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2. Evidence of its use in earlier philosophy appears in the fragment Plutarch *de prim* fr. 7, 94F of Anaximenes who uses the different sensations of temperature at different compressions during breathing to illustrate and give weight to his thesis that qualitative changes can be explained by changes in density.

3. It may be objected that this problem is not a likely concern of the Pre-socratics. In response I quote a passage from Empedocles which is concerned with this same issue: Men behold in their span but a little part of life, then swift to die are carried off and fly away like smoke, persuaded of one thing only, that which each has chanced on as they are driven every way: who, then, boasts that he has found the whole? Not so are these things to be seen or heard by men, or grasped by the understanding. You then, since you have turned aside to this place, shall learn: no further can mortal wit reach. (fr. 2), (after Guthrie, in KRS).

4. Fritz, Kurt von "Noos and Noein in the Homeric Poems" *Classical Philology*, 38 (1943), 88.

5. It is interesting to compare two parallel movements that occur in Xenophanes. The first is the abandonment of the Homeric *voeiv*, which is linked to the intentions and perspectives of the people holding it, in favor of a *voeiv* which is based on a universal perspective. The second movement is the abandonment of the Homeric gods, who not only steal, commit adultery and deceive one another, but take sides in the different causes of men, in favor of Xenophanes' god who he says: Always remains in the same place, moving not at all; nor is it fitting for him to go to different places at different times (fr. 26 & 25). Xenophanes' god does not have various *vooi* (intentions or perspectives). He has one universal perception. He is no more the god of the Thracians than he is the god of the Ethiopians. His universal perspective precludes him from any of the partisan activities characteristic of the Homeric gods. Universal perspective is the only characteristic of Xenophanes' god.

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SPECULATIONS ON THE ORIGINS OF IONIAN SCIENTIFIC AND PHILOSOPHICAL THOUGHT

Why did Western philosophical and scientific thought begin in sixth-century Ionia? This is a traditional question for students of the pre-socratics and an important one, not only for our knowledge of archaic Greece but also for our understanding of our own intellectual past and present. Many answers have been offered to this question, and I think that no single fact about the circumstances of Miletus around 600 B.C. can be singled out as being solely responsible for the profound and decisive change in thought associated with Thales, Anaximander and Anaximenes. Rather, this change had many contributory causes. Among these contributors are¹ the distinctive social and political structure of the Greek city-states—small, independent units marked by the absence of a monarchy,² the nature of Greek religion—largely separate from the state and not characterized by fixed sacred texts or a priestly caste,³ literacy, which facilitated the communication and preservation of ideas,⁴ acquaintance with the scientific and religious ideas of other peoples, especially the Egyptians and Babylonians,⁵ sufficient material wealth to permit some the leisure needed for speculative thought. These circumstances have all been proposed before as either complete or partial explanations and I agree that they are likely to be important contributors. What I want to do in this paper is to call attention to another circumstance which has not been given sufficient emphasis.

Before going ahead to provide this explanation, though, we ought to define more precisely what it is that needs to be explained, and secondly it will be well to acknowledge a limitation on the kind of explanation that can be given of the phenomenon in question.

What, then, are the features of Ionian thought that need to be explained? Not simply the subject matter, since earlier Greeks knew of the natural phenomena treated by the Ionians, although they offered a different kind of account. Thus,

for Homer and Hesiod thunder is Zeus's weapon and individual occurrences of thunder are explained by reference to Zeus's powers and intentions. Also, to the extent that the Ionians borrowed the scientific knowledge of other peoples, it is reasonable to assign credit to those other peoples and not to the Ionians.

If the subject matter was not new, the contribution made by the Ionians was their manner of treating it. At this point we are still on well-worn ground. It is frequently said that the distinctive feature of Ionian thought is the way it treats the divine and the role it assigns to the divine in the natural world. Thunder is no longer due to Zeus, but to a natural principle which operates uniformly and impersonally, so that the explanation of every occurrence of thunder is the same specifiable set of natural circumstances, and whenever those circumstances occur, thunder results. Moreover, these circumstances do not include the intentions, emotions, or beliefs of a divine figure. Although the divine is still a central part of the natural world, the Olympians, as we know them from Homer, Hesiod and other early Greek authors, have no place in the world-systems of the early Greek philosophers. The Ionians also differ in this same way from Babylonian and Egyptian cosmological accounts whose mythological nature is well known. Thus, it has been claimed that "the basic fact" about Ionian thought is its abandonment of a mythological understanding of the world and its adoption of a naturalistic approach. Once this view is accepted, and other features of Ionian thought are accounted for with reference to this characteristic demythologizing, the problem becomes how to account for the abandonment of the earlier mythological mode of seeing and explaining phenomena.

I want to propose a different feature of Ionian thought as "the basic fact" requiring explanation. I will show how this feature accounts for the Ionian rejection of mythological accounts and how this feature in turn can be understood through a circumstance of archaic Greek civilization which has not received the attention it merits.

My proposal is that "the basic fact" about Ionian thought is what I shall call its rational-critical nature. The presocratic period is marked by an astonishing variety of theories on many subjects, but these theories do not appear out of nowhere, but arise from critical reflection on earlier views, which leads first to rejecting those views either because they do not fit the empirical facts or because they are unacceptable according to certain rational criteria, and second to constructing new views which pass the tests the earlier views have failed.

This way of thinking is manifest in Xenophanes' fragments on the gods of popular belief. Reflection on the differing ways different peoples conceive of their gods (the Ethiopians picture the gods as like Ethiopians, the Thracians as like Thracians) led Xenophanes to the *reductio ad absurdum* that if animals could depict the gods, each kind of animal would portray the gods as like itself. This shows that it is absurd to portray the gods as like humans of any one type and equally absurd to portray them as being like humans at all. Traditional views of the gods, based on tradition rather than reason, must therefore be abandoned, and a new standard must be found to replace the authority of tradi-

tion. Xenophanes replaced the authority of tradition with the authority of his reason. The standard he employed to determine god's nature is the rational consideration "what is fitting." It is not fitting for a god to go hither and yon, therefore god does not go hither and yon. God does what is fitting, namely, staying put in one place and causing things to happen not by the might of his hands but by the power of his thought. Moreover, it is unfitting for a god to be constituted of different limbs and organs (like a human): all of him sees, hears, and thinks—presumably (though the surviving fragments force us to guess why) because it is fitting that god should be constituted in this way. Further, and no doubt for the same reason once more, there is only one god.

Xenophanes proceeds in the following way. First, collect a wide variety of beliefs on the topic (Thrace and Ethiopia representing the North and South extremes of the known world). Second, note where these beliefs agree and where they disagree. (There are gods which govern events in the world, but the gods are depicted in incompatible ways by different peoples.) Third, identify a principle which accounts for the disagreement. (Each people models the gods after its own appearance.) Extend this principle as widely as possible so as to show its absurdity. (Animals would behave the same way, if they were able.) Fourth, eliminate the absurdities and inconsistencies, to see if there remains a core of truth on which to base a new theory. (Gods are not anthropomorphic, but the divine is all-powerful and omniscient.) And finally, develop a theory which is based not on uncritical acceptance of tradition, but on critical reflection in accordance with rational criteria. (Here, the criterion is "what is fitting.") The new theory will have epistemological advantages and also disadvantages in comparison with the traditional beliefs. Its disadvantage is that it lacks the authority of tradition, and must stand or fall strictly on its own merits. Its great advantage is that it is based on rational criteria and so can (to some extent) stand up to scrutiny. The basis of its claim to be accepted (here, the criterion of "what is fitting") is asserted publicly and it becomes possible to examine both how securely the theory satisfies that criterion and also how reasonable the criterion is in its own right. So it happens that further thought on the same subject is a matter of applying to Xenophanes' own theory the same critical tests which he used on the traditional theories, and of developing new theories in the same general way Xenophanes developed his.

Now this way of approaching a subject may not have been new with Xenophanes. Although the surviving testimonia and fragments of the Milesian philosophers do not permit us to say with complete confidence that they too used this critical approach, it seems quite likely that they did. A frequently told story about the Milesians has Anaximander identifying the origination substance as *ἄπειρον* because he was dissatisfied with Thales' view that the *ἀρχή* of all things was water. If all things originated from water, then fire, which is the opposite of water, or anyway has opposite characteristics to those of water, could not exist; but fire does exist, therefore it is not true that all things originated from water. But, then, neither could all things have arisen from fire, or from any other kind

of thing with definite qualities. Therefore, the originaive material must be *ἄπειρον*, i.e., it has no definite qualities, and thus it is capable of originating all qualities equally.

On this reading, Anaximander considered Thales' theory, identified a consequence of it ('there can be no fire') which is empirically false, rejected Thales' theory for this reason, saw that any theory of a relevantly similar type was open to the same type of objection, and was therefore unacceptable, and finally constructed a theory which is not open to that sort of objection.

Anaximenes returned to a single stuff as the primary originaive material, but his doctrine of condensation and rarefaction enabled him to avoid Anaximander's objection to Thales' theory. Although air is primary and although air has definite characteristics, the natural processes of condensation and rarefaction cause air to change into types of stuff with different, even opposite characteristics from those of air. Anaximenes' preference for an originaive substance which is familiar over the *ἄπειρον* of Anaximander indicates the following train of thought. Even though Anaximander's theory does not lead to consequences that are empirically false, it has the disadvantage of being based on something unfamiliar to our experience. He posited the unfamiliar *ἄπειρον* because he could not see how anything familiar could account for certain phenomena. Once a way (the doctrine of condensation and rarefaction) has been found to account for those phenomena in terms of something familiar, the need to posit the *ἄπειρον* disappears, and so Anaximenes' rational preference is to return to a single familiar originaive substance.

On this interpretation, Anaximenes begins with critical reflection on Anaximander's theory, and he designs his own theory to improve on Anaximander's by avoiding what he perceives to be a fault of that theory. This time the fault is not a misfit between empirical reality and the implications of the theory, but rather the theory's failure on criteria of intelligibility. It is not fitting, we might say, for the originaive material to be unfamiliar, and so a theory which posits an originaive material that is familiar is preferable to one positing an unfamiliar originaive material. This is not to say that Thales' account is preferable to Anaximander's; Anaximenes did not simply revert to Thales' level. Anaximander's demand that the theory not run contrary to experience still holds, and it presumably takes priority over Anaximenes' preference for the familiar.

This thumbnail sketch of only a very limited number of the opinions of the early Ionian thinkers is not a new interpretation of Ionian thought, but sets out a familiar interpretation so as to highlight what I shall call the rational-critical nature of the Ionians' approach. It is easy to see how such an intellectual method would lead to the demythologizing which is so important a part of Ionian thought. For mythology is hard put to withstand critical scrutiny, and where mythology is traditional, it will be hard to mount a rational defense. Once Xenophanes applied his critical tools to traditional conceptions of the gods, the intellectual unacceptability of those conceptions could not fail to be exposed. But if demythologizing is a predictable consequence of the rational-critical method, the

converse is not true. Simply deciding to abandon mythological accounts does not make inevitable the adopting of a rational or critical approach; it is consistent with adopting in an equally dogmatic and uncritical way other accounts which, although not mythological, are not founded in rationality.

Let us take it, then, that "the basic fact" about Ionian thought is its rational-critical approach. The problem before us is to account for why this approach was developed by the Ionian thinkers. Before sketching out my solution, I feel obliged to point out a feature of all attempts to treat the general topic under consideration. The nature of our evidence about early Greek thought does not allow of definitive pronouncements. The information we possess sometimes enables us to say with confidence what a given thinker believed and occasionally what his reasons were for believing it. But we have no evidence in the surviving fragments of thinkers before Heraclitus about the methodology employed or overall goals or strategy. All discussion of these matters, whether by later ancient authors or by modern scholars, is speculative and should be recognized as such. In fact, the twin goals of finding interpretations which fit the evidence and preferring one interpretation over another on grounds of intelligibility and plausibility are comparable to the rational-critical method I am suggesting the presocratic thinkers followed.

Why, then, did the Ionians adopt their rational-critical approach? Let us begin again with Ionian views on the divine. The nature of the gods was not a new subject, but one which had received attention in Greek as well as non-Greek lands. The variety of views was striking, to be sure, and the choice among them was difficult for anyone not prepared to insist dogmatically that the traditional views of his own civilization were correct. The fact of the matter is that Greeks did and as far as we know people from other civilizations did not adopt a rational-critical attitude towards the nature of the gods. No doubt one relevant fact here is that in the Greek cities, unlike Egypt and Babylonia, religion was not an integral part of a highly centralized government which for that reason had a vested interest in maintaining the current system of religious beliefs and practices. But even so, something more is needed to account for why individual Greeks would come to question their religious tradition, to treat it in a rational-critical way, and even to propose a new view of the divine which is based on no tradition, but strictly on criteria of intelligibility.

A key question is why upon rejecting the traditional Greek view of the gods Xenophanes did not adopt Egyptian or Babylonian or some other current views. The reason, of course, is that the same considerations that he found to be fatal to the Greek gods also proved fatal to the gods of all the other peoples known to him.

The vast intellectual leap involved in rejecting all tradition and inventing an account of one's own to replace traditional accounts could not be made by anyone uncritical of his own religious tradition. Equally, it is not a move we would expect from a person who was led by the cultural prestige of another religious tradition to adopt it in place of his own.

What is special about the situation of the Greeks of the early archaic age is that they came into contact with many different cultures and of those cultures two, not just one, had great antiquity and prestige. I refer to the Egyptian and Mesopotamian civilizations whose antiquity greatly exceeded what the Greeks of the archaic and classical period claimed as their own, and whose cities and other notable monuments were frequently constructed on a vastly larger scale than was known in the Greek lands. Close and prolonged contact with Egypt and Babylonia made the Greeks aware of different views from their own, and different views which they could not fail to take seriously.

I regard it as fundamentally important that Egyptian and Babylonian religious beliefs differed not only from Greek beliefs but also from each other. The Greeks, or rather, certain highly intelligent and reflective Greeks, were led to question and reject their own religious tradition, but (unlike some indigenous cultures confronted with Christian missionaries) they did not have only one clear alternative. With some of their own views challenged directly (recall Hecataeus' encounter with the Egyptian priests who presented powerful evidence against Greek beliefs that the gods had set foot on earth and had had dealings with humans a small number of generations before) the Greeks did not know which way to turn.

It is always most comfortable to stick by your traditional beliefs dogmatically. When that is no longer possible, the natural thing to do is accept another set of beliefs which has already been worked out (the typical missionary situation). But the Ionians were in the highly unusual situation of having two sets of beliefs available to adopt in place of their own. I suggest that the rational-critical approach I have been discussing was the method the Greeks employed to evaluate the merits of the Egyptian and Babylonian religious beliefs. The circumstances demanded that they not simply opt for one set of beliefs over the other, but rather that they examine them to see which, if either, was preferable. Considerations of the plausibility and intelligibility of the beliefs would naturally arise, and once they did, it is not surprising if the Egyptian and Babylonian beliefs were found as unsatisfactory as the Greek ones.

I have concentrated on the nature of the gods, because it is in Xenophanes' fragments on this topic that we have the clearest indications as to why certain views were rejected and why others were adopted. Now Xenophanes is somewhat younger than the three Milesian philosophers and since he lived well into the fifth century the fragments I have been discussing may have been written a considerable time later than the philosophical activity even of Anaximenes. Nevertheless, it is commonly said that his treatment of the gods is not fundamentally new with him, but that he merely makes explicit an approach to the divine already underlying the ideas of Anaximander, and perhaps those of Thales himself. Further, once the divine was demythologized, the traditional mythological accounts of the origin, history, and workings of the world had to be abandoned and new accounts found to replace them. Naturally these new accounts would be demythologized and would be characterized by the same rational-critical ap-

proach. The reconstruction I am offering therefore agrees with those accounts which see the break with traditional mythological accounts as decisive, although it might be worth considering whether an equally plausible story could be told beginning with cosmological issues and proceeding from there to the question of the nature of the gods. Where I differ from earlier accounts is in the importance I attribute to the Greeks' contact with and awareness of a plurality of other culturally impressive civilizations and the intellectual challenges posed by the existence of a variety of options. I believe that the rational-critical approach to traditional problems, which produced highly untraditional answers, is intelligible in the light of these historical circumstances and that once it was adopted it remained, with numerous modifications and differences in detail, one of the principal and most noteworthy and perhaps even definitory features of all later Greek philosophy and science, and in fact retains a central place in the dominant Western philosophical and scientific traditions.

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