

THE HOT AND THE COLD, THE DRY AND THE WET IN GREEK PHILOSOPHY

IN a previous article (*JHS* lxxxii (1962) 56 ff.) I examined some of the theories and explanations which appear in Greek philosophy and medicine in the period down to Aristotle, in which reference is made to right and left or certain other pairs of opposites (light and darkness, male and female, up and down, front and back), and I argued that several of these theories are influenced by the symbolic associations which these opposites possessed for the ancient Greeks. In the present paper I wish to consider the use of the two pairs of opposites which are most prominent of all in early Greek speculative thought, the hot and the cold, and the dry and the wet. My discussion is divided into two parts. In the first I shall examine the question of the origin of the use of these opposites in Greek philosophy. How far back can we trace their use in various fields of speculative thought, and what was the significance of their introduction into cosmology in particular? And then in the second part of my paper I shall consider to what extent theories based on these opposites may have been influenced by assumptions concerning the values of the opposed terms. Are these opposites, too, like right and left, or male and female, sometimes conceived as consisting of on the one hand a positive, or superior pole, and on the other a negative, or inferior one? How far do we find that arbitrary correlations were made between these and other pairs of terms, that is to say correlations that correspond to preconceived notions of value, rather than to any empirically verifiable data?

I

On the problem of the origin of the use of these opposites in various types of speculative theories, it is as well to begin by reviewing the incontrovertible evidence for the post-Parmenidean period before turning to the much less certain and more difficult evidence for earlier writers. The first extant philosophical texts in which the hot and the cold, the dry and the wet are explicitly described as being present at the first stage of cosmological development are certain fragments of Anaxagoras. *Fr.* 4, for instance, specifically mentions these opposites, along with the bright and the dark, 'much earth' and 'innumerable seeds', as being present in the original mixture when 'all things were together', and the same three pairs of opposites, together with the rare and the dense, are described in *fr.* 12 as separating off from one another in the *περιχώρησις* initiated by Nous. The first extant text in which we find a physical theory based on the hot and the cold, the dry and the wet as the *four* primary elements or components of other things appears to be in the Hippocratic treatise *On the Nature of Man*, ch. 3 (L vi 36 17 ff.)¹ where the author states that on death each of the components of a man's body returns to its own nature, *τό τε ὑγρόν πρὸς τὸ ὑγρόν καὶ τὸ ξηρόν πρὸς τὸ ξηρόν καὶ τὸ θερμὸν πρὸς τὸ θερμὸν καὶ τὸ ψυχρὸν πρὸς τὸ ψυχρὸν. τοιαύτη δὲ καὶ τῶν*

¹ The reference to Melissus in ch. 1 (34 6) provides a *terminus post quem* for chs. 1-8 of this composite treatise, and to judge from the report in Anon. Lond., xix 1 ff., its author was Polybus, the son-in-law of Hippocrates (the theory of veins in ch. 11, 58 1 ff., may also be ascribed to Polybus on the authority of Aristotle, *HA* 512b 12 ff.). While most scholars date this work in the second half of the fifth century

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ζώων ἐστὶν ἡ φύσις καὶ τῶν ἄλλων πάντων.² In other fifth- and fourth-century texts these opposites are associated with the elements, rather than named as elements themselves. In *fr.* 21 3–6 Empedocles connects certain pairs of opposites (hot and cold, bright and dark) with certain of his ‘roots’,³ though how far he went in working out a comprehensive schema of such associations, it is much more difficult to say.⁴ But in the Hippocratic work *On Fleshes*,⁵ for example, we find a quite elaborate schema (ch. 2, L viii 584 9 ff.). Here too there is a four element theory, the most important element being the hot itself (‘what the ancients called αἰθήρ’). Of the other three elements, earth is said to be cold and dry, ἡγήρ is hot and wet, and ‘that which is nearest the earth’ (the sea?) is ‘wettest and thickest’. Another such theory is found in *On Regimen* i⁶ where the writer asserts that there are two component elements of all living creatures, namely fire and water, but ‘the hot and the dry belong to fire, and the cold and the wet to water’, though ‘there is some moisture in fire’ and again ‘there is some of the dry in water’ (chs. 3 and 4, L vi 472 12 ff., 474 8 ff.).⁷

The evidence for the post-Parmenidean period is clear enough. In the late fifth and early fourth centuries the hot and the cold, the dry and the wet, whether alone or in conjunction with other pairs of opposites, were used in at least two types of physical theories, (1) where they figure as elements themselves, i.e. as the primary substances of which other things are composed (as in *On the Nature of Man*) and (2) where they are associated with the elements, when these were conceived in the form of other substances (as in *On Fleshes*).⁸

² In ch. 4 (38 19 ff.) the writer describes the components of the body in terms of the four humours, blood, phlegm, bile and black bile, but these are in turn correlated both with the opposites and with the four seasons in ch. 7 (46 9 ff.): e.g. blood, like the season spring, is said to be wet and hot.

³ ‘Sun’ (i.e. fire) is undoubtedly described as bright and hot in verse 3 (ἡέλιον μὲν λευκὸν ὄραν καὶ θερμὸν ἀπάντη) and ‘rain’ (i.e., water) as dark and cold in verse 5 (ὄμβρον δ’ ἐν πᾶσι δοιοφέντᾳ τε ῥιγαλέον τε), and when Aristotle quotes these lines at *GC* 314b 20 ff., he adds that Empedocles ‘characterises the other elements too in a similar way’. But in the more complete version of the fragment quoted by Simplicius (*in Ph.* 159.13 ff.) the interpretation of the lines which refer to the other two elements is far from clear. Verse 6 (ἐκ δ’ αἰῆς προρέουσι θελεμνά τε καὶ στερεωπά) seems to associate earth with solidity, particularly (but not, apparently, with hot or cold): Aristotle, at least, took Empedocles’ theory to have been that earth is heavy and hard (*GC* 315a 10 f.). Verse 4 is even more obscure: ἄμβροτα δ’ ὅσσ’ εἶδει τε καὶ ἀργέτι δεύεται ἀγγῆ. If we take this to refer to air (though this has been doubted by some scholars), it seems to imply that this element, too, like fire apparently, is warm and bright.

⁴ C. H. Kahn, *Anaximander and the Origins of Greek Cosmology*, New York, 1960, 127, has suggested that ‘if the complete poem of Empedocles had survived, we might see that his theory was as fully articulated as that of Aristotle’ (in which each of the four simple bodies is constituted by two of the four primary opposites, hot, cold, dry, wet, e.g. fire by the hot and the dry), but this is a very doubtful conjecture. Kahn points out that ‘other fragments permit us to catch a glimpse of the causal roles ascribed to the hot and cold, the dense and rare, and to the qualities

of taste—bitter, sweet and others’, and he instances *frs.* 65, 67, 75, 90 and 104. But there is nothing in these fragments to suggest that these opposites are associated with specific ‘roots’. Empedocles’ theory of these associations survives in *fr.* 21 alone, and there the doctrine seems to be still in quite a rudimentary form.

⁵ On the date of this treatise, see K. Deichgräber, *Hippokrates, über Entstehung und Aufbau des menschlichen Körpers*, Leipzig, 1935, 27 n. 4, who concludes that it belongs to the end of the fifth century. It should be remembered, however, that the date of this, as of almost every other, Hippocratic treatise cannot be determined with any degree of precision.

⁶ This treatise is now generally agreed to be more probably a fourth- than a fifth-century work (see, e.g., J.-H. Kühn, *System- und Methodenprobleme im Corpus Hippocraticum*, *Hermes Einzelschriften* 11, 1956, 80 n. 1).

⁷ Anon. Lond. xx 25 ff. attributes a neat schema of elements and ‘powers’ to Philistion: there are four elements and each of these has its own ‘power’, fire hot, air cold, water wet and earth dry. The dates of *On Fleshes* and of Philistion are, of course, known only very imprecisely, but it seems possible that the theories of Empedocles, *On Fleshes*, Philistion and Aristotle represent a gradual and continuous progress towards a doctrine of elements and opposites that is at once simple and comprehensive.

⁸ We should also note theories of the type found in Diogenes of Apollonia in which there is a single primary element (in his case Ἀήρ) but hot and cold, dry and wet and so on are mentioned as its differentiations (see *fr.* 5: ἔστι γὰρ πολύτροπος (sc. ὁ αἶρ) καὶ θερμότερος καὶ ψυχρότερος καὶ ξηρότερος καὶ ὑγρότερος καὶ στασιμώτερος καὶ δευτέρην κίνησιν ἔχων).

In addition, there are, of course, innumerable pathological theories in the Hippocratic Corpus, in which diseases are attributed either to these opposites directly, or to their effect on other substances or parts of the body. To mention just two typical examples, in *On the Places in Man* the writer says that 'pain is caused both by the cold and by the hot, and both by what is in excess and by what is in default' (ch. 42, L vi 334 1 ff.), and the author of *On Affections* puts it that 'in men, all diseases are caused by bile and phlegm. Bile and phlegm give rise to diseases when they become too dry or too wet or too hot or too cold in the body' (ch. 1, L vi 208 7 ff.). The author of *On Ancient Medicine* (writing after Empedocles, as we know from ch. 20, *CMG* i.1 51 10) attacks the extreme version of such a theory in which the hot, the cold, the wet or the dry was postulated as the sole cause of diseases, and it would appear from a text in Aetius, at least (v 30.1, *DK* 24 B 4) that the use of these opposites in theories of disease goes back as far as Alcmaeon, who is reported to have held that health depends on the *ἰσονομία* of certain factors in the body, and that the *μοναρχία* of one of these causes diseases: as examples of the factors, or as he calls them the 'powers', in question, Aetius mentions wet, dry, cold, hot, bitter and sweet.

Hot and cold, dry and wet seem to have been used in pathological theories as early as Alcmaeon, but how far back can we trace their use in cosmological doctrines? With the exception of some fragments of Heraclitus (notably *fr.* 126), we rely on the testimony of Aristotle and Theophrastus, and sources which were in turn dependent on them, for our evidence concerning the role of these opposites in pre-Parmenidean writers. For many years these authorities were thought quite reliable enough by the majority of scholars. What might be described as the traditional view of the role of these opposites in the early stages of Greek philosophy is expressed by Cornford, for example (*Principium Sapientiae*, Cambridge, 1952, 34): 'in studying Anaximander's system we shall find the four cardinal opposites mentioned by Hippocrates [Cornford has just referred to the treatise *On Ancient Medicine*—hot and cold, moist and dry—playing a leading role in cosmogony. They can be identified with the four seasonal powers of summer and winter, rain and drought; and, in the order of space, they become the four elements of Empedocles, fire, air, water, earth.' Yet first Heidel⁹ and Cherniss¹⁰ and then more recently McDiarmid¹¹ have seriously impugned the accuracy of both Aristotle's and Theophrastus' accounts of Presocratic philosophy. Moreover it was just at this point, in his attribution of theories based on opposites to the Presocratics, that Aristotle's interpretation was particularly attacked on the grounds that in *Physics A*, for example, he is attempting to show that all earlier thinkers held the opposites as principles in order to establish that his own theory of Form and Privation is both final and inclusive. Commenting on the accounts of Anaximander given by Aristotle and Theophrastus, McDiarmid put it that 'their interpretation clearly presupposes that he had subscribed to the specifically Aristotelian notion of the equilibrium of the contraries and the genesis of the four simple bodies through the interaction of the contraries on undifferentiated matter' (*op. cit.*, 99), and Hölscher,¹² too, remarked, with reference to the report on Anaximander in pseudo-Plutarch *Stromateis* 2 (*DK* 12 A 10), that 'die gegensätzlichen Qualitäten Heiss und Kalt können als solche nicht anaximandrisch sein'. Nevertheless both Kahn¹³ and most recently Guthrie¹⁴ have upheld the general reliability of our evidence concerning the role of opposites in the systems of the Milesians.

⁹ W. A. Heidel, 'Qualitative Change in Presocratic Philosophy', *Archiv f. Gesch. d. Philos.*, xix (1906) 333 ff.

¹⁰ H. Cherniss, *Aristotle's Criticism of Presocratic Philosophy*, Baltimore, 1935.

¹¹ J. B. McDiarmid, 'Theophrastus on the Presocratic Causes', *Harvard Studies in Classical Philology* lxi (1953) 85 ff.

¹² U. Hölscher, 'Anaximander und die Anfänge der Philosophie', *Hermes*, lxxxi (1953) 266.

¹³ *Op. cit.*, especially ch. 2, 119 ff.

¹⁴ W. K. C. Guthrie, *A History of Greek Philosophy* i, Cambridge, 1962. See also Guthrie's article, 'Aristotle as a Historian of Philosophy', *JHS* lxxvii (part 1) (1957) 35 ff.

The general problem of the reliability of our sources for Presocratic philosophy cannot be entered into here. But since there is a quite fundamental disagreement, among those who have studied the matter, on whether the hot and the cold, and the dry and the wet themselves were used in cosmological theories as early as Anaximander, a brief re-examination of the evidence that is relevant to this particular question must be undertaken.

The problem hinges on our interpretation of the evidence concerning Anaximander, and first of all we should grant a general point to McDiarmid and others, that on certain occasions when Aristotle or the doxographers have attributed a theory based on contraries, or on the hot and the cold in particular, to one or other of the Presocratic philosophers, they have undoubtedly reformulated the theory in question. A clear example is *Ph.* 188a 20 ff. (cf. *Metaph.* 986b 34) where, indeed, Aristotle himself makes it plain that he has reformulated the doctrine of Parmenides. καὶ γὰρ Παρμενίδης θερμὸν καὶ ψυχρὸν ἀρχὰς ποιεῖ, he says, and then goes on ταῦτα δὲ προσαγορεύει πῦρ καὶ γῆν.¹⁵ The report in Hippolytus (*Ref.* i 7 3, *DK* 13 A 7) on Anaximenes' cosmology contains what seems to be a similar rationalisation of an original theory in terms of the hot and the cold, for having described the changes which air undergoes as it rarefies and condenses (becoming fire on the one hand, and wind, clouds, water, earth and stones on the other), Hippolytus concludes with the inference: ὥστε τὰ κυριώτατα τῆς γενέσεως ἐναντία εἶναι, θερμὸν τε καὶ ψυχρὸν.¹⁶ As regards Anaximander himself, the main sources of evidence on which we must base our interpretation of the role of opposites in his system are (1) the reports in Aristotle and Simplicius, (2) the account of his cosmology in pseudo-Plutarch and (3) the extant fragment. We may consider these in turn to see how far they enable us to determine the nature of his cosmological theories and the terms in which they were expressed.

Anaximander is rarely mentioned by name in Aristotle,¹⁷ and of the passages in question only one (*Ph.* 187a 20 ff.) is relevant to the problem of his use of opposites. At *Ph.* 187a 12 ff. Aristotle divides the theories of the φυσικοί into two groups. One group of philosophers postulated a single element and derived other things from this by condensation and rarefaction, and the other group is described as follows: οἱ δ' ἐκ τοῦ ἐνὸς ἐνούσας τὰς ἐναντιότητας ἐκκρίνεσθαι, ὥσπερ Ἀναξίμανδρός φησι, καὶ ὅσοι δ' ἐν καὶ πολλὰ φασιν εἶναι, ὥσπερ Ἐμπεδοκλῆς καὶ Ἀναξαγόρας· ἐκ τοῦ μίγματος γὰρ καὶ οὗτοι ἐκκρίνουσι τὰλλα. Now with regard to Empedocles and Anaxagoras, the accuracy of this statement can be checked by referring to the extant fragments of the philosophers themselves. Anaxagoras, at least, undoubtedly refers to a 'separating off' of certain pairs of opposites (the term used in the extant fragments being ἀποκρίνεσθαι), though, as Aristotle himself points out at *Ph.* 187a

¹⁵ It may be noted that in this instance later writers refer to Parmenides' principles more often as fire and earth than as hot and cold, e.g. Theophr. *Phys. Op. fr.* 6 (Alex. in *Metaph.* 984b 3, p. 31, 7 Hayd., *DK* A 7), Hip. *Ref.* i 11.1, *DK* A 23, Diog. L. ix 21, *DK* A 1, but contrast τὸ θερμὸν καὶ τὸ ψυχρὸν in Diog. L. ix 22, and at Aet. ii 20.8a, *DK* A 43, what is 'rarer' is described as hot, and what is 'denser' as cold. Aristotle's reference to Parmenides' second principle (Νύξ) as 'earth' has been taken as a typical misinterpretation (McDiarmid, *op. cit.*, 120 f.), but it seems probable enough, to judge from the description of night as 'dense' and 'heavy' (*fr.* 8 59), that this principle was associated with earth, if not actually identified with it.

¹⁶ Contrast the testimony of Plutarch (*de prim. frig.* 7 947F, *DK* 13 B 1) which suggests that Anaximenes reduced differences of temperature to differences of density (and this accords with the

frequent mention of 'the rare' and 'the dense' in other reports on Anaximenes, e.g. Theophr. *Phys. Op. fr.* 2, Simpl. in *Ph.* 24.26 ff., *DK* A 5). Kahn, however, apparently takes the evidence of Plutarch in precisely the contrary sense, as if Anaximenes reduced differences of density to differences of temperature, for he comments (*op. cit.*, 160) 'Anaximenes seems in fact to have made use of these two (viz., Hot and Cold) in their classic function, as powers of rarefaction and condensation (B 1, A 7.3).'

¹⁷ Four times in all (*Ph.* 187a 20 ff., 203b 14, *Cael.* 295b 12, *Metaph.* 1069b 22), excluding the valueless reference in the spurious *de Melisso* (975b 22). On the passages which refer to unnamed philosophers who postulated an element intermediate between fire and air, or between air and water, see the full discussion in G. S. Kirk, 'Some problems in Anaximander', *CQ* N.S. v (1955) 24 ff.

25 f., it is not only the opposites, but also what Aristotle calls τὰ ὁμοιομερῆ that are present in the original mixture and separate off from it. In Empedocles, on the other hand, the principal substances that are described as coming together and separating off are the 'roots' (between which there are, it is true, certain oppositions¹⁸), rather than such opposites as hot and cold, or wet and dry themselves. It would seem, then, that when Aristotle groups these three philosophers together and suggests that they all 'separate out the opposites that are present in the one', this is only true as a broad generalisation, and indeed there is a further reason not to press the term ἐναντιότητες too far here, in that throughout this chapter Aristotle is arguing towards the general conclusion that *all* previous philosophers 'make the opposites in some way the principles of all things' (*Ph.* 188a 26 f., *cf.* also a 19 and b 27 ff.). It is true, of course, that the theory of the separating-out of opposites is *particularly* associated with Anaximander at *Ph.* 187a 20 ff., but if this passage is good evidence that he referred to opposed substances of some sort in his cosmological theory, it leaves the problem of the precise nature of those substances still unresolved.

The interpretation that the substances that separate off from the Boundless were the hot and the cold, the dry and the wet themselves rests, rather, on the testimony of Simplicius. First there is a passage which contains not so much a direct report on Anaximander's theory, as a generalising comment on it. We are told that Anaximander οὐκ ἁλλοιουμένου τοῦ στοιχείου τὴν γένεσιν ποιεῖ, ἀλλ' ἀποκρινομένων τῶν ἐναντίων διὰ τῆς αἰδίου κινήσεως (*in Ph.* 24.23 ff., *DK* 12 A 9).¹⁹ The use of the term ἁλλοιοῦσθαι shows that this comment is made in part, at least, in the light of Aristotle's analysis of different types of change, and once again it would be rash to try to press the term ἐναντία too far. Elsewhere, however, Simplicius specifies the opposites in question as θερμόν, ψυχρόν, ξηρόν, ὑγρόν, καὶ τὰ ἄλλα (*in Ph.* 150.24 f., *DK* ib.). Yet this passage occurs in a commentary on the text of Aristotle which we have already discussed (*Ph.* 187a 20 ff.), and it is quite clear, as indeed Kahn grants, that Simplicius is, here, 'more concerned to explain Aristotle's text than to describe Anaximander's doctrine in detail'. Kahn goes on to suggest, however (*op. cit.*, 41), that while the second pair of opposites, dry and wet, may or may not have been supplied by Simplicius, the first pair, hot and cold, was certainly given by Theophrastus. He cites two pieces of evidence for this, which we must now consider, namely a text of Aetius and the account of Anaximander's cosmology in the *Stromateis*, and these do indeed suggest, quite strongly, that the hot and the cold were mentioned in Theophrastus' account of Anaximander. This still leaves the much more difficult question of whether Theophrastus mentioned the hot and the cold in an attempt to elucidate Anaximander's theory, or in a direct report on it, and while it is, no doubt, impossible to achieve certainty on this problem, some light is thrown on it by examining the context of the reference to these opposites in the two texts in question. Thus at ii 11.5 (*DK* 12 A 17a) Aetius reports: 'Αναξίμανδρος ἐκ θερμοῦ καὶ ψυχροῦ μίγματος (*sc.* εἶναι τὸν οὐρανόν). As the context in Aetius shows, the theory reported here is not a general cosmological doctrine, but one that concerns the substance of the heavenly sphere (οὐρανός means 'heavens' rather than 'universe' here). Now we do not lack other reports on Anaximander's theory of the nature of the heavenly *bodies*, the stars,

¹⁸ See above, n. 3, on *fr.* 21 3 ff. The main opposition referred to there is that between fire and water, and this is an obvious fact of experience. As Kahn points out, *op. cit.*, 160, the enmity between these two was proverbial, e.g. Theognis 1245 f., Aesch. *Ag.* 650 f. and *cf.* the fight between Hephaestus and the river Xanthus at *Il.* xxi 342 ff.

¹⁹ This text occurs in a passage in which Simplicius first quotes Anaximander's fragment and then goes on to *conjecture* the motives which may have led him

to postulate τὸ ἀπειρον (δῆλον δὲ ὅτι τὴν εἰς ἄλλα μεταβολὴν τῶν τεττάρων στοιχείων οὗτος θεασάμενος οὐκ ἤξιώσεν ἐν τι τούτων ὑποκείμενον ποιῆσαι, ἀλλὰ τι ἄλλο παρὰ ταῦτα · οὗτος δὲ οὐκ ἁλλοιουμένον κτλ), and while this conjecture is plausible enough (*cf.* also *Arist. Ph.* 204b 22 ff.), it is obvious that Anaximander cannot have argued in precisely the way in which Simplicius suggests since this argument depends on the anachronistic doctrine of the four elements.

sun and moon. Hip. *Ref.* i 6.4–5 (*DK A 11*), Aet. ii 13.7 (*DK A 18*), ii 20.1 (*DK A 12*) and ii 25.1 (*DK A 22*) all agree in the main features of the theory of the heavenly bodies which they attribute to Anaximander, which is that they are circles of fire which are enclosed in ἀήρ but which have certain openings at which the stars, sun and moon appear. When we have a set of reports that tell us that according to Anaximander the heavens contain a series of circles composed of *fire* and *opaque mist*, and when we also know that Aristotle and the doxographers do sometimes reformulate the theories of the Presocratics in terms of the neater opposites hot and cold (see above), there is clearly a distinct possibility that the report in Aet. ii 11.5 which refers to the heavens themselves as being composed of a mixture of hot and cold is just another such reformulation, especially since Aristotle's interpretation of Parmenides' principles *fire* and *earth/night* as hot and cold sets such a close precedent.

The second passage in which the hot and the cold are mentioned is in the fullest account of Anaximander's cosmology which we possess, pseudo-Plutarch *Stromateis* 2: φησὶ δὲ τὸ²⁰ ἐκ τοῦ αἰδίου γόνιμον θερμοῦ τε καὶ ψυχροῦ κατὰ τὴν γένεσιν τοῦδε τοῦ κόσμου ἀποκριθῆναι καὶ τινα ἐκ τούτου φλογὸς σφαῖραν περιφύῃναι τῷ περὶ τὴν γῆν ἀέρι ὡς τῷ δένδρῳ φλοιὸν ἥστινος ἀπορραγείσης καὶ εἰς τινας ἀποκλεισθείσης κύκλους ὑποστῆναι τὸν ἥλιον καὶ τὴν σελήνην καὶ τοὺς ἀστέρας. The comparison between this passage and Simplicius in *Ph.* 24.23 ff. is instructive. Where Simplicius refers quite generally to a 'separating off of opposites', the author of the *Stromateis* specifies that what separates off from the Boundless (or the Eternal) is, as he puts it, γόνιμον θερμοῦ τε καὶ ψυχροῦ, i.e. that which is 'capable of generating hot and cold'.²¹ But Kirk and Raven²² rightly point out that 'the nature of the hot (substance) and cold (substance) thus cryptically produced appears from what follows: they are flame and air-mist (the inner part of which is assumed to have condensed into earth)'. And thereafter the account describes how the flame is broken up into circles (surrounded by mist, though this is not stated here) to form the heavenly bodies. Here too, then, there seems to be a distinct possibility that the reference to 'hot and cold' is in the nature of a comment on Anaximander's theory, rather than a verbally accurate report.

To recapitulate the evidence for Anaximander considered so far: on the one hand, Aristotle and Simplicius refer quite generally to a separating off of opposites in Anaximander's cosmology, and Simplicius certainly reports in one passage that the substances in question are 'hot, cold, dry, wet and the rest'. Again, the hot and the cold at least are referred to in one text of Aetius (ii 11.5) and again in the phrase γόνιμον θερμοῦ τε καὶ ψυχροῦ in the *Stromateis*. On the other hand, Aristotle and the doxographers do sometimes reformulate Presocratic theories in terms of the opposites (such as hot and cold); against Aet. ii 11.5 it may be argued that elsewhere Anaximander's theory of the heavenly bodies is much more often described in terms of *fire* and *mist*, and the reference to hot and cold in the phrase quoted in the *Stromateis* seems simply to anticipate the fuller and more precise description that follows: in effect what is produced from the original 'germ' is a *flame* which grows round the *mist* that encircles the earth. On this evidence, the view adopted by Hölscher, that what was produced from the Boundless was not 'the hot' and 'the cold' as such, but rather such substances as (e.g.) flame and mist,²³ seems, to my mind, to have the balance of probabilities in its favour; and it seems to derive some support from the fact that in the earliest physical and cosmological theories which have survived in original fragments (those of Xenophanes, Heraclitus, and Parmenides in the Way of Seeming) the primary

²⁰ Diels (*Doxographi*, 579 note *ad loc.*) suggested *τι* as a possible alternative, and this is preferred by Kahn. *DK* and Kirk and Raven retain *τό*, however.

²¹ Hölscher, Kahn and Guthrie understand the term γόνιμον (rightly, I believe) on the analogy of the similar expression γόνιμος καὶ ζώων καὶ φυτῶν

which is used of the heat of the sun in Theophrastus *de Igne* 44.

²² *The Presocratic Philosophers*, Cambridge, 1957, 133.

²³ Hölscher (*op. cit.*, 266) refers tentatively to 'Feuer und Luft', but stresses that the question must remain open.

elements of which other things are composed are such substances as water and earth,²⁴ fire, light and night, and not the hot, the cold, the dry and the wet themselves.²⁵

Yet if the likelihood is that Anaximander's cosmological theory was stated in terms of such substances as e.g. fire and mist, there is surely no reason to doubt that an important and original feature of that theory was that the relationship between the substances in question was conceived as some sort of *opposition*. This seems clear from the one major piece of evidence that we have yet to consider, the fragment itself, where he says διδόναι γὰρ αὐτὰ δίκην καὶ τίσιν ἀλλήλοις τῆς ἀδικίας κατὰ τὴν τοῦ χρόνου τάξιν. If we assume, as we surely must, that αὐτά here refers to cosmological factors of some sort, the sentence tells us nothing about the nature of those factors, but what it does illuminate is Anaximander's conception of the relationships between them, which are described in terms of alternating aggression and reconciliation. As Kirk and Raven, among others, have noted (*op. cit.*, 118) 'the things which commit injustice on each other must be equals, different and correlative', and they continue 'these are most likely to be the opposed substances which make up the differentiated world'. Now the parallels between the known features of Anaximander's cosmology and the system which Parmenides describes in the Way of Seeming are quite striking. Whether or not we hold (with Gigon²⁶) that the substances that separate off from the Boundless are Light and Darkness themselves, there seems to be a close similarity between the *fire* or *flame* and *opaque mist* which appear in the reports of Anaximander's theory of the heavenly bodies and in the early stages of the cosmology attributed to him in the *Stromateis*, and the two principles which Parmenides calls φλογὸς αἰθέριον πῦρ (*fr.* 8 56) or φάος (*fr.* 9) or φλόξ (*fr.* 12) and νύξ ἀδαής or ἄφαντος (*fr.* 8 59, *fr.* 9 3),²⁷ and it has often been noticed that the obscure system of interwoven rings, composed of fire or light and darkness, which Aetius (ii 7.1, *DK* 28 A 37) attributes to Parmenides and which is referred to briefly in *fr.* 12, bears a marked resemblance to Anaximander's system of the heavenly bodies, with its series of rings compounded of fire and mist.²⁸ But it is the account of the relationships between major cosmological factors which especially concerns us here. Where we *infer* from Anaximander's fragment that certain cosmological factors (whether two or more than two in number) are opposed to one another, but of equal status, Parmenides' description of his principles in the Way of Seeming is *explicit*: they are *opposites* (τὰντία δ' ἐκρίναντο δέμας *fr.* 8 55, τὰντία v. 59) and 'both of them are *equal*' (ἴσων ἀμφοτέρων *fr.* 9 4). There is, of course, no need to suppose that Anaximander is the only, or even the most important, influence which can be detected in the Way of Seeming. Parmenides' own

²⁴ E.g. Xenophanes *frs.* 29 and 33, though neither of these fragments necessarily implies a general physical theory (see Guthrie, *HGP* i 383 ff.).

²⁵ These opposites are, however, mentioned in Heraclitus *fr.* 126. But this simply refers (like many other fragments in Heraclitus) to the *interconnection* between these opposites (we might compare the mention of day and night, winter and summer, war and peace, satiety and hunger in *fr.* 67, for example), and does not suggest that these opposites have any special role in Heraclitus' physical or cosmological theory. To judge from *frs.* 31 and 36 that theory was stated in terms of fire, earth and sea (water), and not in terms of the opposites as such themselves.

²⁶ *Der Ursprung der griechischen Philosophie*, Basel, 1945, 75.

²⁷ This is not to say, of course, that in choosing Light and Night as his principles in the Way of Seeming Parmenides may not have been influenced by other philosophers besides Anaximander. It has often been remarked that this pair figures in the

Pythagorean *συστοιχία* given by Aristotle at *Metaph.* 986a 22 ff., though we cannot be certain whether this represents a pre- or a post-Parmenidean theory. It may be added that the question of whether, or in what sense, the cosmology of the Way of Seeming represents Parmenides' own beliefs is irrelevant to the present issue in that whatever view we adopt on that problem, the cosmology in question may exhibit resemblances to Anaximander's system.

²⁸ There is a full discussion of Parmenides' highly obscure theory in Heath, *Aristarchus of Samos*, London, 1913, 66 ff., who notes that it 'seems to be directly adapted from Anaximander's theory of hoops or wheels'. Yet Parmenides' theory was clearly an adaptation, rather than simply a copy, of Anaximander's, for while each of Anaximander's wheels consisted of fire enclosed in mist, Parmenides apparently distinguished between three different kinds of rings, one sort made of 'the rare' (light) alone, a second made of 'the dense' (darkness) alone, and a third composed of both elements combined.

claim that it is the best cosmology of its kind (which is implied by the remark *ὡς οὐ μὴ ποτέ τις σε βροτῶν γνώμη παρελάσση* fr. 8 61) suggests that whatever influences he has undergone, or whatever the sources from which he has drawn, he has modified and developed his predecessors' theories in the Way of Seeming, not simply copied them, and indeed there appear to be certain specific points of difference between the theories reported from the Way of Seeming and those ascribed to Anaximander in particular (see above n. 28). But if we ask what form the opposition between cosmological factors took in Anaximander, the Way of Seeming suggests one *possible* answer. The things whose acts of aggression are referred to in Anaximander's fragment were certainly *ἐναντίοι* in the original sense of hostile to one another. But if the things in question were not the hot and the cold, the dry and the wet themselves, it seems probable enough that they were conceived as possessing certain specific opposite characteristics, just as in Parmenides' Way of Seeming Night is described as dense and heavy and Fire is, no doubt, conceived both as rare and light (though the text of fr. 8 57 is corrupt). In conclusion, we may agree with Hölscher and others that the reports in Aristotle and Simplicius that refer to a separating off of opposites have to some degree reformulated Anaximander's ideas, and yet the actual extent of that reformulation may not have been very great. Whatever the substances were that separate off from the Boundless in the early stages of cosmological development, the notion of some *opposition* between them certainly seems to have been part of Anaximander's theory.²⁹ If the evidence suggests that these substances were, e.g., fire and mist rather than the hot and the cold themselves, it nevertheless seems possible, and indeed quite probable, that Anaximander himself distinctly associated hot and cold and other pairs of opposites with the substances in question, just as Parmenides associated certain pairs of opposites (rare and dense, light and heavy) with Fire and Night in the Way of Seeming.

A note should be added on the originality and significance of Anaximander's theory of the interactions between opposed cosmological factors. It is well known that certain Presocratic cosmological doctrines are foreshadowed, though often only quite dimly foreshadowed, in Homer and Hesiod. The notion of 'elements', i.e. primary component parts, is, perhaps, implicit in the myth of the making of Pandora out of earth and water,³⁰ and Kahn³¹ has recently attempted to trace how Empedocles' doctrine of the four elements may have developed out of references to the four world-areas, sky, sea, earth and underworld (or night) in such passages as *Il.* xv 189 ff., *Hes. Th.* 106 f., 736 f., although this seems at best a remote possibility. It has been noted, too, that opposed factors of various sorts appear quite prominently in the *Theogony*. Emphasis is sometimes laid on the reference to Night (and Erebus) and Day (and Aither) at 123 ff. (a passage which implies the priority of Night); even more important, no doubt, is the role ascribed to Earth and Heaven (132 ff., 147 ff.) as the parents of various creatures, and the use of sexual imagery, the pairing of *male* and *female* personifications, recurs, of course, throughout the *Theogony*. Yet what the *Theogony* contains is merely an account of the *origins* of the various entities mentioned: it is not concerned with the *present* interactions, changes or relationships between them. Anaximander, on the other hand, attempted, it seems, not only to describe the formation

²⁹ A similar doctrine of the interaction between opposed substances of various sorts can be traced not only in the fragment and in the theory of the formation of the world reported by pseudo-Plutarch where (hot) flame and (cold) mist separate off from the Boundless, but also in several of the biological and geophysical theories attributed to Anaximander. Thus according to *Hip. Ref.* i 6, 6 (*DK* A 11) he held that living creatures arose from the *wet* acted upon by the *sun* (cf. *Act.* v 19.4, *DK* A 30), and according to the theory described in *Arist. Mete.*

353b 6 ff. and attributed to Anaximander by Alexander and Aetius (*DK* A 27) he may have represented the sea as what is left of the original *moisture* in the region round the earth, after this had been dried by the *sun*.

³⁰ *Hes. Op.* 60 ff. *Il.* vii 99 is also usually mentioned in this context, though its interpretation is, to my mind, quite doubtful.

³¹ *Op. cit.*, 134 ff. cf. also M. C. Stokes, 'Hesiodic and Milesian Cosmogonies', pt. 1, *Phronesis* vii (1962) 1 ff.

of the universe from the Boundless, but also to give an account of the *continuing interactions* between things in the world as we know it. Unlike Earth and Heaven in the *Theogony*, which unite simply to produce a series of offspring, but whose subsequent relationship is left undefined, the unnamed subjects of Anaximander's fragment are involved in a continuous self-regulating interaction, an alternating cycle of *δίκη* and *ἀδικία*. This is a new and undoubtedly most important conception, the introduction of which may be said to mark the beginning of cosmology as such, as opposed to cosmogony or theogony.³² Moreover, we should note that it is in connection with theories of a type broadly similar to Anaximander's that the hot and the cold, the dry and the wet are most often used in later philosophical and medical writers. The first philosophical text in which these four opposites appear (Heraclitus *fr.* 126) describes their *interactions*: τὰ ψυχρὰ θέρεται, θερμὸν ψύχεται, ὑγρὸν ἀναίνεται, καρφαλέον νοτίζεται. Anaxagoras, too, stresses the *interdependence* of hot and cold in *fr.* 8, and there are, of course, many medical theorists who connected health, or the natural state of the body, with the balanced interaction of these and other opposites, and disease with their temporary imbalance. We find, then, that while the first extant physical theory based on the hot and the cold, the dry and the wet as the four primary elements of other things appears in *On the Nature of Man*, the doctrine of the balanced interaction of opposed substances occurs in various forms in earlier theorists and goes right back to Anaximander himself. Furthermore, while we cannot be certain of the exact terms in which his cosmological theory was expressed, it is likely enough that he referred to some interaction between hot and cold substances, at least, if not between the hot and the cold as independent entities.

II

The hot and the cold, the dry and the wet appear particularly often, though not exclusively, in theories of a general type which can be traced back as far as Anaximander, in which the relationship between opposed factors is conceived as one of a continuous, balanced interaction. Unlike right and left, male and female, or light and darkness, these four opposites do not figure in the Pythagorean *συστοιχία*,³³ and it may seem unlikely that any of the theories in which they appear should be affected by preconceived notions of value such as influence many of the doctrines which were based on right and left. Yet these two pairs are undoubtedly correlated often enough with other opposites, and moreover some of the correlations which were proposed quite clearly correspond not to any empirically verifiable data, so much as to assumptions concerning the values of these opposite terms. Several of the theories which were based on these opposites can, in fact, only be explained on the hypothesis that they too sometimes possessed certain positive and negative values, though these may be neither so pronounced, nor so stable, as those of the pair right and left. First, however, we should consider to what extent these opposites, hot, cold, dry and wet, had any marked symbolic associations for the ancient Greeks as a whole, in so far as we can judge from the pre-philosophical texts.

Like ourselves, the ancient Greeks connected warmth not only with life itself, but also

³² See G. Vlastos' article, 'Isonomia', *AJP* lxxiv (1953) 337 ff.

³³ Hot and cold, dry and wet are, however, described as being *ισόμοιρα* in the world in the cosmology reported to have been found by Alexander Polyhistor in certain 'Pythagorean notebooks' (Diog. L. viii 24 ff., *DK* 58 B 1a) though the value of this evidence is disputed (see most recently Guthrie, *HGP* i 201 n. 3). As Kahn notes (*op. cit.*, 190) the

doctrine of the equality of hot, cold, dry and wet resembles that which is found in, for example, *On the Nature of Man* ch. 7 (L vi 48 20 ff.). The conception of the special importance of the hot, and its connection with life, in chs. 27 f., may also be paralleled elsewhere, e.g. in the theory attributed to Philolaus in Anon. Lond. xviii 8 ff., and *On Fleshes* ch. 2, L viii 584 9 ff.

with such emotions as joy and relief.³⁴ Conversely, cold is associated, naturally enough, with death, and then also with such emotions as fear.³⁵ As regards the pair dry and wet, several usages suggest that the Greeks conceived the living as 'wet' and the dead as 'dry'. In the *Odyssey* (vi 201) we find the expression *διερός βροτός* used apparently as the equivalent of *ζωός βροτός* (e.g. xxiii 187) to mean 'living mortal' (cf. ix 43, where the same adjective evidently means 'active'), and there seems no good reason to suppose that *διερός* here is anything other than the common Greek word which literally means 'wet' (e.g. Hes. *Op.* 460).³⁶ Conversely, dead or dying things are 'dry'. This is obviously true of dead wood (e.g. *ἀζόμενος* used of a poplar drying after it has been felled, *Il.* iv 487), but 'dead' parts of the body, such as the nails, are also described as 'dry' (e.g. Hes. *Op.* 743). The dead themselves were called *ἀλίβαντες* (e.g. Plato *Rep.* 387c) which was taken to mean 'without moisture',³⁷ and the old, too, were apparently thought of as 'dry' for when Athena is about to transform Odysseus into an old man at *Od.* xiii 392 ff. she says she will 'dry up' his fine skin (*κάρφω μὲν χροά καλόν* 398, cf. 430).³⁸ These usages are, for the most part, clearly derived from such obvious facts of experience as the dryness of dead wood, the warmth of living animals and the cold of the dead. From this largely biological point of view, hot and wet are together opposed to cold and dry. Yet from another point of view a different correlation naturally suggests itself. The Greek summer is unmistakably hot and dry, the Greek winter unmistakably cold and wet. The contrast between the season of cold and rains and the season when 'Sirius dries the head and the knees and the skin is parched by the burning heat' is vividly described by Hesiod (*Op.* 504 ff., 582 ff.).³⁹ If the antithesis between Heaven and Earth is particularly important in early Greek religious beliefs, the hot and the dry are naturally associated with the sun and so with Heaven. Unlike right and left, neither hot and cold, nor dry and wet, it seems, possessed any strong positive or negative values *in themselves*, though they acquire such values *by association* in different contexts. But while hot and cold have uniformly positive, and negative associations respectively, the dry and the wet, on the other hand, appear to have ambivalent associations. On the one hand, hot and wet are both connected with what is alive, and cold and dry with the dead, and here wet acquires certain positive, dry certain negative, overtones; but on the other hand, observation of the seasons naturally suggested a different correlation, in which the *dry* and the hot are the positive terms set over against the negative cold and *wet*.

In the philosophers, these opposites are correlated sometimes from a 'cosmological', sometimes from a 'biological', point of view. Anaxagoras, for instance (*fr.* 15), separates on the one side cold and wet and dense and dark (associating these, in all probability, with earth) and on the other side hot and dry and rare (connected with aether), and Parmenides,

³⁴ Thus the basic meaning of *λαίνω* seems to be to warm (e.g. *Od.* x 359, cf. melt, *Od.* xii 175), but when applied to the *θυμός*, for example, it comes to mean 'comfort', e.g. *Od.* xv 379, *Il.* xxiv 119, cf. *λαίνομαι*, *Od.* xix 537.

³⁵ Among the objects to which the epithets *κρυερός* and *κρύεις* are applied in Homer or Hesiod are Hades (*Op.* 153), fear (*Il.* ix 2), war (*Th.* 936) and *γός* (*Il.* xxiv 524).

³⁶ Cf. Onians, *Origins of European Thought*, Cambridge, 1951, 254 ff. Onians (ch. 6, 200 ff.) also discusses the expression *κατέλβετο δὲ γλυκὺς αἰὼν* (e.g., *Od.* v 152) and collects certain evidence which suggests that sexual love and desire may have been associated with moisture by the ancient Greeks (e.g., Hes. *Th.* 910, Alcman 59 Page, Anacreon 114 Page, *h. Hom.* xix 33 f.).

³⁷ Cf., Aesch. *fr.* 229 which speaks of the dead in whom there is no moisture (*ικμάς*). In the Orphic fragment 32 (a) and (b) (in *DK* as 1 B 17 and 17a) the dead man who speaks describes himself as *αὔρος*, and the belief that the dead are thirsty evidently underlies the widespread Greek practice of offering them libations.

³⁸ Cf. e.g. Soph. *El.* 819 where Electra, foreseeing her old age, says *ἀνανῶ βίον*.

³⁹ It is to be noted, however, that there is no sign in Hesiod, or anywhere else in pre-philosophical literature, of any schematic correlation between the four seasons and the four opposites, such as we later find in, for example, *On the Nature of Man*, ch. 7 (L vi 46 9 ff.) where winter is wet and cold, spring wet and hot, summer dry and hot and autumn dry and cold.

too, very probably associated hot, as well as rare, with fire and light, and cold, as well as dense and heavy, with night or darkness, as the scholion reported by Simplicius (*in Ph.* 31.3 ff.) explicitly suggests. On the other hand, there is plenty of evidence that the belief in the connection between life and the hot and the wet continued in Greek philosophy and medicine.⁴⁰

Each of the two types of correlations which we have noted so far draws on a different set of observations, on the one hand such meteorological phenomena as the alternation of summer and winter and day and night, and on the other such biological phenomena as the warmth of living creatures and the coldness, and in some cases the dryness, of what is dead. But when we turn to some of the more detailed doctrines which were based on these opposites, we find theories which apparently have no basis in empirical evidence at all. Thus it was widely assumed that the difference between the two sexes was in some way to be connected with a difference between hot and cold (and sometimes, too, between dry and wet), though there was no general agreement as to which opposites corresponded with which sex. The view that women are hotter than men is mentioned by Aristotle at *PA* 648a 28 ff., where he ascribes it to Parmenides among others. Furthermore the *grounds* on which this theory was adopted are clear from Aristotle's text and from the Hippocratic treatise *On the Diseases of Women* (Book i, ch. i, L viii 12 17 ff.), namely that menstruation is due to an abundance of (hot) blood and is, therefore, a sign of the greater heat of women. But if this was one opinion that was put forward, the contrary view, that men are hotter than women, was maintained, for example, by Empedocles (Arist. *ib.*, cf. *fr.* 65 and 67). If we ask why *this* position was adopted, the answer lies not so much in any empirical data that could be adduced, as in the belief that male and hot are inherently superior to their respective opposites female and cold. True, both the authors of *On Regimen* and Aristotle feel it necessary to defend this view with arguments, though on examination their arguments can be seen to consist largely of special pleading. (1) At *On Regimen* i ch. 34 (L vi 512 13 ff.) the writer suggests that males are hotter and drier (a) because of their regimen, and (b) because females purge the hot from their bodies every month. But (a) depends on the writer's schematic, *a priori* analysis of the effects of food and exercise, and (b) is clearly a case of special pleading, since if the effect of menstruation is taken to be that females become colder, then by the same reasoning they should also become *drier* on the loss of blood. Yet in the writer's view *males* are hotter and *drier* (conforming to the element Fire) and females are colder and wetter (conforming to the element Water). These opposites are, in fact, arranged according to the writer's notions of fitness (hot, dry, male and fire each being the positive terms), rather than according to his observation of the differences between the two sexes. (2) Aristotle shares a similar doctrine, but the arguments he uses to defend it are no more convincing. At *GA* 765b 8 ff. he distinguishes males and females by their ability, or inability, to concoct the blood, assuming that that which becomes the menses in females, becomes semen in males. He notes once again (as at *PA* 648a 28 ff.) that other theorists took menstruation as a sign of the greater heat of the female sex, but he suggests that this view does not take into account the possibility that blood may be more or less pure, more or less concocted, and he argues, or rather asserts, that semen, though smaller in quantity, is purer and more concocted than the menses.⁴¹ While it is interesting that

⁴⁰ The idea that living creatures originated in the wet when acted upon by the sun is attributed to Anaximander at *Hip. Ref.* i 6.6 (*DK* 12 A 11) and a similar theory occurs in the cosmology reported in Diodorus (i 7.3 ff., *DK* 68 B 5.1) (cf. also the view mentioned by Aristotle when he discusses the possible reasons which may have led Thales to make water the principle, namely that 'the hot itself comes to be from this and lives by this', *Metaph.* 983b 23 f.).

On Regimen i chs. 32 f. (L vi 506 14 ff.) develops the theory that generation takes place from an interaction between the hot and the wet (or Fire and Water) and the connection between humidity and vital heat is also pointed out in *On Fleashes* ch. 9 (L viii 596 9 ff.).

⁴¹ There is an obscure comparison with the production of fruit at *GA* 765b 28 ff. ('the nutriment in its first stage is abundant, but the useful product

Aristotle refers here to qualitative, rather than to purely quantitative, differences, in order to determine what is 'hot', his view that males are hotter than females depends first on the notion that semen and menses are the end-products of strictly comparable processes, and second, and more important, on the quite arbitrary assumption that semen is the *natural* product of the process of concoction, and the menses are an *impure* residue. Aristotle believes that the female is, as it were, a deformed male, and it is this conviction, rather than any empirical considerations, that underlies his doctrine that males are hotter than females.⁴²

One clear instance where certain theorists correlated hot and cold, dry and wet and other opposites according to preconceived ideas of fitness or value has now been considered, and other less interesting examples could be given from fifth- and fourth-century writers.⁴³ But the most striking evidence of the tendency to treat these pairs as consisting of a positive and a negative pole comes from Aristotle, whose theories should now be considered in more detail. First we should note how he defines these four terms at *GC* 329b 26 ff. 'Hot' is 'that which combines things of the same kind' (τὸ συγκρίνον τὰ ὁμογενῆ); 'cold' 'that which brings together and combines homogeneous and heterogeneous things alike' (τὸ συνάγον καὶ συγκρίνον ὁμοίως τὰ τε συγγενῆ καὶ τὰ μὴ ὁμόφυλα); 'wet' is 'that which, being readily delimited (i.e. by something else), is not determined by its own boundary' (τὸ ἀόριστον οἰκείῳ ὄρω, εὐόριστον δὲν) and 'dry' 'that which, not being readily delimited (i.e. by something else), is determined by its own boundary' (τὸ εὐόριστον μὲν οἰκείῳ ὄρω, δυσόριστον δέ). These definitions are highly abstract and convey no hint that these opposites had any positive or negative associations for Aristotle. It is all the more surprising, then, that in other contexts these pairs are clearly conceived as divided into a positive, and a negative, pole. This is particularly obvious in the case of hot and cold. As we have just seen, Aristotle's belief that the male sex is hotter than the female has no empirical basis, but merely reflects his preconceived notion of the superiority of *male* and *hot*. The doctrine that the right hand side of the body is hotter than the left is another theory that derives from assumptions concerning the values of these terms and has no basis in fact (see *JHS* lxxxii (1962) 62 ff.). Then again in *PA* B 2 647b 29 ff. he suggests certain correlations between the temperature and the purity of the blood, and the strength and intelligence of different species of animals or even of different parts of the same animal. Thus thick and hot blood is conducive to strength, and thinner and colder blood to sensation and intelligence,⁴⁴ but 'best of all are those animals whose blood is hot and thin and clear: for such are favourably constituted both for courage and for intelligence'.⁴⁵ Elsewhere the association between heat and perfection is again apparent when he suggests at *PA* 653a 27 ff. that the region round the heart and the lung is hotter and richer in blood in man than in any

derived from it is small'). The idea seems to be that as a plant turns its food first into leaves, then into fruit, so animals turn theirs first into blood, and then (in males) into semen (see Platt's note in the Oxford Trans. *ad loc.*).

⁴² E.g. *GA* 737a 27 ff. τὸ γὰρ θῆλυ ὥσπερ ἄρρεν ἐστὶ πεπρωμένον, καὶ τὰ καταμήνια σπέρμα, οὐ καθαρὸν δέ. Cf. further E. Lesky, *Die Zeugungs- und Vererbungslehren der Antike und ihr Nachwirken*, Wiesbaden, 1951, 151f.

⁴³ Thus there is an elaborate schema in which the four ages of man are correlated with pairs of opposites in *On Regimen* i ch. 33 (L vi 510 24 ff.), the first age being hot and wet, the second hot and dry, the third cold and dry, and old men cold and wet. But this schema seems dictated in part, at least, by the author's desire to associate the second age, that of the young man, with the male sex and the superior

element Fire, and old age with the inferior element Water (cold and wet): his view that the old are cold and *wet* in particular runs counter to the generally accepted Greek notions (see above, p. 101) though it also appears in *On Regimen in Health* ch. 2 (L vi 74 19 ff.).

⁴⁴ One of the facts which he has in mind when making this latter suggestion is that some bloodless animals (e.g. bees) are more intelligent than many sanguineous animals which are hotter than them (*PA* 648a 5 ff.).

⁴⁵ He goes on to suggest that the upper parts of the body are distinguished in this respect (i.e. in the heat and purity of their blood) from the lower, as also are males from females, and the right side of the body from the left (*PA* 648a 11 ff.).

other animal (and in males more so than in females), for this too is a doctrine for which he can have had no direct evidence.

In Aristotle's theory hot is clearly the positive term, cold the privation: indeed this is explicitly stated on several occasions (e.g. *Cael.* 286a 25 f., *GC* 318b 16 f.). His attitude towards the pair dry and wet is, however, less clear. At *PA* 670b 18 ff. where he correlates hot and right on the one hand, and cold and left on the other, the inferior left side of the body is said to be both cold and *wet*. Again at *GA* 766b 31 ff. he says that parents who have a 'wetter or more feminine' constitution tend to produce female children, and this suggests that wet is also associated with the inferior female sex.⁴⁶ On the other hand at *GA* B 1 (732b 15 ff.) he defines the main genera of animals according to their methods of reproduction (which correspond to differences in their constitutions) and here the most perfect animals, the Vivipara, are said to be 'hotter and wetter and less earthy by nature' (732b 31 f.). The second group, the 'ovoviviparous' animals (e.g. cartilaginous fishes) are cold and wet, the third and the fourth (the Ovipara which lay perfect, and those which lay imperfect, eggs) are hot and dry, and cold and dry respectively, and the fifth and final group (insects) are 'coldest of all' (733b 10 ff.). Greater perfection clearly corresponds, in this schema, to a combination of greater heat and greater 'humidity'. Again at *Long.* 466a 18 ff. he says that 'we must assume that the living animal is by nature wet and hot, and life too is such, while old age is cold and dry, as also is that which is dead: for this is plain to observation'. Yet he goes on to note that both the quantity and the *quality* of the humidity of animals affect their length of life: 'for not only must there be a lot of the wet, but it must also be hot' (a 29 ff.). The pair dry and wet occupies, then, a somewhat ambivalent position in Aristotle's philosophy, as indeed it had also done, to some extent, in earlier Greek speculative thought. On the one hand he notices a connexion between humidity and life, and between dryness and death (and here he develops a notion which can be traced back to Homer and Hesiod). Yet this does not prevent him from suggesting, in other contexts, that the wet is the inferior, privative term, when he correlates it with female, left and cold.

The evidence we have considered shows that the tendency to divide opposites into a positive and a negative pole is by no means confined, in early Greek speculative thought, to the use of such pairs as right and left, or light and darkness, but is found also in some of the theories based on the much more common pairs hot and cold, dry and wet. This is all the more striking since the symbolic associations which these two pairs possessed for the ancient Greeks were not particularly marked (compared with those of right and left and certain other opposites) and indeed in the case of dry and wet these associations were rather ambivalent. Hot and cold, dry and wet do not figure in the Pythagorean *συστοιχία* as reported by Aristotle: moreover when they are introduced into cosmology and medicine, they are used most often in theories in which their *balance* and *continuous interaction* are stressed, which certainly do not imply, though they do not exclude, the idea that these pairs are each divided into a positive and a negative pole. Yet on several occasions we find theorists proposing correlations between these and other opposites which have no basis in empirical evidence at all, but merely reflect certain preconceived notions of the values of the contrasted terms. Several theorists maintained, for example, that the male sex is hotter than the female, and Empedocles, for one, took the difference in temperature to be the origin or source of the difference between the two sexes (*fr.* 65, 67). If this may have been the traditional view, or rather the view that accords with the generally accepted notions concerning the values of these opposites, other theorists rejected it and reversed the correlation. In discussing the use of right and left, I noted that some of the *a priori*

⁴⁶ The view that men are dry and hot, and women wet and cold is also often expressed in the pseudo-Aristotelian *Problemata* (e.g. 879a 33 ff.).

theories which were proposed, were rejected by later writers on empirical grounds: thus Aristotle refuted the belief that males are formed on the right side of the womb by referring to the evidence of anatomical dissections (*GA* 765a 16). So too it would seem that some theorists (of whom Parmenides may well have been the first) argued from the fact of menstruation that females, and not males, are the hotter sex. Among later philosophers, the tendency to divide hot and cold, and dry and wet, each into a positive and a negative pole is particularly marked in Aristotle, even though the abstract definitions which he gives of these four terms at *GC* 329b 26 ff. give no hint of this. Although he never presents his theory in the form of a complete *συστοιχία*, his Table of Opposites, if we reconstructed it from remarks scattered through the physical works, would be almost as extensive as that which he attributed to the Pythagoreans. Right and male and up and front and hot and dry would certainly appear on one side, set over against left, female, down, back, cold and wet on the other, and such other pairs as light and heavy, rare and dense, might also be included in the list, correlated with hot and cold or dry and wet—the Table as a whole reflecting both empirical and *a priori* considerations.⁴⁷ Even where the facts appeared to conflict with his correlations, he did not abandon his belief that these pairs of opposites may be arranged in a single systematic schema. This is apparent from his firm correlation of wet with left, female and cold, even though he recognised the connection between humidity and warmth and life, and between dryness and cold and death. Indeed, on the subject of hot and cold, he explicitly remarked on the extent of the disagreement that existed between different theorists as to which things are hot and which cold. As he puts it at *PA* 648a 33 ff. (*cf.* also a 24 f.) ‘if there is so much dispute about the hot and the cold, what are we to think about the rest? For the hot and the cold are the most distinct of the things which affect our senses’. One instance of such a dispute, concerning the temperature of the two sexes, has already been discussed, and Aristotle mentions several others.⁴⁸ Yet we saw that while there was no agreement as to which sex was hot, which cold, *both* parties in this dispute seem to have assumed that *some* correlation may be established between male and female on the one hand, and hot and cold on the other. Some at least of those who rejected the view that males are hotter than females, were not content simply to reject that view, but proposed the contrary, but equally erroneous, theory that the female sex is uniformly and essentially hotter.⁴⁹ It is, then, one of the notable features of the use of hot and cold and dry and wet in early Greek speculative thought, that while there was little agreement about their particular application to different problems, the assumption that *some* correlation

⁴⁷ At *Cael.* 286a 26 ff. ‘heavy’ is said to be the privation of ‘light’, and at *Ph.* 217b 17 ff. and *Cael.* 288b 7 ff. ‘heavy’ and ‘dense’ are associated together, and so too ‘light’ and ‘rare’ (for this reason, perhaps, as well as because of the association between ‘thin’ and ‘clear’, the blood of males is said to be ‘thinner’ than that of females, *PA* 648a 11 ff.). Yet with such a pair as ‘soft’ and ‘hard’ we find different types of correlation proposed in different contexts: on the one hand ‘hard’ is associated with ‘dense’ (e.g. *Ph.* 217b 17), but on the other it is assimilated to ‘dry’ at *GC B* 2 330a 8 ff. in a chapter in which he reduces various types of opposites to ‘hot’ and ‘cold’ or ‘dry’ and ‘wet’ while at the same time pointing out some of the ambiguities of these terms. From other passages (e.g. *Ph.* 259a 6 ff.) it would appear that like the Pythagoreans, Aristotle thought ‘one’ superior to ‘many’ and ‘limited’ to ‘unlimited’.

⁴⁸ E.g. the dispute as to whether land-animals are hotter or colder than water-animals, and the dis-

agreement about which ‘humours’ are hot and which cold. *Cf.* also the opposite views about the nature of the *ψυχή* mentioned at *de An.* 405b 24 ff. We know little about the arguments used on each side in these controversies, but it seems unlikely that *a priori* considerations affected the discussion to any great extent. Thus Philolaus seems to have held that the phlegm is hot (as opposed to the generally accepted view that it is cold) simply on the grounds of a suggested etymology of the word *φλέγμα* from *φλέγειν* (see Anon. Lond. xviii 41 ff.).

⁴⁹ It is strange that the fact of menstruation was taken by both sides in this dispute to be significant of a difference in the temperature of the two sexes (though they disagreed about how this evidence was to be interpreted). Yet while the temperature of the female certainly rises and falls according to the menstrual cycle, the fact of menstruation provides no evidence concerning the *relative* temperature of males and females at all.

was to be set up between these and other pairs of opposites was sometimes shared both by those who put forward views based on *a priori* considerations, and by those who rejected those views on empirical grounds.⁵⁰ And it is, perhaps, particularly surprising that the tendency to incorporate these opposites into a single systematic, but often quite arbitrary, schema should survive in Aristotle, even though he was fully aware of the lack of agreement among his predecessors on the subject of the hot and the cold and the dry and the wet, and drew attention, on several occasions, to some of the ambiguities which the use of these terms involved.⁵¹

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⁵⁰ The writer of *On Ancient Medicine* provides something of an exception to this general rule, for he notices the difficulties which arose concerning the application of the doctrine of the hot and the cold, the dry and the wet to problems of diagnosis and cure (ch. 13, *CMG* i. 1 44.8 ff.) and then suggests

that hot and cold are the least important of the *δυνάμεις* in the body (ch. 16, 47.12 ff.).

⁵¹ I must express my thanks to Mr G. S. Kirk for reading and criticising an earlier draft of this paper. The faults that remain are, of course, entirely my own responsibility.