compound antidote with very intense action, which he recommends if the cold quality is extremely persistent.[129]

Lastly, what makes John's account particularly interesting is that he often attempts to adapt his account to Joseph's particular needs and thus to those of his contemporaries, who followed the dietary restrictions and fasting regimen of the Orthodox monastic tradition.[130] Monks ate twice on non-fast days and only once on fast days. Meat was completely prohibited. They were expected to fast about 195 days per year, including abstaining from fish and dairy products, but not from shellfish and molluscs; on some of these days they would also abstain from oil and wine. In this context, for example, John apologises to Joseph for paying attention to the quality of various kinds of meat.[131] Particular importance is also given to the quantity of food consumed and to dividing that food into three equal parts; the first two to be taken at midday and the third at night. This had special importance for Joseph, who – because he followed the strict rules of monastic fasting – did not always eat properly, which could produce either a state of overwarmth or over-coldness, resulting in a disturbance of the psychic pneuma.[132] In terms of exercise, John recommends speedy walking (ὀξεῖς περίπατοι), hunting (κυνηγεσίαι), wrestling (πάλαι), running (δρόμοι), discus (δίσκοι) or exercise with a small ball (τὸ διὰ μικρᾶς σφαίρας γυμνάσιον)[133] for those consuming strong foodstuffs, while for Joseph, who followed a light diet, even a short walk would be enough, particularly before the consumption of food in the early morning. More exercise is recommended in winter than in summer. John strongly advises avoiding exercise after meals, since it may disrupt the process of digestion and result in the accumulation of raw humours (ὠμοχυμίας θησαυρίζουσαι).[134] Finally, in line with his programmatic statement, in giving an account of the best way to maintain good health and thus taking into consideration a

**127** On the introduction of juleps and syrups to Byzantine medicine, see briefly Bouras-Vallianatos 2015, 120–21.

**128** JZA, *Medical Epitome vers. Lat.* 5.2–4 (Mathys 2.319,21–335,17).

**129** JZA, *On Psychic Pneuma* 2.17.16 (Ideler 1.385,7–10). On theriac of Andromachos, see Boudon-Millot 2010.

**130** On fasting in the Orthodox tradition, see Musurillo 1956; and Louvaris 2005. On Byzantine monastic meals, see Talbot 2007. See also Koder 1970, who provides a critical edition, German translation, and commentary on the poem on fasting by Patriarch Nicholas III Grammatikos (1084–1111) written for Protos, the head of the Athonite monastic community.

**131** JZA, *On Psychic Pneuma* 2.6.28 (Ideler 1.366,36–367,4).

**132** JZA, *On Psychic Pneuma* 2.9–10 (Ideler 1.372,24–373,15).

**133** Galen wrote a special treatise on *The Exercise with the Small Ball* (= *Parv. Pil.*) (Wenkebach 254–297 = K. 5.899–910), which was considered beneficial for the health of both body and soul.

**134** JZA, *On Psychic Pneuma* 2.11.5–8 (Ideler 1.374,6–29).

wide range of factors associated with an ideal daily regimen, John gives some brief instructions on bathing,[135] which he considers extremely beneficial, and, in particular, for Joseph, since his body is too dry due to long periods of fasting.

## 7 Conclusion

Inspired by the spiritual model of his contemporary, the monk and philosopher Joseph Rhakendytes, John wrote a special treatise on psychic pneuma, the first instrument and vehicle of the soul in the human body. In contrast to his ancient medical predecessors, such as Galen, John had no difficulty in identifying the carrier of the soul, i.e. the psychic pneuma, in the body. His endeavour was facilitated by the Neoplatonic theory of the pneumatic body (*ochēma*-pneuma). The theory of the three pneumata (i.e. psychic, vital, and natural) had been established as the main dogma in the Greek medical literature by the end of late antiquity. John's addition of a fourth pneuma in the stomach allows him to ascribe two qualities to each pneuma and directly connect the production and distribution of pneuma with bodily mixtures.

John was influenced by Galen's theories on the fineness of pneuma and later Neoplatonic views, as they feature in the works of Synesios of Cyrene and John Philoponos, in relation to the role of regimen. However, the systematic classification of qualitative change of the psychic pneuma as the object of treatment is John's own innovation. His entire second book is a practical manual for those with little familiarity with the medical art, aimed at helping them diagnose and treat themselves easily and thus keep their bodily and spiritual health in good condition. John's efforts to classify a large number of foodstuffs and also the way he connects the role of exercise, sleep, and bathing with keeping the psychic pneuma and the health of the soul in good condition is exceptional, and allows him to offer comprehensive advice on the most appropriate psychotherapeutic regimen.

135 *Ibid.* 2.11.9–10 (Ideler 1.374,29–375.6).

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