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CRITICAL STUDIES

THE FRAMEWORK OF GREEK COSMOLOGY

JOHN ROBINSON

A STRIKING PHENOMENON of recent years (and one not without its significance for the historian of contemporary philosophy) has been the appearance of a substantial body of work on the early Greek philosophers. Most of this work is characterized by a new approach to the subject, an approach marked on the one hand by a greater attention to the fragments themselves as opposed to the doxographic materials, and on the other hand by a more vigorous analysis of the relation of the language of the fragments to the wider non-philosophic context from which it was in so many instances borrowed. Charles Kahn's recent study,¹ beautifully printed and bound by the Columbia University Press, is a worthy contribution to this growing body of literature and bears the impress of its characteristic method. The single remaining fragment of Anaximander is not discussed until it has been firmly fixed in its historical context by a thoroughgoing consideration of the classical conception of the four elements; and one of the most striking features of this consideration is the use made by the author of the extensive body of Greek medical writings known as the Hippocratic Corpus. It was W. A. Heidel who first called attention to the extraordinary value of these writings—the only complete scientific treatises to have come down to us from the early period—for the elucidation of Greek thought. Since then this material has been referred to more and more frequently by students of the early Greek philosophers, and the tendency is strikingly evidenced in the present study.

The use of this material is not without its difficulties. The treatises which form the Hippocratic Corpus are not the work of a single individual, and there is abundant evidence that they were written over a period of at least two hundred years. It is, there-

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fore, essential, in attempting to reconstruct the scientific world-view of the early period, that we rely so far as possible on treatises belonging to this period. Unfortunately, in the present state of Hippocratic studies, it is impossible to date these works with any exactitude. On the other hand, certain of them belong pretty clearly to the fifth century; and it seems fairly well established that the view of the constitution of man which most of them assume dates from the time of Alcmaeon, who flourished around the turn of the century. Since this view is based upon an analogy between microcosm and macrocosm, the processes involved in sickness and health reflect on a small scale the greater processes which constitute the life of the cosmos as a whole; thus, indirectly, these treatises illuminate in striking ways aspects of the larger world-view implicit in the fragments of the early cosmologists, but obscured by the fewness of these fragments and the imperfect state in which they have been preserved. In the present study they are used to illuminate just such obscurities.

Kahn uses these treatises, moreover, not only to bring into sharper focus the world-view of the fifth century, but also to establish, in conjunction with the fragments, a thesis of great importance; namely, that "from the sixth to the fourth century . . . the Greek study of nature is a close-knit unity, and the originality of the individual thinkers is intelligible only against the background of a continuous tradition, that is to say, of a common set of problems, principles and solutions" (p. 207). The truth of this has been obscured by the doxographic tradition; the doxographers were more interested in the differences between early thinkers, or groups of thinkers, than in their similarities. The present study seeks to undo this mischief, "to counterbalance the particularism of our sources by emphasizing those fundamental ideas which bind the early thinkers to one another. It is these common traits which permit us to recognize the Greek philosophy of nature as a unity and as a whole" (p. 6). If we accept this thesis (and I think that eventually we must), we are going to have to give up the useful but misleading distinction between an Eastern and a Western tradition in Greek philosophy. We are going to have to treat the Italian school as "an offshoot of the Ionian philosophy and not as

its rival" (p. xi), and this must inevitably affect our understanding of Pythagoras, Parmenides and Empedocles in turn.

But not only does Greek thought form a unity; "this unity can receive an historical explanation only if the common features are shown to result by genetic descent from a common source. In terms of our oldest firsthand documentation, this source may be described as the world scheme which Parmenides presupposes, and against which he is in part reacting. But for a more precise location of the springhead of Greek natural philosophy we must define this scheme as the cosmology of Anaximander. As one examines the remains of this early period, it is Anaximander who emerges more and more clearly as the central figure in sixth-century thought. It is, in all probability, his work which laid down the lines along which ancient science was to develop and his mind which gave the Greek philosophy of nature its characteristic stamp" (p. 6). It is all the more unfortunate that the evidence upon which we are obliged to rely in reconstructing Anaximander's thought is so meagre. Not only is it meagre, but almost all of it is thirdhand, being derived from the lost *Physical Opinions* of Theophrastus who, in turn, had before him the lost work of Anaximander. Hence the great value attached to the single fragment of that lost work which is preserved for us by Simplicius in his commentary on Aristotle's *Physics*.

The fragment, embedded in the context of Simplicius' commentary, runs as follows:

Anaximander. . . declared the Boundless to be principle and element of existing things, having been the first to introduce this very term of 'principle'; he says that 'it is neither water nor any other of the so-called elements, but some different, boundless, nature, from which all the heavens arise and the *kosmoi* within them; out of those things whence is the generation for existing things, into these again does their destruction take place, according to what must needs be; for they make amends and give reparation to one another for their offense, according to the ordinance of time,' speaking of them thus in rather poetical terms. It is clear that, having observed the change of the four elements into one another, he did not think fit to make any one of these the material substratum, but something else besides these. (Kahn's trans.)

This passage presents a number of difficulties, only two of which will be dealt with here. To begin with, Simplicius states that

from the Boundless issue “*all* the heavens . . . and the *kosmoi* within them.” Elsewhere (in *De Caelo* 202.14 and 615.16) he states that Anaximander *appears* to hold that an infinite number of worlds are produced from the Boundless. The other doxographers are more positive about it, Aetius going so far as to add that they are equidistant from one another. Kahn rejects these latter statements on the ground that they falsely assimilate Anaximander’s views to those of the atomists. But he cannot very well reject the testimony of Simplicius without disastrous results; consequently he is obliged to fall back upon Zeller’s unlikely suggestion, revived by Cornford, that the “heavens” of Anaximander were simply the rings of fire which constitute the heavenly bodies in his cosmology. On this hypothesis the *kosmoi*, which are said to be “within” the heavens, would have to be “lower ‘arrangements’ of atmosphere or earth” (p. 50). There is, however, no real precedent for such a use of these terms, and indeed the whole hypothesis is quite unnecessary. For it is not true that “there is no intelligible reason why the theory of innumerable worlds should have been formulated within the context of Milesian thought” (*ibid.*). As Kahn himself rightly insists, the life of the cosmos is but a reflection of the life of man. It must, therefore, come to an end, and the doxographic evidence that it does so in the system of Anaximander is too uniform to be put aside. Indeed, to put it aside is to rob of its significance the fact that the Boundless is made boundless in order that (among other things) it shall be *inexhaustible*, and hence eternally productive of those opposites from which a new world may arise when the old has completed its life cycle. Looked at from this point of view, the doctrine of innumerable worlds is not only intelligible within the context of Milesian thought but is required by it. Whether Anaximander conceived the momentous possibility of a plurality of *simultaneously* existing worlds is unclear. Aetius’ statement, referred to above, must be read in the light of Cicero’s assertion that according to Anaximander “there were gods who came into being, arising and passing away at long intervals, and that these were the innumerable worlds” (*De Nat. Deor.* I.10.25, = Diels-Kranz 12 A 17), where the “intervals” may very well be intervals of time, an interpretation to which perhaps some weight is given

by Augustine's statement that the innumerable worlds "are now dissolved, now born again, according to the age to which each is able to survive" (*C.D.* VIII.2, = Diels-Kranz 12 A 17, Kirk's trans.). However this may be, that Anaximander believed in *successive* worlds seems to me beyond doubt.

A second difficulty in the passage from Simplicius concerns the interpretation of the words "for they make amends and give reparation to one another for their offense, according to the ordinance of time." Kahn argues (convincingly, in my opinion) that "they" can only be the elements, that is, the hot, the cold, the wet, the dry, and those other "powers" which, early in Greek philosophic thought, assumed the guise of "elements." The sentence which concludes the excerpt shows clearly that this was, at any rate, the view of Simplicius, and Simplicius, who had Theophrastus before him, was in a better position to form an accurate judgment on the matter than we. The sense in which the elements "wrong" one another, and the necessity which compels them to make recompense for these wrongs, is admirably illustrated by Kahn from the medical literature:

The body of man [writes the author of *The Nature of Man*] always possesses all of these [the four humours, characterized by the four primary opposites], but through the revolving seasons they become now greater than themselves, now lesser in turn, according to nature. For, just as every year has a share in all, in hot things as well as cold, in dry things as well as wet (for no one of these could endure for any length of time without all of the things present in this *kosmos*; but if any of these were to cease, all would disappear; for from a single necessity all are composed and nourished by one another): just so, if any one of these components should cease in a man, the man would not be able to live. (*Nat. Hom.* 7, Kahn's trans.)

Hence the hot and the cold, the wet and the dry, must rule in turn, whether in the microcosm or in the macrocosm; "precisely considered, the *kosmos* is a concrete arrangement of all things, defined not only by a spatial disposition of parts, but also by the temporal *taxis* within which opposing powers have their turn in office. It is the spatial aspect (in which the *kosmos*, identified with the *ouranos*, appears as a body whose limbs are the elements) which tends more and more to obscure the temporal order that prevailed in the earlier conception. Both ideas, however, are inextricably

linked from the beginning to the end of Greek philosophy. The cosmos has not only an extended body, but also a lifetime (*aiōn*), whose phases are celestial cycles" (p. 188-9). The language in which Anaximander expresses this conception is the language of the law courts. But this does not mean that he sought to impose upon a nature conceived as disorderly conceptions borrowed from that man-made order which expressed itself above all in the *polis*. On the contrary, for the primitive mind there is no gap between these two realms; "it is not," as Kahn justly observes, "the assimilation of Nature and Society which philosophy was called upon to establish, but rather their separation from one another" (p. 192). In the *polis* injustice is not impossible, but in nature it is. Action *must* be followed by reaction; there is no room between the two for the intervention of some capricious act of will. Nature is becoming impersonal, though in the interval between the birth of this idea and the growth of a technical terminology proper to its expression, it will be expressed in that language which lies to hand and which was designed to express moral and hence personal relations.

I have said nothing as yet of Kahn's treatment of the physical details of Anaximander's system. These are of less interest to the philosopher than the wider aspect of his thought, and understandably so. But Kahn takes a different view of the matter; it is, he holds, in the light of the clearer tradition regarding these physical details, and only so, that we can grasp the import of the wider framework of concepts, and he proceeds to deal with these details at some length before attacking the fragment at which we have just glanced. It is, therefore, the more unfortunate that it is in his treatment of these details that the most serious defect in his study occurs.

The problem can be put briefly. In the *De Caelo* Aristotle argues that if the earth's rest is due to constraint, it must have been because of the action of the cosmic whirl, the *dinē*, that it travelled to the center:

For this is the name which all agree in giving to the cause, reasoning from what happens in liquids and in the air, where larger and heavier things always move toward the middle of a vortex. Therefore all who hold that the world had a beginning say that the earth travelled to the middle (295 a 10, Guthrie's trans.).

Aristotle states that *all* those who made the cosmos come into being invoked the whirl. Now it might be argued that this is a palpable exaggeration, and that at best Aristotle is warranted only in asserting that *most* of them do this. But this does not improve matters; for the Ionian tradition, which is obviously referred to here, goes back, as Kahn rightly insists, in *its main outlines*, to Anaximander. The whirl plays such an important role in this tradition that on any reckoning we should have to number it among its central ideas; and this in turn ought to create a presumption in our minds that the whirl was made use of by Anaximander. Yet Kahn makes virtually no mention of the whirl, and, judging by his adverse comment on Aristophanes' complaint (in the *Clouds*) that the Vortex has driven out Zeus, has failed to grasp the significance of the role played by this conception in the depersonalization of the cosmic process which he rightly regards as the distinctive effect of Greek physical thought.

He is prevented from seeing the evidence for the whirl in the system of Anaximander by a passage which occurs a little further along in the *De Caelo*:

There are some [Aristotle says] who name its [sc. the earth's] 'indifference' as the cause of its remaining at rest, *e.g.* among the early philosophers Anaximander. These argue that which is situated at the center and is equably related to the extremes has no impulse to move in one direction—either upwards or downwards or sideways—rather than in another; and since it is impossible for it to accomplish movement in opposite directions at once, it necessarily remains at rest (295 b 10 ff., Guthrie's trans.).

Kahn, with most commentators, accepts this statement without reservation. Understandably, he attaches great significance to it: "Anaximander's view of the earth as resting in equipoise at the center of the heavens is perhaps the most significant single piece of information which has reached us concerning the development of scientific thought in sixth-century Miletus" (p. 76); "even if we knew nothing else concerning its author, this alone would guarantee him a place among the creators of a rational science of the natural world" (p. 77). But we are left with an unanswered question: if Anaximander created the framework of Ionian cosmology, how are we to explain the failure of his successors not only to adopt this "geometric" account of the earth's immobility

(which is, of course, *unscientific* precisely because it is “geometric”!), but to show any awareness whatever of its existence.⁹

Kahn’s basic error lies in his assumption that in a “symmetrical” universe there is “no more reason for the earth to move down than up” (p. 78). There is such a reason, and the reason is that the earth is heavy, i.e. absolutely heavy. Kahn does not consider among the “opposites” of the Greeks “the heavy” and “the light,” but they are explicitly opposed to one another by Parmenides (Diels-Kranz 28 B 8.53 ff.), for example, and implicitly in Anaximenes’ contrast between the rarity of fire and the density of earth (in early Greek thought, weight is a function of density). To separate the heavy from the light is precisely the function of the whirl; the medical literature, of which Kahn otherwise makes such good use, confirms this, were the fragments not enough:

If [says the author of *On the Nature of the Child*] you will attach a small tube to a bladder and put earth, sand, and fine scrapings of lead into the bladder through the tube, pouring water in over them, and then blow through the tube, the contents will at first be mixed together by the water; but in time, being blown upon, the lead will go to the lead, the sand to the sand, and the earth to the earth. And if, having allowed it to dry, one tears open the bladder and examines the contents, he will find that like has gone to like (*Nat. Puer.* 17 [vii. 498 Littré]).

The air, as it circles around in the bladder, which is at it were a model of the *ouranos*, imparts its motion to the mixture, which separates to form a miniature cosmos. The same forces are at work here which disrupt the Sphere of Empedocles and create the cosmos over which Strife rules. It is the vortex action which sends the earth to the center and the vortex action that keeps it there; being “equally related to the extremes,” i.e. equidistant from all points on the periphery of the whirl, it does not move precisely *because* it is heavy.

That, however, is not the end of the matter. The earth lies (indeed, it rotates, though Kahn unwisely rejects the evidence for this) in the plane of the whirl, and the plane of the whirl is horizontal. The Ionians had to tip their flat earth in order to bring the heavenly bodies overhead. Consequently a further problem always remained to plague them; this was the problem of preventing the earth from falling downwards, i.e. out of the plane

of the whirl. The solution they gave was the same in every case: they made the earth ride upon a base of air by reason of its flatness. That Anaximander gave the same explanation is quite clear from the statement of Simplicius (*in De Caelo* 532. 14) that "Anaximander seems to say that the earth remains where it is *both* because it is supported by the air *and* because of its equipoise and 'indifference'" (my italics). Kahn considers that this statement is based upon a confusion; but it is not Simplicius who is confused. It is Aristotle, who fails to grasp the fact that for the Ionians the problem of the earth's immobility was a *double* problem. In consequence he takes Anaximander's answer to part of the problem for his answer to the whole of it; and indeed he shows his misunderstanding even of what he does take from Anaximander, by falsely assimilating it to the theory of the earth's immobility advanced in the *Phaedo* (108E-109A)², the very language of which he has obviously borrowed throughout. We must, therefore, add this to the other misunderstandings of Aristotle. But we can do so only because we have a control over what he says; and our control is precisely the unity, so often insisted upon in the present study, of the Ionian tradition. No account of that tradition can be complete which fails to take seriously the central role played in it by the whirl.

If the present study fails to do this, it must be added that this is its only serious defect. It combines soundness of judgment with sensitivity, it is rich in illustrative material, and it displays a breadth of vision, a sense of the whole movement of Greek thought in its early stages, often wanting in detailed studies. When the history of early Greek philosophy is rewritten, this book will be one of those of which account must be taken.

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² Cf. *Timaeus* 62E-63A.