
Explaining the Cosmos: The Ionian Tradition of Scientific Philosophy
by Daniel W. Graham

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Daniel Graham's splendid monograph, *Explaining the Cosmos*, takes on the task of presenting a new reading of Presocratic philosophy under a single, unifying theme: the development of a scientific paradigm—or rather, two—for explaining the natural world. This is an ambitious undertaking, and Graham's lucid and thoughtful account offers much of value to interpreters of early natural philosophy. The book undertakes two projects, intertwined but nonetheless distinct: one is to present an account unifying the main themes in Presocratic thought; and the other, to present that thought as scientific in a modern sense of the term. While I think there are unanswered questions about the second project, these should not undermine the strength of the book's contributions to the first.

Graham challenges what he calls the 'Standard Interpretation' of Presocratic thought, an interpretation going back to Aristotle, in which the monistic materialism of the Ionians is rejected—in response to Parmenides' criticisms—in favour of various pluralist systems. Unlike one recent interpretation, his critique of this narrative does not amount to a rejection of the idea of a unifying story [see [Osborne 2004](#)]. Quite the contrary: Graham tries to save what he presents as the scientific character of Presocratic thought by reformulating our understanding of the connecting narrative. While Graham is acutely aware of the lack of historical evidence linking some of the figures—in many cases we are speculating who, if anyone, they are responding to—he reformulates the standard story of thesis-and-response, retaining the ambition to make sense of the complexities of Presocratic thought through a single, connecting narrative. The result deserves serious consideration.

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Graham highlights the importance of Ionian philosophy, by which he means, principally, Anaximander and Anaximenes, with the likely addition of Xenophanes. Graham adapts and develops a proposal by Cherniss and Stokes that the Ionians were not, as commonly thought, monistic materialists. Rather, they thought that a single generating substance gives rise to all else through transformation. In Graham's revised interpretation, Anaximenes is no minor figure but the culmination of Ionian scientific philosophy: his provision of a 'mechanism' by which the primary substance can transform (by condensation and rarefaction) sets this Ionian Generating Substance Theory (GST) on a solid scientific footing. Graham questions Barnes' argument that an account based on condensation and rarefaction is evidence of an attempt to view other substances as made out of something else. However familiar such an approach is to us, Graham argues, there were no criteria available at the time to make sense of the claim that one substance is really another. He suggests that consumption is the natural way to conceive of transformations, and that the idea that apparent transformation could occur in a monistic materialism is a later idea, hard won.

Although GST belies Aristotle's reports on the Ionians, Graham notes the scarcity of textual evidence that the Ionians were monists: he thinks that Aristotle was misled by the popularity of a later natural philosopher who was a material monist, Diogenes of Apollonia. Against the background of the fifth century, when the distinctions between appearance and reality, nature and essence were well established, he argues, monistic materialism became a reasonable option; and Aristotle could easily have been read Diogenes' view back onto earlier thinkers.

Graham sees the Generating Substance Theory of the Ionians, moreover, as providing a better foil for the reactions of Heraclitus and Parmenides than the Standard Interpretation. On his reading, Heraclitus is no proponent of contradiction, but is merely educing the consequences of Ionian philosophy. Heraclitus articulates the principle that constant change of substance is compatible with stability of the higher-order structures that supervene on them. Flux becomes law-like. Graham even suggests that this reciprocity would allow for laws of conservation of proportions, an idea that Heraclitus does not develop. Heraclitus' response to the Ionian theory of transformation was to develop a philosophy that focused on the process, not on the

material. In doing so, however, he identified a difficulty implicit in Ionian philosophy: that there is really no argument for taking one substance over others as primary.

Parmenides, Graham suggests, is reacting to another difficulty implicit in the Ionian program, the problem of accounting for change if transformation of substance happens without remainder. Had the Ionians already proposed monistic materialism, he argues, they would already have solved this problem. Parmenides' criteria for Being are, he suggests, directed to 'mortals' who 'think that to be and not to be are the same and not the same' [159], i.e., to Heraclitus' recognition that Ionian philosophy implies the simultaneously ever-changing and unchanging nature of reality. Parmenides' four criteria for Being—it is ungenerated, all alike, motionless, and complete—could be given a minimal or maximal interpretation: either these are properties anything must have to count as a being, or they could be taken to be sufficient to delimit the only viable account of reality. Only on the maximal interpretation is Parmenides a monist; the former implies a critique of Ionian philosophy but does not reject cosmology out of hand.

Graham gives a prominent place to Parmenides' *Doxa* in his narrative; he stresses that this account is not presented as falsehood but as mere opinion. Although later Eleatics like Melissus became the filter for subsequent understandings of Parmenides, Graham takes Parmenides to be offering a serious attempt at a cosmology that surpasses the Ionian accounts and that he regards as the best, albeit flawed, way to make sense of the world [171]. It is unlike Ionian cosmologies in beginning from the idea that equal and permanent opposites account for everything. Graham suggests that the *Doxa* is the basis for the new theories of the pluralists—especially Empedocles and Anaxagoras—who, contrary to the Standard Interpretation, are not explicitly critical of Parmenides. The view which they and the atomist develop constitutes a new paradigm, the Elemental Substance Theory (EST), replacing the earlier, Ionian GST.

This is an innovative and philosophically rich reading of Presocratic thought. It contains some gems aside from the central narrative itself: the analysis of textual parallels linking Heraclitus and Parmenides, the readings of the indifference argument in Democritus, the serious attention paid to Xenophanes and Diogenes, and the clear

and economical presentation of major trends in scholarly interpretation. But its strength is the attempt to provide a textually supported, philosophically coherent, and historically plausible narrative that motivates the reactions and responses of different figures. This is a fresh and innovative thesis, one that should be taken seriously.

But it would help to clinch the deal if we had more of a story on the background to the questions addressed by the Ionians in particular. Graham argues that the Ionian cosmologies should be regarded as a ‘scientific paradigm’, an attempt to produce a unifying account of the natural world. In a context where there is no methodological or epistemological tradition to draw on, he understands this to be achieved simply by offering a concrete example of a complete cosmology, allowing for development or rejection. While he acknowledges the absence of other features like a professional community, a program for empirical testing, or an institutional setting, Graham takes the very act of offering a complete, material world picture which eschews the superstition of mythological accounts, as establishing a ‘research program’.

What is interesting here is surely the suggestion that a particular way of explaining the world became dominant, was challenged, and was superseded by another. It is a little disappointing, then, that there is not more to be said on the motivation for articulating such an account or why it might have seemed compelling to others. He argues later that Ionian philosophy provided the unifying framework within which other fields such as history, medicine, mathematics, technology, and rhetoric were able to make substantive contributions to knowledge and denies that these fields helped spur the development of philosophy [302–305]. He also declines to suppose that the motivation for the Ionian program was a deliberate attack on mythology [104]. He occasionally allows for a technological or political inspiration for particular ideas, but does not seem to think we can really *explain* the emergence of such a powerful world picture: he describes the physicalism of the Ionian cosmologies as ‘miraculous’ [98]. But this seems too quick.

Graham follows a usage common with much of 20th century scholarship—despite cautionary notes by Balme [1941], Lonie [1981], Furley [1987], and Hirsch [1990]—and writes of ‘mechanical explanation’ in the Ionians. Graham generally uses the term to signify

the rejection of intentional or teleological accounts, but the claim is surely not that this rejection is motivated by a machine analogy or an appeal to the workings of mechanics. He in fact denies that Ionian natural philosophy was driven by experience with technology [305]. In a work that aims to illuminate the early history of scientific thought, one might want to hear more about the reasons for this rejection. What commitments constrained the speculation of the Ionians; what heuristics or exemplars might have guided their accounts? One further reason for stressing the scientific character of Ionian thought seems to be that, at least implicitly, the transformation of substances is law-governed. Here again, one might like to hear more about the conception of law at work and also its relationship to the idea that nothing comes from nothing: Graham scarcely mentions, except in passing [125], a commitment that others have seen at the heart of Ionian cosmological speculation.

Graham defends a belief in scientific progress against Kuhn's reservations [299]. Although he makes a case for the cumulative effect of some unprogrammable ideas like the borrowing of the Moon's light from the Sun, others may be sceptical of the idea that 'conceptual progress' can be identified by noting anticipations or forerunners of modern theories [300]. Indeed, Graham's scholarly reserve sometimes prevents him from assuming that cumulative progress is the norm: why else would he hesitate to ascribe to Diogenes the view that differences of heat go along with differences of density [284], an association well established in the Ionian philosophy?

But these reservations should not be taken to detract from the worth of Graham's proposal. There are many interesting and valuable insights in this book, which has much to contribute to Presocratic interpretation. Graham's fine prose and uncluttered style is exemplary; his scholarship, sound and accessible to non-specialists. He helps the reader keep track of an alphabet soup of theories admirably, and uses formal precision without letting it dominate his account. This book leaves many questions unanswered in its attempt to portray the Ionians as the founders of western science, but its ambition in offering a bold new unifying narrative is to be applauded.

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