

"common account" that will yield some broad general conclusions about animal behavior and depict animals as a part of a naturally ordered environment, all of whose parts are in complex ways interdependent. When we have examined the later arguments, we will be in a position to draw some general conclusions about the *MA* picture of the sciences.

ESSAY 3

THE *SUMPHUTON PNEUMA* AND THE
DE MOTU ANIMALIUM'S ACCOUNT
OF SOUL AND BODY

One of the thorniest exegetical problems confronting an interpreter of the *MA* is the theory of the *sumphuton pneuma*, or innate breath, presented in the treatise's penultimate chapter. The theory is internally obscure, one of a series of cryptic pointers towards a fuller account of this *pneuma* that Aristotle may have planned, or even composed, but which does not survive.¹ But even if one manages to make internal sense of it, it remains very difficult to see how the tenth chapter fits together with the theory of motion presented in the rest of the treatise. Two questions immediately suggest themselves: (1) What is the connection between *pneuma* and desire (*orexis*) that is suggested in the opening sentences of chapter 10? At the end of the account of *pneuma* Aristotle writes, "We have said what the part is in virtue of whose motion the soul imparts movement, and what the reason is" (703^a28–29). What does this mean, and what are the implications of this claim for our understanding of the treatise's theory of soul? (2) What part does this mysterious stuff play in the account of animal physiology presented in chapters 7 ff., and why does Aristotle feel it necessary (*dei*, 703^a6) to introduce an extra, apparently non-empirical, component in addition to the ones he has already described?

Jaeger and Düring, the only modern writers who have attempted to provide a comprehensive account of the argument of the *MA*, both hold that a central aim of the entire treatise is to show the importance of *pneuma* in explaining animal motion.² They point to the *De Anima* forward reference ("But as for the

¹ For general accounts of *pneuma*, cf. I, Chapter 1, n. 17, and *infra*, n. 2.

² Jaeger, "Pneuma," I–II: Düring, *Aristoteles*, 345.

tool (*organon*) in virtue of which desire imparts motion, this is already bodily; so we must consider it when we deal with the functions common to body and soul," 433^b19 ff.), and to 703^a28–29 (cf. *supra*), which announces the completion of the projected task, as evidence that everything that precedes prepares the way for this chapter, the treatise's primary contribution to Aristotle's psychology.

If this is correct, we might expect to find indications in earlier chapters that there is a gap in the account of motion that can be filled only by an innovation like the *pneuma*-theory; or, at the very least, once we reach chapter 10, we might expect to be able to see clearly how it completes the elaborate earlier account. In fact, from the point of view of both of our questions, it is extremely difficult to see what chapter 10 contributes. The account of motion offered in chapters 6–8 appears to be complete and intelligible without further supplementation. The teleological account tells us that desire "prepares" bodily *pathē* (702^a10 ff.) and that perceptions and *phantasiai* are, of necessity, accompanied by bodily heatings and chillings, which, in their turn, lead directly to expansion and contraction of the limbs (701^b13–19, 23–24, 34–702^a5). Whatever this "prepares" and this "accompanies" mean for Aristotle's theory of mind, it appears that there is no difficulty in telling how, when an animal sees and desires an object, this desire is translated into motion. On the physiological side, Aristotle emphasizes repeatedly that the body is constructed so as to be able to carry out complicated motions rapidly upon a simple change in an internal part. The examples of the automatic puppet and the child's cart (701^b2 ff.) indicate that all is in such good order in the animal body that a simple heating or chilling in the heart region will become, automatically, the varied and complex motions that we observe. The first section of chapter 8 ends with what appears to be a final summary, answering both the psychological and the physiological questions:

Since these processes happen this way, and since the passive and active have the nature that we have often ascribed

to them, then whenever it happens that there are both active and passive elements, and neither falls short in any respect of the account we given of them, at once one acts and the other is acted upon. That is why it is pretty much at the same time that the creature thinks it should move forward and moves, unless something else impedes it. For the affections suitably prepare the organic parts, desire the affections, and *phantasia* the desire. And *phantasia* comes about either through thought or through sense-perception. The rapidity and simultaneity result from the fact that the active and passive are naturally relative to each other (702^a10–21).

Once desire has "prepared" the initial bodily alteration, the limbs are moved because of the body's own nature. If there remains any *aporia*, if any essential factor has been omitted, Aristotle does not bring it to our attention, but turns instead to an expansion and correction of his account of joints.

But chapter 10 is clearly telling us that an important part of this picture has yet to be discussed. Now that we have spoken of desire, we must (*dei*) go on to speak of *pneuma*, the bodily moved mover (703^a4–6), the constituent in virtue of which desire imparts movement (703^a28–29). All animals clearly have *sumphuton pneuma*, from which they derive strength (703^a9–10). Located in the region of the heart or its analogue (703^a15–16), it is well-suited by nature for imparting movement and supplying strength (703^a18–19), for it is capable of expanding and contracting, pushing and pulling, without constraint, and is heavy in comparison to the fiery, light in comparison to its opposite (703^a23–24). This sketch is followed by the comparison of the animal to a well-ordered city (703^a29–^b7)—as though only the presence of *pneuma* completed the account of soul and body, ensuring the orderly, city-like functioning of the organism. We have been told that expansion and contraction are set up as a direct result of heatings and chillings. Now we learn of a special stuff whose particular nature it is to expand and contract. Awareness of the object of desire seemed to be accompanied by simultaneous alterations in the part around the heart. Now we

learn there is this mysterious *pneuma* located near the heart that does not undergo alteration, but has a close connection of some sort with desire.

Our first response is to suppose that chapter 10 does not belong with the rest of the treatise, that it is irrelevant to, perhaps even inconsistent with, the account of bodily motion in chapters 6–8. We wonder if it is not an interpolation—perhaps from a later hand, or, since *pneuma* also clearly plays a major role in the *GA* and the *PN*, an addition made during a later phase of Aristotle's career, and never fully incorporated into the text. But if we look more closely at the two questions we have raised, we find that, in fact, they do admit of an answer that makes of chapter 10 an integral, even a necessary part of the *MA* argument. For the account of animal motion in chapters 6–8 is not as complete as it might at first appear. Both the teleological account and the analysis of bodily movement reveal substantial internal difficulties, both of which the theory of *pneuma* helps to resolve. It clarifies the account of motion towards an object of desire by making it clear that desire, like *aisthēsis*, is a functional state of matter and not some Cartesian incorporeal agent, quite literally using the body as a tool to effect change in the world. It supplements the physiological analysis by adding to the usual four elements, with their limited repertory of natural motions, a more versatile constituent that helps to guarantee the body's organic unity.

THE PNEUMA AND HYLOMORPHISM

The answer to our first question must be closely bound up with an attempt to settle another problem. The psychology of the *DA*, as we have already described it in Essay 1, holds that soul is the form or functional organization of a certain kind of body and that the various "parts of soul" are functional states of matter. As biologists, we are interested in knowing in what sort of matter various bodily functions are standardly realized: that *aisthēsis*, for example, "is" a certain sort of physiological

change (*MA* 701^b17–18)³, that anger "is" the boiling of blood around the heart (*DA* 403^a31–^b1), that respiration "is" certain necessary interactions of hot and cold matter (*PA* 642^a32 ff.). But it is even more important that we should give a functional account of these processes that incorporates them into an analysis of the creature's self-maintaining activity. The "is" used in statements about the material cause is not the "is" of identity, since we must leave open the possibility that these functions can be realized in other kinds of matter, or material processes.⁴ Or rather we might say that the "is" of a *particular* statement might well be the "is" of identity—*this* act of perceiving just *is this* physiological change⁵—but that no more general identities should be postulated, since a certain function can always potentially be realized in different matter, even if it has not been so far in our experience.⁶ We might say, then, that the "is" of general claims such as "*aisthēsis* are a certain type of qualitative change" is the "is" of realization or constitution; we are saying that this function is usually realized in a certain physiological process, that *aisthēsis* is a functional state of matter, and that in the animals we know it usually has such-and-such a physico-

³ Cf. *DA* 424^a17, 425^b27, 426^a16, 427^a3, 431^a14, 19, 432^b1; on all this, cf. further in Essay 1.

⁴ Slakey, "Aristotle on Sense-Perception," assumes that if Aristotle can describe perception physically, the formal account is therefore otiose: "Aristotle tries to explain perception *simply* as an event in the sense-organs" (470, emphasis mine). Cf. Essay 1, the criticisms by Sorabji in "Body and Soul," 78, and the arguments of Taylor's "Mind-Body Identity."

⁵ Sorabji's "Body and Soul," generally a very stimulating article, fails to distinguish (1) between token and type-identities and (2) between statements identifying entities ("this house is bricks and mortar") and statements identifying processes ("this perceptual activity is a physical change"). He does not give us any reasons to suppose that Aristotle would not have fully identified a particular psychic process with a particular physical interaction. These identities would not conform to Leibniz's Law: Corippus' desire for revenge can be called excessive, or unjustified; the boiling of blood around his heart cannot. What is required is something like the "theoretical identity" defended in T. Nagel's "Physicalism," 105 ff., and postscript, 115–16.

⁶ Cf. *Metaph.* VII.11, and comments in Essay 1.

chemical character.⁷ In this way Aristotle can consistently both make what appear to be general identity claims and also say, more loosely, that psychic processes are "not without body" (*DA* 403^a5-7), or "always with some body" (^a15), that "together with these the body undergoes some affection" (^a18-19). The point of these latter statements is not to claim that there are two separate processes, somehow correlated, but to remind us that the function, which we characterize generally, is realized now in this matter, now in that. There is always *some* bodily affection that constitutes the process, but not necessarily the same one, though empirical physiology might suggest this. The most precise way of speaking of soul and body (cf. *DA* 408^b4 ff.) is to say that there are various life-activities of *the creature*, which we can characterize now functionally, now by specifying the usual material constituents. If we speak this way, we are not led to think that soul is and acts apart from body; it is something about a living creature, its functional organization, which is always in matter. If we want a general account, we look at the form, and speak of perception, desire, motion; if, as doctors or physiologists, we need more specific information about how particular beings work, we look for the material realization.⁸

But this hylomorphic view may not be the only one Aristotle ever held about the relationship between soul and body. Nuyens

⁷ The view taken here is very much like Sorabji's. But he applies to Aristotle's view of soul and body the distinction between identity and composition made at *Metaph.* 1041^b12-16, suggesting that the bodily constituents survive the dissolution of the substance (cf. also Wiggins, *ISTC*, 10-25). But Aristotle insists that the constituents of a living body and the constituents of the corpse that was that body are related only homonymously (cf. Ackrill, "Aristotle's Definition," 130). And further problems arise when we turn to a discussion of processes: the *alloiōsis* that realizes or constitutes this act of perception is not something that can survive the animal's death or occur in the same way outside of this living organism.

⁸ Thus when Aristotle asks, at *DA* 424^b16-17, whether smelling is not more than an *alloiōsis*, he would be asking not whether it has some non-physical component, but whether the formal account, which abstracts from the particularities of the matter, is not superior to and independent of any particular physiological account.

points to the conclusion of the *MA* discussion of *pneuma*, and especially to the city simile that follows, as evidence that he held, at the time he composed this treatise, a different and incompatible view: that the soul is a non-material substance, identifiable separately from body, that imparts motion to body using some part of it as a tool. *Pneuma* is this part, and its function in the treatise is to provide a lacking link between desire and the body, showing us the "meeting place" of the psychic and the physical in animal motion.⁹

Two problems immediately arise. First, Nuyens's account does not resolve the difficulty we have found in trying to read the treatise as a whole: in chapters 7-8, an initial change associated with perception caused, automatically, the succeeding changes leading to motion; in chapter 10, *pneuma* steps in to take a central role. Second, the passage of the *DA* to which the concluding remarks of the *MA* chapter plainly refer does, indeed, use "tool" language of soul-body relations, but in a way fully and plainly compatible with the *DA*'s hylomorphic view. "But as for the tool in virtue of which desire imparts motion, this is already bodily." Taken out of context, this might, indeed, suggest that Aristotle is claiming that soul is some sort of substance that causes bodily activities—Nuyens's "instrumentisme mécaniste."¹⁰ But read with the rest of the *DA*, it is not even seriously misleading. The soul was defined as the *entelecheia* of a *sōma organikon*; this phrase was offered in explanation of the phrase, "natural body potentially having life" (412^a27-^b1). A body can be (potentially) living only if it has an organic structure of a certain complexity; soul is the functional organization of such a body. Again, in *DA* II.4, Aristotle asserts that all the bodies of living beings can be called *organa psuchēs*, "tools of soul," in that they are "for-the-sake-of soul" (415^b18-20). To

⁹ Cf. I, Chapter 1 on Nuyens's view and general criticisms by Block and Hardie.

¹⁰ Because of this forward reference to the *MA*, Ross goes so far as to argue that *DA* III belongs to Nuyens's middle stage—see "Development," 67; *DA* 14, 316; and I, Chapter 1.

call a body or bodily part the "tool" of soul can, then, be just to ascribe a function to it, to say that it enters somehow into an analytical account of how the animal performs its life-activities: to do a job, the creature has to have some tools, and these are the tools that do such-and-such jobs. The forward reference in III.10 means, then, only that if we want to know what organic process it is that performs the function of getting the animal going towards his object of desire, we will have to wait until another time. Desire is a functional state of matter; if we want to know in specific terms what the stuff is that is usually in motion when the animals we are interested in are desiring something, we will be told when we reach the treatises that deal in more specific terms with animal physiology.

There is no reason, then, why "tool" language should be taken as evidence of instrumental dualism; we might just as plausibly take a statement that sight is the function of the eye to imply that there are two separate dispositions, sight and some state of eye matter, that stand in a causal relationship to one another. We have good reason to expect the *MA*, whose job it is to discuss desire's bodily "tool," to continue the hylomorphic account. In view of the mutual and well-embedded cross-references, we should assume compatibility with the *DA* except in the face of very strong evidence. Nuyens has, as we shall see, no such evidence; nor does his account appear to offer a coherent reading of the *MA* itself. We shall find that, on closer examination, the *MA* theory (including the city simile, when read in its context) is fully compatible with hylomorphism—and that the addition of chapter 10 removes the one potential obstacle to a hylomorphic reading.

Nothing said about the soul in *MA* 6–8 implies that it is separable and substantial. We find, instead of a claim that some object called *psuchē* is the mover of the animal, the claim that animals move in virtue of certain vital capacities: species of cognition and species of desire. Because of their role in the explanation of goal-directed motion, these are called "the movers of the animal" (*ta kinounta to zōion*, 700^b17). The account of the practical syllogism in chapter 7 says quite clearly that a certain

combination of cognitive and desiderative activities is a sufficient condition for motion; there seems to be no room here for a stage at which an immaterial resolve is translated into bodily movement. "That the conclusion is the action, is obvious" (701^a22–3; cf. 701^a12–13).¹¹ Unless Aristotle has omitted a transitional step of great importance, this clearly suggests that the perceptions and desires that are the "premises" of the syllogism are realized in matter. And Aristotle says explicitly that they are: "Perceptions just *are* some sort of alteration" (701^b16)—the language of the *DA*. Other statements, though looser, are equally clear: "The animal moves and progresses in virtue of desire or choice, when some alteration has taken place in accordance with (*kata*) sense-perception or *phantasia*" (701^a4–6). "Of necessity the thought and *phantasia* of these are accompanied by (*akolouthei*) heating and chilling" (701^b34–5). Thoughts of painful and pleasant things are nearly always "with" (*meta*) some sort of heating or chilling (702^a1; cf. 3–5). Life-processes, functionally characterized, are "with" bodily change; bodily changes take place "in accordance with" a life-process—i.e., as required for the fulfillment of the function. This language is a careful and revealing elaboration of hylomorphism: life-processes are necessarily enmattered, so always *with* some bodily change, though not necessarily any particular one; bodily change realizes the function and takes place *in accordance with* it. We cannot read these passages as saying that the alteration is *caused by* sense-perception, etc. *Kata* is never causal in this way.¹² Nor have we any good reason to read a causal relationship into the "with" statements: Aristotle might have said "productive of" a heating or chilling, but he did not. If we are in any doubt, the clear recapitulation of the *DA*

¹¹ Cf. Essay 4.

¹² I am relying for this claim on Peter M. Smith's exhaustive survey (forthcoming) of all pre-Aristotelian uses of *kata*, which establishes this conclusion without any exception, and, for Aristotle's usage, on Bonitz, *Index*, 368^a–69^a and Eucken, *Praepositionen*, 38–46. William's *secundum* and Torracca's "secondo" are just right; Forster's "as the result of" ignores this evidence; Louis and Farquharson are also misleading, though more ambiguous.

position on perception ought to settle the point. The language is sometimes unclear; but no more so than most of the *DA*, which, without II.1–2, might be misread in many places.¹³

A number of potential obstacles to the hylomorphic reading can be readily dismissed. The opening posing of the question ("it remains for us to consider how the soul moves the body," 700^b10) is dialectical and states the problem in a familiar form, one of the most common characterizations of soul (cf. *DA* I) being as that which imparts movement. Aristotle refers back to the *DA* (700^b4–6) as background for this discussion. The claim that "*phantasia* and thinking have the power of the actual things" (701^b16 ff.) refers, as the sequel makes clear, to the power of these enmattered processes to cause large-scale bodily change (shuddering, etc.), not to the power of soul-events to cause body-events. The language is less clear than in the preceding claim about *aisthēsis* because the relevant physiological facts are less clear. The point is that with *aisthēsis* we know right away that it is bodily, since we can pick out the bodily alteration that usually realizes it. With *noēsis* and *phantasia*, it is not intuitively obvious that something bodily is going on; but the fact that the large-scale result can be the same as in cases of actual perception suggests that there is a bodily realization.¹⁴

Nor is the notorious city simile at the end of the tenth chapter in any way inconsistent with the hylomorphic view. It summarizes arguments advanced in chapters 8–9 to the effect that the unified functioning of the animal organism presupposes some single physiological center (the heart or its functional analogue) that will receive perceptual stimuli and initiate responses.¹⁵ In *Metaph.* VII.10, Aristotle associated with the hylomorphic view

¹³ For a general discussion of Aristotle's usage of ordinary expressions that might seem to imply a theory of soul different from his own, see Hardie, *AET*, chapter V.

¹⁴ On the relationship between *noēsis* and *phantasia*, cf. Essay 5. *Noēsantes monon*, "just thinking of something," is, then, to be taken as contrasting not what cognition can do alone with what it can do when backed by desire, but rather the effect of perceiving an actual object with that of thinking (or imagining) the same object, whether or not it is there.

¹⁵ On these arguments, see notes to chapters 8–9.

of soul and body the suggestion that there might be some part or parts "that are in charge and in which, primarily, are the definition and the substance" (1035^b25–6).¹⁶ To talk of soul as *eidōs* is not, then, incompatible with seeing its functioning as "in" a bodily part; and "in" seems to have, here and in several similar passages,¹⁷ the sense of "causally dependent on." The integrated functioning of the whole animal depends on, or requires, the existence of some central, "guiding," bodily organ; to say that soul is "in" the heart is to say no more than that, for most animals, it is the heart that plays this central role. The *MA* speaks of the heart region as the bodily *archē* of, or for, the soul (702^a32, 702^b2, ^b16; 703^a12)—the part that realizes, in a primary way, the animal's vital activity—and says quite clearly that soul itself is "distinct from a magnitude of this kind, though it is 'in' it" (703^a3–4). The city simile (703^a28–^b2) does no more than to summarize this line of argument. The animal, like a city, can function as a mature, coordinated whole only if there is some physiological center that monitors all stimuli; we cannot explain goal-directed motion without positing some such center. There is "no need of soul in each part"—limbs and similar parts do not need to be separable animals in order to function well when attached. The parts live in virtue of their connection to the central organ and perform their various tasks because of their natural fitness for responding in consistent ways to changes in the center.¹⁸ If Aristotle makes a blunder here, it is not in connecting proper functioning of the entire creature with the states of some bodily organ—for one may even now be a hylomorphist without denying that the higher creatures require

¹⁶ On this passage, see Block, Hardie, "Relation," and Wiggins, *ISTC*, n. 61.

¹⁷ Cf. *Ph.* 210^b21–22 on the senses of *en*; also *Metaph.* 1023^a8–11, 23–25; *EN* 1109^b23.

¹⁸ The parallels cited by Nuyens and others as evidence of a period of "instrumentisme mécaniste" claim no more than this. *Juv.* 469^b13–17 says that the warmth of all the body is dependent on the heart, and (in a self-confessed metaphor) that the soul is "kindled, as it were," in this place, for just the reason that all vital processes require heart-warmth. *PA* 670^a26 ff. calls the heart "the *akropolis*, as it were," of the body because it is the *archē* of vital warmth.

a central nervous system or its functional analogue—it is in inferring from functional unity to the *singleness* of the relevant organ and assuming without argument that all systems and processes depend in similar ways on the same center. But that is a mistake of another kind, which casts no doubt on the consistency of the *MA* account with the *DA*.

There is, however, one serious and pervasive difficulty about which we have so far been silent. Throughout chapters 6–8, the treatment of desire is persistently obscure. We are never told clearly that it, like the cognitive processes, is necessarily enmattered; far less are we told what its material embodiment is usually like. The result is that a serious doubt does, in fact, arise about the consistency of this theory with hylomorphism. “Desire and the faculty of desire impart motion while being themselves moved” (701^a1): does this mean only what it means in *DA*, that desire is central in activating animals towards their goals, or does it suggest the instrumental picture, in which a non-bodily desire causes bodily change? There is a physiological account given, or suggested, for the cognitive processes; but no provision is made for distinguishing, in physiological terms, between cases where desire is active and cases where it is not. “The animal moves and progresses in virtue of desire or choice, when some alteration has taken place in accordance with sense-perception or *phantasia*” (701^b4–6): does this mean that an enmattered perception gives rise to an enmattered desire, or that the perception triggers a non-bodily activity, which in turn moves the limbs? The final summary, though vague, suggests the instrumental, rather than the hylomorphic, reading:

For the affections suitably prepare the organic parts, desire the affections,¹⁹ and *phantasia* the desire. And *phantasia* comes about either through thinking or through sense-perception.

¹⁹ *Pathē* and *pathēma* are ambiguous, standing now for fears and feelings of confidence (702^a2–3), now for the bodily changes accompanying these (701^b23, cf. *Metaph.* 1022^b15–19), so we cannot be certain where the apparent leap from the psychic to the physical takes place. But the *pathē* here seem most likely to be the heatings and chillings.

Aristotle’s “prepares” is extremely vague: it is compatible with the view that an enmattered desire causes, in its turn, new physiological changes. But it must be admitted that the instrumental reading looks easier.

There are several *prima facie* reasons against taking this to be the best reading of the entire *MA* account. First, its oddness as a theory. The Nuyens instrumental view is neat and simple: all psychological processes are non-physical. But here the cognitive processes are clearly enmattered, desire incorporeal. Instead of a Cartesian movement from soul to body, we have the improbable picture of motion from body to soul to body again. But, second, even this reconstruction cannot fit much of the evidence, which claims boldly that the bodily alterations associated with cognition set up an automatic sequence of *bodily* changes leading directly to motion of the limbs. The extended automatic-puppet example, and passages like 702^b21–25 and 701^b24–32, can be understood only on the assumption that the desire that is triggered by perception is also something physical and part of the chain of physiological events. The opening of chapter 8 speaks of a heating or chilling in the heart region connected with the seeing of something *as* something to be pursued or avoided; this must be distinct from the change caused by the mere presentation of the object (cf. chapter 11 and notes), and must indicate the activation of desire. We have, then, a picture in which an *initial* perception is realized in a certain physiological change; but nothing should follow automatically from this (except isolated limb-movements—cf. chapter 11), unless desire is also activated. If desire is activated, a *further* bodily change, a heating or chilling, ensues, from which limb motion follows by a series of automatic steps. The picture is extremely unclear. Aristotle is not careful to distinguish the change that realizes the initial perception from the change following on the activation of desire, from which motion directly follows. But they must be distinct, for not every perception leads to motion; and 701^a4–6 and 701^a33–36 clearly show that the cognitive and the desiderative processes are both necessary in setting up the ensuing motion. Unless the

account is very badly confused, Aristotle does mean to apply the puppet example to the sequence following from the *initial* cognitive change (cf. 701^b16–18). And this cannot work unless desire, like cognition, has a physiological manifestation, and mediates, physiologically, between the initial cognitive change and the change that (as in 701^b34–35) follows on desiring and leads to motion.²⁰ Not every initial change leads to motion, but everything that *does* follow the initial change is physical and occurs smoothly and swiftly because of the body's own nature. What we seem to need, then, is a bodily process in which desire is realized, that will be moved by initial perceptual changes and, in turn, set up the changes in the heart region that lead directly to motion.

The introduction of *pneuma* in chapter 10 seems to offer what is needed, acknowledging explicitly the deficiency of the earlier account:

According to the account that gives the reason for motion, desire is the middle, which imparts motion being moved. But in living bodies there must be some body of this kind (703^a4–6).

This account reminds us that there are two *logoi*—a teleological one that gives the reasons for motion and a contingent physiological one that tells us (given that there must be *some* body in which desire is realized) what the body usually is. Desire is an enmattered process, and we want to find out what the bodily “moved mover” is; we need an organ, or some stuff, that is capable of receiving perceptual stimuli and initiating bodily responses. The mysterious *pneuma* is invoked to fill this gap.²¹

²⁰ It is worth mentioning that *akolouthei* is ambiguous between “accompany” and “follow”; therefore 701^b34–35 could be saying either that the heating and chilling *follow* some change that realizes the activity of desire, or that they *accompany* the perception or thought of the object as an object of pursuit or avoidance—which, unlike the initial perception, must follow the activity of desire. It makes little difference which reading we choose.

²¹ Note that *pneuma* responds to qualitative change and causes it in turn, without itself undergoing such change (703^a25)—thus supporting Aristotle's frequent claim that local motion is in all respects prior to alteration (cf. chapter 5 and notes and *Ph.* 260^b7 ff.).

Commentators are divided concerning the place at which *pneuma* enters into the physiological account. Some argue that it sets up the alterations in the heart region that are mentioned in 701^b34–35; others hold that it intervenes between alteration and the locomotion of the limbs.²² Both are, in a sense, correct—for Aristotle does not clearly distinguish perceptual alterations from those that lead directly to limb motion. The former are followed, the latter preceded, by *pneuma*'s operations. It certainly cannot follow the final alteration. It is said to operate around the heart—not to circulate between the heart and the limbs.²³ It is the sinews that are said to be analogous to the puppet strings, not the *pneuma*. If the heating and chilling are followed automatically by expansion and contraction, there will be no need of an extra element here.

A second question is, with what sort of desire is this *pneuma*-activity associated? With a general desire, corresponding to the major premise of a practical syllogism? Or with a concrete desire for something already perceived as accessible? The latter seems more likely, since motion is to follow immediately, and since Aristotle several times indicates that the desire he is interested in follows the initial perception.

The theory of *pneuma* remains obscure. We can see why Aristotle wants to insist that there is some material realization

²² The first position is held by Buridan (see notes to chapter 5) and Peck (*GA*, 578); the second by Albertus Magnus, Farquharson, and Siwek (147).

²³ Because this is inferred from the preceding statement (*touto . . . pros to akinēton*, 703^a11–14), the analogy cannot be used to help the Farquharson-Siwek position. Rather than suggesting that the *pneuma* is a moved mover set in motion by some “unmoved” *archē* in the heart, it stresses only the geographical inseparability of *pneuma* from the heart area. The moving and the unmoved points in the joints are inseparable in place, though their functions differ (cf. *DA* III.10, 433^b24–25, and the analogous use of “potentially one, many in activity” at *MA* 702^a30, 702^b25–26, 702^b30–31). The inference goes: the *pneuma* is as inseparable locally from the central *archē* as the moved “point” in a joint is from the unmoved. Therefore, since the *archē* is in the region of the heart or its analogue, the *pneuma* must be there too.

of desire, but it is not yet clear why he wishes to point to this particular stuff. Why is it impossible to solve the problem within the confines of the usual theory of matter, making use of the animal's physiology as the treatise has already characterized it? Why must the "body of this sort" be an extra body?

THE PNEUMA AND ARISTOTLE'S THEORY OF MATTER

Aristotle's theory of matter holds that there are in the sublunary world four elements, each with a rectilinear natural motion. Fire and air always tend to move up, water and earth to move down, until their natural places are reached. This theory poses grave problems for the explanation of how an organic body retains its unity. Only the heavenly bodies, made out of a perfect kind of matter whose natural motion is the same as their own purposive motion, seem to have solved that problem effectively: because their bodily nature is perfect, they are able to move eternally as desire urges.

We must concede that animal bodies are, on any theory of matter, less perfectly integrated, more subject to sickness, disintegration, and death, than Aristotle's divinities. "The movement of the eternally moved by the eternal mover is in one respect similar to that of any animal, but in another respect dissimilar: hence the first are moved eternally, but the movement of animals has a limit" (*MA* 700^b30). But the rectilinear natural motion theory cannot account even for the defective and limited organization of mortal animals. Aristotle's earliest solution to the problem of organic unity is to suggest that the recalcitrant parts, which would tend, without constraint, to fly off here and there, are held together by constraint imposed by soul. In *DC* II.1, he describes the effort exerted by mortal souls in keeping the body together, and denies that such a picture could apply to the perfect natural motion of the heavens. Decay and disability occur in animals when the elements break loose from this soul-constraint and seek their natural places (II.6, 288^b12 ff.). The explanation of animals' organic unity and their

relative success at goal-directed motion seems, then, to require a dualistic theory of soul and body—while the heavenly spheres, on the other hand, admit from the first a hylomorphic account.²⁴

But if Aristotle rejects, as he later does, the apparent dualism of this early work, he must make some revisions in his theory of matter. In *Ph.* VIII.4, he broaches the question again, without speaking of soul-constraint or non-physical substance. At 254^b17 ff., we read that the animal as a whole moves itself naturally; but this is not to say that the various constituents of its body are not moved both naturally and unnaturally. All this, Aristotle says, depends on what the movement is, and what is the element in question. What we need, according to this passage, is some explanation of how the body is able to function as an organic unity, though composed of various elements not in their natural places. Aristotle must assimilate his account of animals more closely to the account of the heavenly spheres, showing how their bodily nature is, without the aid of incorporeal substance, suited for at least some degree of purposive motion. We are reminded of the important passage in the *GA* that suggests that the *sumphuton pneuma*—or rather the vital heat in it²⁵—plays a central role in transmitting sensitive soul to the embryo because the *pneuma* is, in some way, like the element of which the stars are made:

Now the capability of every kind of soul seems to be associated with a body different from and more divine than the so-called elements; and as the souls differ from each other in value and lack of value, so too this sort of nature differs For within the seed of everything there is present that which makes the seeds to be fertile, the so-called hot. This is not fire or that sort of capability, but the *pneuma* enclosed within the seed and within the foamy part, and

²⁴ On the spheres as living, cf. Essay 2, and notes to chapter 3.

²⁵ This distinction is not made in the *MA*, presumably because it is not required for the treatment of this particular problem.

more precisely the nature in the *pneuma*, being analogous to the element of the stars (736^b30 ff.).²⁶

This is the only passage in which the *pneuma* is explicitly compared to the *aithēr*; but this passage suggests that other life-functions, too, must be explained with reference to an element more divine than the usual four. Aristotle's use of *pneuma* elsewhere is very unsystematic, and he nowhere offers a lengthy account.²⁷ It differentiates the parts of the embryo (*GA* 741^b37 ff.) and it fills the passages of certain sense-organs (744^a3, 781^a24 ff.). Its overall importance for him, at some period in his career at least, can be seen in the remark at *GA* 789^b8 ff. that nature effects almost everything using *pneuma* as a tool: it is as versatile in living beings as the anvil or hammer are in bronze-work.

I suggest that in chapter 10 the divine *pneuma* is being applied to the resolution of the dilemma of purposive motion. We have argued that it is the stuff in which desire-activity is realized. Now we see that it is also needed to provide a non-dualistic answer to the problem of describing how the body holds together. The earlier chapters of the *MA* made no mention of the theory of natural motions or of the need for a bodily element more flexible than the others. Chapter 10, however, spends some time in a discussion of natural motion and of the interaction of *pneuma* with fiery and earthy bodies. The simple

²⁶ The translation is Balme's, except that for his "now the capability of all soul," I have preferred "Now the capability of every kind of soul" (cf. Peck, Platt). The relation of this passage to its context in the *GA* has been analyzed by Solmsen in "The vital heat." For an interesting recent treatment of this and related problems in Aristotle's embryology, see Preus, "Science and Philosophy."

²⁷ Good concise summaries of the evidence are in Balme, *PA-GA*, 158-65, and Peck, *GA*, Appendix B (see also his "The connate pneuma"). Still useful is Beare's *Greek Theories*, 333 ff. Jaeger's "Pneuma" remains valuable for its careful demonstration of the *pneuma*'s importance for Aristotle's account of all animals, not just those that do not have respiration. More remarks along these lines are made by Ross, *PN*, 40-43. Rüsche's *Blut*, 188-250, and Lesky's *Die Zeugungslehren*, 128-59 contain useful discussions of the relation between *pneuma* and the vital heat.

elements were said in *Physics* VIII to have only a passive, not an active, power of imparting motion.²⁸ Now Aristotle remarks, "That which is moved but does not naturally impart movement can suffer according to another's power, but that which imparts movement must necessarily have some power and strength" (703^a6-9). The four elements that compose the limbs are being contrasted with *pneuma*, which provides creatures with their *ischus* (703^a9-10, 18-19)—since without this special component animals would, apparently, be unable to go after their objects of desire. It contracts and expands without compulsion (703^a22) and without undergoing qualitative change—a feat of which none of the other elements would be capable. It unifies the animal by offering a counterbalance to the tendencies of the elemental parts, having weight by comparison with the fiery and lightness by comparison with its opposite (703^a23-24). Aristotle concludes by insisting that only a special kind of stuff could move the elements without undergoing alteration, since the "natural bodies" engage in a process of reciprocal dominance (25-26), overcoming each other and (as we learn elsewhere) changing into each other. The city analogy follows—and not by chance, for only with *pneuma*'s introduction has the exposition of the necessary conditions for city-like order been completed. The recalcitrant parts can now be seen as working in organic order for the "good" of the whole, without constant constraint.

These claims on behalf of the *pneuma* are impressive. But in the absence of the detailed account of its operations that we suspect Aristotle at some point either wrote or planned, they strike us as a somewhat incredible promotional effort. We are never even told what element this *pneuma* is actually meant to be. Warm air, says the *GA* at 736^a1. And critics such as Balme, Moraux, and Rüsche²⁹ are certainly correct to protest against any facile identification of *pneuma* with *aithēr* on the basis of the

²⁸ Cf. note on 700^a11 ff.

²⁹ Balme, *PA-GA*, 163-64; Moraux, "Quinta Essentia," 1196 ff.; Rüsche, 194; cf. also Cherniss, *Aristotle's Criticism*, 601-2.

GA analogy cited above. But if it is simply air,³⁰ the motion problem will not be solved, since the natural motion of air is a rectilinear motion upward to an intermediate place below that of fire. Air would indeed be heavier than fire, lighter than its opposite, but there is no reason to think it could escape qualitative change, or expand and contract "without constraint." Aristotle is so far from revising his natural motion theory in psychological contexts that he says of soul in the *DA* (406^a27), "If it moves upward, it will be fire, if downward, earth—for these are the motions of these bodies—and the same argument holds for the intermediate elements." Aristotle does not seem to admit the possibility that there might be air in the body that did not move with the natural motion of air. Nor can *pneuma* really be *aithēr*; this would get Aristotle no closer to solving the problems of bodily motion. Even if we could admit that there might be some of the fifth body in the sublunary sphere—and Preus³¹ cites in evidence *DA* 418^b6–10, where a "transparent nature" is said to be present in water and air as it is in the *aithēr*, claiming a parallel with the discussion of spontaneous generation in the *GA*, where *pneuma* is invoked—even if this possibility could be established, circular motion would not seem to be any more helpful than rectilinear in the *MA* argument, although the *aithēr* would at least be naturally exempt from qualitative change. But in view of Aristotle's proof that there are these five elements and no more, what possibility is open? Reiche's claim for a special mixture of the four elements rests on too many dubious historical arguments to seem at all plausible.³² We can only say that *pneuma* is, apparently, air with a special kind of heat in it that makes it behave unlike ordinary air, more like a different element. But the reasons for

³⁰ The view, as well, of J. Skemp, *The Theory of Motion*, 91–92, of Solmsen, "Greek Philosophy," 177; and, apparently, of Wiersma, "Die ar. Lehre," 102–7.

³¹ Preus, "Science and Philosophy."

³² Reiche, *Empedocles' Mixture*, particularly 83–100. For devastating criticism of Reiche's general plan, see especially the review by Solmsen, *AJP*; also those by Kerferd and Wiersma.

its exemption from the cyclical strife of the elements remain unclear. These are complex questions to which the brevity and simplicity of Aristotle's sketch offer no hope of a satisfactory answer. We had better regard the theory as one in the course of development³³ and *pneuma* as a hypothetical gap-filler whose workings cannot be scrutinized too closely. We frequently wish that Aristotle had a better notion of what sort of work he would have to do to establish the adequacy of a physiological theory—in this case that, rather than presenting us with a non-empirical stuff whose operations are so unclear, he had seen fit to overhaul more thoroughly the theory of natural motions whose limitations made its invention necessary.

The chapter dealing with *pneuma* was used by Nuyens as the best evidence for ascribing a theory of instrumental mechanism to the Aristotle of the *MA*. We see that there is very little in the treatise as a whole that suggests such an account, much more that implies or is at least fully compatible with the hylomorphic theory. The two difficulties in the way of a fully hylomorphic reading of chapters 6–8 are, in fact, removed by chapter 10, which insists that desire is enmattered, showing us what its realization usually is, and which, furthermore, expands the natural motion theory of matter to allow for organic bodily unity without constraint from a non-bodily soul.

If we examine the steps that led Aristotle to his doctrine of *pneuma*, we notice something else of interest. We find that an essential part of the search for the best account of animal physiology was an examination of the goal-directed motions of the heavenly spheres, realized in a uniform and perfect body. At least as a heuristic principle, then, these arguments endorse cross-disciplinary speculation; and we may add the *pneuma* theory to the examples cited in Essay 2 that suggested that Aristotle was adopting a more flexible position on the nature of scientific inquiry. Aristotle indicates in this treatise that the different areas of natural study should not be separated and departmentalized, but must be in constant communication.

³³ As is suggested by Solmsen, "Greek Philosophy," 177, and Balme, *PA-GA*, 164.

Animal motion and heavenly motion must be understood together: on neither subject can we establish our conclusions firmly without a more general inquiry into the articulation of the universe as a whole. With its interdisciplinary arguments, the *MA* shows us that Aristotle, in his mature thought about the sciences, did not view them as separate deductive systems with discrete first principles established by a study of a discrete body of appearances. As in nature it is best that the higher be separated from the lower, but all beings are nonetheless interdependent and ordered together,³⁴ so in science the "higher" disciplines may be marked off from the "lower," but must contribute to each other's progress. And since the "highest" science, cosmology, is the weakest and the most in need of support, the need for cooperation and interdisciplinary study is all the more acute. No inquiry is genuinely separable from a whole group of interlocking studies, and no being can be exhaustively studied without an account of his placement in the whole of nature.

³⁴ Cf. *Metaph.*, 1075^a16 ff. and comments in Essay 1; also *GA* 732^a6

ESSAY 4

PRACTICAL SYLLOGISMS AND
PRACTICAL SCIENCE¹

"Haven't we seen that the appearance leads us astray and throws us into confusion, so that in our actions and our choices of both great things and small we frequently affirm and reject the same things, whereas the science of measurement would have cancelled the effect of the appearance, and by revealing the truth would have brought rest to the soul abiding in the truth, thus saving our life? Considering this, would people agree that our salvation lay in the science of measurement, or in some other science?"

"The science of measurement," he answered.

(Plato, *Protagoras*, 356 d-e,
tr. Guthrie, revised)

So Socrates proclaimed, to the hypothetical "many," his dissatisfaction with the messiness of ordinary attempts at practical reasoning and his hope for a more scientific enterprise that would bring order, even salvation, to troubled men. We have inherited both his discontent and his optimism. The notion that deliberation about how to live might be rendered scientific, and that we might develop a practical *technē*² having the elegance,

¹ I owe a great deal to Wiggins's "Deliberation and Practical Reason," and to Putnam's "Literature, Science, and Reflection." My discussion of practical conflict is greatly (and obviously) indebted to two papers by B. Williams: "Ethical Consistency" and "Consistency and Realism." My analysis of Aristotle's practical syllogisms was very much helped by reading von Wright's discussions of practical inference in "PI," *VG*, and *EU*, and by Malcolm's "Intention and Behavior." I am very grateful to Professor Malcolm for allowing me to discuss his paper here, in advance of its publication, and also to Professor J. Kim for sending it to me.

² Throughout this paper, I shall generally use "practical" where a modern reader might expect an emphasis on the ethical or, at any rate, some attempt to set off moral from non-moral practical reasoning. Aristotle notoriously (and, I believe, correctly) does not distinguish two different forms of reasoning here and makes deliberation about virtues we