

II

Reality, Perception and the One: The Introduction of Metaphysics

1. XENOPHANES

One god, greatest among gods and men, in no way
similar to mortals either in body or in thought...
All of him sees, all of him thinks, all of him hears...
Always he remains in the same place, moving not at all...
But without toil he shakes all things with the thought
of his mind.

Xenophanes, Fragments 23, 24, 25.¹

In 546 the Persians conquered Ionia, and refugees from the upper classes scattered abroad to every part of the Greek world. One of these, **Xenophanes (571–after 483 BCE)**² left his home in Colophon to wander, for the rest of his long life, as a professional poet among the Greek settlements of southern Italy.

Xenophanes's physical views develop the already existing science of the Ionians.³ He refers what happens aloft to clouds arising through evaporation from the seas, and undergoing transformation into St. Elmo's fire, rainbow, glowing stars, the sun and the moon. He remarks on moisture found in caves, and takes fossils of sea creatures found on land to indicate a universal flood sometime in the past. It seems he thought the earth gradually washed into the sea, finally disappearing entirely and turning the sea to mud. We have no

¹Translation from Kirk, Raven and Schofield (1983).

²For Xenophanes, see Palmer (1998) and (2000), Leshner (2002) and (1992), Jaeger (1947) 48ff, Broadie (1999), Finkelberg (1990) for a reconstruction of the testimony of Theophrastus, and Finkelberg (1997) for Xenophanes' relation to Parmenides. Most of Xenophanes's poetry was, of course, conventional praise of his clients, paeans for victors in the games and the like, but he expressed his philosophical views in passing there and in his *silloi* or 'satires,' usually from the stance of a pious regard for the gods.

³I assert this even though some odd, un-Ionian things have been attributed to him based on over-interpretation of his poetry. He was supposed to have thought that the earth extended indefinitely downward, and that each sun, a new one every day, passes indefinitely onwards rather than revolving about a columnar earth. The first supposition goes back to a citation from a poem in Aristotle's *On the Heavens* II 13, "This upper limit of the earth at our feet is visible and touches the air, but below it reaches down indefinitely." Aristotle interprets this in light of Empedocles's Fragment 39, which asserts that there are some who irrationally propose that the earth extends indefinitely downwards and air indefinitely upwards. Surely the poet's intention was not to assert that the earth actually goes down indefinitely, but only that we cannot see how far down it goes. Empedocles would have been guilty of over-interpretation, as he looked for those foolish mortals who violated Parmenides dictum against the postulation of anything indefinite or undefined, as discussed below. If the sun is nourished by evaporation from the seas, so that the stuff constituting it continually changes, that would be enough to make it new every day, at least for a reader of Heraclitus. For an attempt by a serious scholar to take these un-Ionian things quite seriously, and construct a cosmology around them, see Mourelatos (2008).

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information how he thought earth and water separated out again.⁴ He is sometimes said to have made the primary stuff earth, so that all four elements can be covered by himself, Heraclitus, Anaximenes and Thales, but he is elsewhere more plausibly credited with the view that all things arise from earth and water.

Xenophanes's theology breaks new ground in its use of argument, rather than revelation or tradition, to establish the truth about the gods. In one place Xenophanes has it that "no one has seen or known clearly as regards the gods and all the things of which I speak" that is, theoretical matters about the nature of things, "for even if one succeeded in saying the exact truth, one would still not know it, for in all things there is only opinion."⁵ On the other hand, he allows that sometimes our opinions are like the truth, that the gods have made some things evident to mortals, and though they have not made them all evident from the beginning, in time we find out more.⁶ So perhaps we can say that he thought argument, exploring the consequences of one's views to test their accuracy, was necessary because one could not settle these matters by any kind of direct vision. This brings him very close to the views of Socrates on knowledge, as we shall see. But whatever his hesitations about our knowledge may be, he, also like Socrates, gives no credit at all to the old mythology, attributing its errors to uncritical anthropomorphism—Thracians, we are told in his satyric verses, think of the gods as blue-eyed blondes, the Ethiopians think of them as snub-nosed and black, and cattle or horses, had they an opinion, would no doubt think of them as cattle and horses.

Xenophanes thought the gods in fact stood outside the natural order of the Cosmos, and were similar to nothing found within it. Most especially, they do not compete with one another as things do within the Cosmos, since no god stands in need of anything. Thus no god is master of any other. In a less ironic mood, he warns against disrespect towards the gods, and urges that there is one God who is greatest, and, unlike gods, remains always in one place, unmoving, and without effort "shakes all things by the impulse of will arising from

⁴The natural phenomena noted by Xenophanes are also noted, and made part of cosmic history, in Empedocles. It is not at all clear that Xenophanes attempts a cosmic history or cosmogony, any more than Heraclitus does. His interests, like Heraclitus's, lie elsewhere.

⁵Fragment 34. Palmer (1999) 23–27, observes that the notion that one would not recognize the truth even if he knew it occurs, in close to the same words as in Xenophanes, in Plato's *Meno*, in which recollection of the Forms is introduced to deal with the difficulty presented. Plato, at least, takes this as a serious skeptical argument. It is also reflected in Parmenides, who is likewise interested in responding to the skeptical argument, and in the opening of the Hippocratic treatise, *On Ancient Medicine*.

⁶Fragments 35, 36, 18. Again, Plato and Parmenides adopt the notion that our theories may be *like* the truth (in the *Timaeus*), and we can make progress, making them more like the truth, even when they concern sensibles, and rely on perception.

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his perception of the truth.⁷ Moreover, *all* of him sees, hears, and perceives the truth, and he governs all things with a wise providence.⁸ We are also told God is similar in every part, else some part would be better than another, and this all sounds like Anaximenes's air or Heraclitus's fire, or the Unlimited that steers all things in Anaximander. But if, as seems likely, Xenophanes held to several kinds of fundamental stuff, or identified no fundamental stuff at all, then it gets more difficult, and it has been suggested instead that this God is, like the Goddess of Parmenides's *Way of Opinion*, Love and Strife in Empedocles, and Mind in Anaxagoras, something standing aside from and controlling the stuff making up the world. Given that these other thinkers all provide the divine with a location, it would seem reasonable to say that Xenophanes identified God with the highest heaven.⁹ He may have modeled this God on the Justice of Anaximander, conceived as personal, but still sustaining an unchanging universal law applied even-handedly to all things. Indeed, since this God is unlimited, that is, is not placed in any external environment or situation, it could have no motive to vary from a perfect and abstract justice. Aristotle reports that Xenophanes, "with his eye on the whole heaven," speaks of God as one, though he did not make it clear in what sense he is¹⁰—perhaps God is the one, intelligent governor of all things.

As for the lesser gods, the Atomists, who often followed the Ionian tradition closely, also held that the gods were outside the Cosmos, long-lived due to their undisturbed peace in the surrounding void, and in Epicurus the view was passionately advanced as an antidote to superstition, meditation upon their peaceful life

⁷Gomperz (1896) I 44, notes that "the subordination of the many separate deities to the supreme will of a single arbiter of destiny was here the expression of the steady growth of man's insight into the regularity of natural phenomena." Even if the key to natural law was the conflict of opposing powers, this yields regularity only if there are rules (imposed by whom?) regulating the conflict.

⁸If he equated the highest God with the stuff that makes up the world, would this make Xenophanes a pantheist? He could have taken God to be the totality of things without identifying the parts of the totality, taken individually, with God. In the same way one might say that a person is her body, the totality of it, but not her hand or kidney. In that case God could be unmoving, even if his parts moved. What of the statement that God shakes all things with his mind? Does not this distinguish him from all things? Well, it could be taken to mean that God moves his parts, in the same way that a person might move her hand even though she herself, taken as a whole, is stationary, sitting in a chair. Interestingly, Anaximander was said to have claimed in some connection that "the parts change, though the whole remains immovable" (Diogenes Laertius 2.1).

⁹So Palmer (1998), who points out that the notion may be dependent on Persian sources, for Herodotus (I 131) reports that the Persians identified Zeus with the "entire sphere of the heaven," but native Greek theological speculation, making Zeus the aither and identifying Mount Olympus with the heavens, would seem to provide sufficient background. Finkelberg (1990) identifies Xenophanes's God as the "single and unchangeable, intelligible essence unifying the manifold," but this would seem anachronistic, and we should hold to Aristotle's view that, like other theological poets, Xenophanes "makes nothing clear," even if Finkelberg correctly identifies the tendency of his thought.

¹⁰Aristotle, *Metaphysics* I 5.

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serving as consolation for us in our troubles. Xenophanes, then, may very well have conceived lower gods as long-lived beings found in the peaceful regions above the heavenly bodies. If so, behind his views lies this argument: A god lives a life free of the suffering and doing of evil, and such a life is unattainable in this lower region, where competition and injustice, arising from the production of many opposing things, makes individual perfection impossible. As Homer remarked, only the gods receive happiness unalloyed, and we mortals must suffer, at best, blessings mixed with pain. As the price of their perfect happiness, the lower gods exercise no influence on the cosmos. They don't answer people's prayers, or guard justice in the world. Were they to become involved in such affairs, they could no longer remain undisturbed. Xenophanes must have observed the frustration of Homer's Olympians when they took part in the conflicts of mortals. Indeed, not only is the ideal life impossible within the natural order of our cosmos, it is impossible even in the most ideal natural order—the gods cannot interact even with one another, lest they limit one another and ideal happiness be lost.

This ideal life without limitation by others is not restricted to isolated deities outside the cosmos, but is also enjoyed by the unlimited force that rules the totality of things. Is this Unlimited involved in the affairs of mortals? It "shakes all things" and rules by a wise providence, which suggests that it is, but can it then be perfectly happy? Well, the lesser gods would meet resistance were they to interfere in the world's affairs, but the Unlimited need meet none—nothing in the world resists natural law, things only resist other things in accord with natural law. Still, it seems that the Unlimited's wise providence must be consistent with a certain indifference to the outcome of its enforcement of law in the affairs of competing beings, for it must be unaffected by the unavoidable evils they suffer. In Xenophanes, as in the Ionian thinkers in general, the world is divine apparently without aiming at any particular good or purpose. Xenophanes urges respect for the gods, and he says God is good, but he does not expect God's help in his particular affairs. God's providence is not a *particular* providence, but a *general* providence, like that of an impartial judge. He enforces justice in all things, and for this very reason is undisturbed by the fate of individuals, as long as their fate is just, as it always is. Possibly he thought this justice was established for the good of the whole (as impartial justice might be established in a state), but even if so, it is enforced even-handedly without the expression of any personal interests on the part of the enforcer (who is unlimited and so has no interests), or any regard for the particular fates of individuals.

2. PARMENIDES OF ELEA

It is proper that you should learn all things, both the unshaken heart of well-rounded truth, and the opinions of mortals, in which there is no true reliance.

Parmenides, Fragment 8.28-30¹¹

One path only is left for us to speak of, namely, that it is [what it is]. In it are very many tokens that what is [what it is], being ungenerated is also imperishable, whole, of a single kind [uniform], unshaken [still] and complete [perfect]. Nor was it once, nor is it yet to be; for it is now, all together, one and continuous. For what kind of origin for it will you look for? In what way and from what source could it have grown? I shall not let you say or think that it grew from what is not [any sort of thing]; for it can neither be thought nor said that what is not [any sort of thing] is. And, if it came from nothing, what need could have made it arise later rather than sooner? Therefore it must either fully be or be not at all. Nor will the force of conviction ever allow anything, from what-is [what it is], to come-to-be something apart from itself; wherefore Justice does not loosen her shackles so as to allow it to come-to-be or to perish, but holds it fast . . . Thus, coming-to-be is extinguished and perishing unheard of. Nor is it [i.e. what is what it is] divisible, since all alike it is [what it is and that which is what it is is] all [that is], and there is no more of it in one place than in another, to hinder it from holding together, nor less of it, but everything is full of what is [what it is]. Wherefore all holds together; for what is is in contact with what is . . . It is the same, and it rests in the self-same place, abiding in itself. And thus it remains constant in its place; for hard necessity keeps it in the bonds of the limit that holds it fast on every side. Wherefore it is not permitted to what is that it be indefinite, for it is in need of nothing [to define its being], while, if it were indefinite, it would stand in need of everything . . . And nothing is nor will be except the presence of what-is, since it was just this that Fate did shackle to remain whole and unchanging; wherefore it has been named all things that mortals have established, persuaded that they are true: 'to come-to-be and to perish', 'to be and not to be' and 'to shift place and exchange bright color'. Where, then, it has its farthest boundary, it is complete on every side, equally poised from the centre in every direction, like the mass of a rounded sphere; for it cannot be greater or smaller in one place than in another. For there is nothing which is not that could keep it from reaching out equally . . .

¹¹The translation is from Mourelatos (1974b).

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Parmenides, Fragment 8¹²

Xenophanes apparently said that his God does not breathe.¹³ Perhaps the remark was meant as a rejection of Pythagorean views—the one stuff that makes up the world does not breathe in any limiting void. The totality is *everything that is*, and there is not anything, certainly not some nothing, standing outside it.¹⁴ If so, a fellow refugee from Ionia, **Parmenides of Elea (born 515-510, active 490-480 BCE)**, might have encountered this criticism, seen no answer to it, and rejoined that it worked against more traditional Ionian views just as much as Pythagorean notions. If only one stuff made up the world it could not have various densities at different times and places as the Ionians imagined, without some admixture of nothing.¹⁵ If there is just one stuff and it varies within itself it *must* “breathe in the void,” so that it would have an alterable arrangement in space, rather than simply being a uniformly continuous plenum. But Parmenides agreed that the Pythagorean limiting void, a ‘nothing’ rather than another kind of stuff, was plainly absurd, for everything that *is* is *something*. How can we permit scientists to include ‘nothing’ on the list of things that are, the things they take to make up the world, and make it central to their explanations of what we observe? So Parmenides concluded that there must be several different kinds of stuff to explain the variety in the world. Indeed, if Xenophanes did not hold there was only one sort of stuff making up the world, but held out for two, as we have seen may be the case, he might well have turned his argument against the Pythagoreans on his own Ionian assumptions, and his solution to the problem would have been the same one adopted by Parmenides. But if Parmenides received some ideas from Xenophanes, he also went considerably beyond them. They would have suggested to him an entirely new method of argumentation, one that promised a road to absolute certainty concerning at least some truths about the cosmos that could not possibly be otherwise, and led him to the

¹²I have added the words in square brackets to indicate how I understand the passage. The word “is” here can be read other ways. I take it to mean “is some kind of thing, has some sort of being,” but it could be taken as “exists,” and that would dramatically change the sense.

¹³Diogenes Laertius 9.19.

¹⁴One is reminded of Lewis Carroll’s *Through the Looking Glass*, and the White King’s opinion that if nobody is faster than his messenger, then it would be well to fire his messenger and hire nobody in his place.

¹⁵Aristotle, *Physics* I, claimed that the Eleatics thought everything that is substance, and that substances did not allow of accidental variation, and then draws the conclusion on Parmenides’s behalf that there must be at least two different sorts of substances if there is variation and change. Aristotle seems to think of Eleatic doctrine as a monistic materialism, like that of Melissus, but I shall argue that if he does, this is a misinterpretation of both Parmenides and Zeno. The reasons Aristotle might have been confused will emerge in our discussion.

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founding of metaphysics.¹⁶

Parmenides was probably a citizen of Elea at the city's founding, when a young man of 25 or 30. He was rich and of distinguished family. The tradition was that he was taught by a Pythagorean, Ameinias, to whom he erected a Hero's shrine. From this we can infer that he was initiated into the Pythagorean mysteries, and that he credited Ameinias with the founding of a new religious fraternity, or perhaps of the founding of the city itself. From archaeological evidence, we know that Parmenides was the founder of a cult of healing at Elea.¹⁷ The sick, under the guidance of the priest, would withdraw, often for some days, into a cavern sacred to Apollo, where they would fast, receiving a cure in a dream. The cult seems to have been a continuation of one in Phocaea, the mother city, whose sacred objects the citizens had taken with them when they left home to escape Persian domination, removing first to Corsica and then Elea. Apollo, as the Sun, resided in the underworld, from which he journeyed each day across the sky in his chariot, and so was a God of the Dead, like the Egyptian Osiris. The sacred cave would serve as a passage to the underworld where one could receive his advice, for he was, again like Osiris, also a God of healing.

Parmenides's views come down to us in fragments preserved from his poem, *The Way of Truth and the Way of Opinion*. The poem opens with the author's allegorical journey away from the human realm of light and night, in a chariot drawn by mares and guided by the daughters of the Sun. They have come from the Halls of Night into the light, and pushed back the veils from their faces to be seen. The chariot travels into the underworld to the verge of Tartaros, the great gap between earth and sky, where Night and Day alternate

¹⁶Thus we may understand Plato's assertion that Xenophanes founded the Eleatic School, *Sophist* 242D. For Parmenides, see Owen (1960), Furth (1968), Mourelatos (1970), (1971), (1974b), Furley (1967), Nussbaum (1979), Matson (1980), Kingsley (1999), Sedley (1999), Palmer (1999) and (2009), Finkelberg (1986) and (1999), and Curd (1998). We know about Parmenides chiefly from extensive fragments of his philosophical poem preserved in later commentators on Aristotle. Parmenides has been interpreted in very different ways by different scholars. There has been continuous controversy, still unsettled, over the most basic tenets in Parmenides's doctrine for more than a century. I follow some of the more recent scholarship here, relying chiefly on Mourelatos, Curd and Finkelberg. Very different readings of Parmenides are given by (1) Guthrie (1965), which takes it that he is arguing about what exists, not what is something, when he talks about what is, and making him into a strict monist who denies the reality of change or the variety of sensible qualities, (2) Owen (1960), who emphasizes his strictly metaphysical argument for this position, making any supposed criticism of the Ionian monists or the Pythagoreans (Raven (1948), Kirk and Raven (1957), criticized in Vlastos (1959)) secondary to his positive metaphysical argument, (3) Palmer (2009), who holds that Parmenides thought there were two realities, one detectable by mind, unchanging and perfectly one, and another detectable by the senses, the two occupying the same space although they are not identical to one another or consubstantial—in the way, perhaps that Anaxagoras's Mind occupies the same space as the material world but is unmixed with it. I don't adopt this view, taking it that Parmenides is no more friendly to the "two worlds view" than Plato is according to Gail Fine. But I do follow his "modal interpretation," taking it that the distinction between what must be, what can in no way be, and what is but does not have to be is fundamental in straightening out the relation between his cosmology and the metaphysics of the *Way of Truth*. See Palmer (2008) for an excellent summary of the different views that have been advanced.

¹⁷Kingsley (1999).

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residence when they are not journeying over the earth—neutral ground where the opposites both dwell, apparently ruled by justice. Here, not in the Light, is where truth is to be found.¹⁸ Justice herself, in her usual role as guardian of the underworld, admits them to the house, and a goddess, most likely Persephone, wife to Hades and mistress of the Underworld, relates to Parmenides both the necessary truth about things, and how things must seem to mortal men.¹⁹ The intention is perhaps that the truth will, in equity, lean to neither side, recognizing neither of any pair of opposing factors as the whole of reality.²⁰ The inspiration of the goddess is presented as the source of truth, but this is a Goddess of wisdom, and she shows everything by argument—no revelation that is not established by reason occurs. A supernatural revelation as we might conceive it is not intended. Nor is there any hint of a direct intellectual intuition of the truth without the use of argument.²¹ It may well be that Parmenides reported a truth that he realized while sleeping or meditating in a sacred cave, and credits the goddess for his new insight, but his reasons for believing it are stated in arguments.²²

¹⁸It is not insignificant that the philosopher must be taken there in the chariot of the goddess. As long as he dwells in the realm of human beings, he could only desecrate the truth he discovered by rejecting the arguments, or falling back into old habits of sensation, reject the conclusion even though he accepted the arguments. So he must first have the truth revealed to him, and only then can he understand and accept the arguments for it. See Broadie (1999) 214–216. This, if it is on target, suggests that we must escape the influence of the senses to rely on reason, rather than a supernatural revelation above reason. The journey motif has been compared in illuminating detail to the same motif in the *Odyssey* by Mourelatos (1970), and a connection of the goddess and Athena, Goddess of Wisdom and patron of Odysseus, is hard to dismiss.

¹⁹Fragment 1. The phrase “how things must seem to mortals” is difficult of interpretation. I suspect what is intended is a reference to things mortals must assume to understand the world, but cannot prove, because they are, if true, not true necessarily but only as it happens. I do not think it intends a reference to false beliefs that mortals cannot help but have, but rather to possibly true beliefs (something like those beliefs must be true) of which mortals cannot be certain.

²⁰This is Kingsley’s reading (1999). It is clear that no journey toward the light is envisioned here, so Aristotle’s identification of light in the *Way of Opinion* with what really is is suspect. Possibly what really is is to be identified there with night, in particular since the senses, activated by light, are what give rise to the illusion of multiplicity—this is the view of Karl Popper, and Sedley (1999). Or possibly it is best, as Kingsley does, to identify what is with neither of these opposites, as something with purely ‘positive’ being, which in no way is not. Note that the god in Heraclitus appears not to be identified, as he is in himself, with either of any pair of opposites, since he underlies them all, and the *apeiron* in Anaximander is that from which opposites separate out, not itself one of the opposites. There are precedents here. Or, as seems most likely to myself, there are two things that are, light and night, and each of these is something on its own, neither being simply the opposite or absence of the other, although the presence of one excludes the presence of the other. This seems to be the view advanced in the *Way of Opinion*. In that case what-is in the first part of the poem should be identified with what is knowable, which, as knowable, must be.

²¹This is suggestive of Plato’s view of dialectic and its relation to knowledge in the *Republic* and afterwards, and opposed to, for instance, the way in which recollection of the Forms is depicted in the myth of the *Phaedrus*.

²²The fact that Parmenides wrote in verse, in dactylic hexameters, the meter of epic poetry, is thus explained. He meant to lay claim to divine inspiration in the same way that Homer had. The poetry of Xenophanes is somewhat in contrast. His critical remarks are for the most part found in *silloi*, a poetic form given to ironic moralizing, and his positive doctrines about God were expressed in odes, which customarily told stories about the gods to honor them and entertain dinner guests. Xenophanes, of course, refused to tell the usual stories about gods involved in strife (opposition to one another) and deception, for this was unworthy of them,

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Parmenides's argument begins with the insistence that we can *know* only what necessarily is:

Come now, and I will tell you—and once you have heard my story, take it with you—the only two roads of inquiry there are for knowing: the first, namely, that it is and it is not possible for it not to be, is the way of persuasion, for persuasion is truth's companion; the other, namely that it is not, and that it is necessary that it not be—that, I tell you, is a path wholly without persuasion, for you cannot be acquainted with what is not, nor say it [indicate it, point it out with language].²³

He asserts here that we can know only what is and cannot fail to be, so only necessary truths, and only necessary beings.²⁴ The whole argument becomes involved in a range of possible meanings for the words “is” and “being,” and we shall have to distinguish among these meanings, and see how it works with each of them. In what follows this argument Parmenides relies on the assumption that we can only know what necessarily “is” in the sense that it *exists*, and so is there to be known, and also in the sense that it is necessarily *what* it is, so that it has a defining nature which belongs to it necessarily.²⁵ So that is presumably what he is trying to show. For instance, we can know water, for it exists, but also because it *is something*, that is, there is something, a kind of thing, that it is, so that we can know what water is. Water is whatever it is (a stuff of a certain sort) necessarily, it cannot possibly change what it is and still be water. So we can identify it as that, securely, without any concern that something that is that will turn out not to be water, or that there might be some water that is not that. It must have what philosophers later came to call an “essence,” which defines it and invariably belongs to it wherever it is to be found, and is not found in anything else, unless it is a sort of water. It is handy to be able to refer to two sorts of being here, existence and “essential being”.

We might suppose something could have essential being without having any possibility of existing, and even that we know something about such a thing, namely, that it doesn't exist, because we know its essence. So “scrangles”, which is what I will name square triangles, given their essence (they are necessarily square and

and so he criticizes the stories of the poets from their own poetic stance, claiming *religious* motivation for his critical remarks. Nonetheless, Parmenides's is no supernatural revelation—the goddess represents the divine power of reason.

²³Fragment 2.

²⁴Greek uses “what is” sometimes to mean “what is the case,” but that is not intended by Parmenides here.

²⁵“Is” can also indicate “accidental” being, as in saying that a ball is red. Accidental predications generally don't make necessary truths, so Parmenides is not interested in them here. Also, I think, he would take it that “the ball is round” is not a necessary truth, even though “as long as it is a ball it is round,” perhaps would be. The problem is that the ball may be destroyed, so that it (the stuff making it up) is no longer a ball (no longer makes up a ball). So nothing that can come into being or pass away has necessary truths true of it.

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triangular at the same time), don't exist, and we can know they don't, since we know that anything with that essence would have contradictory properties, which cannot happen. So we know that there are no scrangles. But Parmenides would have said, if someone proposed to speak of such things to him, that there is nothing that scrangles are (essentially), since "square triangularity" is not really a property at all, not even a possible one. There are words here, but they do not and cannot be true of anything. It must be something, have an essence, to be knowable, and to be something is for it to be possible that it is true of an existing thing. Just like square triangularity, what necessarily is not might seem a candidate for knowledge, indeed, scrangles are one sort of thing that necessarily is not. But in fact what necessarily is not cannot be known, for it is not *there* to be known, and cannot be there to be known, and so one cannot be acquainted with it, or refer to it or talk about it.

Parmenides also thinks that nothing can exist without having essential being. This view might be called "essentialist realism," and is characteristic of the orthodox in Ancient thought, though it was challenged by the more disreputable philosophers, as we shall see. It is a tempting view. Could someone refer to and talk about something, even though there is no description he could advance that identifies it except accidentally? He could say what he meant, and might use a description that does not necessarily belong to the thing to identify it, so he might say that he means to talk about the metal used most commonly to make car bodies. But surely, we might say, if there is such a metal, we can say what it is, that it is steel, for instance, and that is what we are talking about. If people started making cars mostly of aluminum, well, we meant steel, and our identifying description only happened, as things were, to fit what we were talking about back then, and it no longer does, so we should find a new one—or we could fall back on identifying it as steel, which *cannot* fail. Often, though, we really can't identify an essence of a thing at all readily, and if we can talk about particulars that we are aware of through the senses, this particular thing, we often depend on appearances it presents (and doesn't have to present) in ignorance of what it *is*. So I might speak of those funny reddish-brown wiggly things that hide under logs around here. Perhaps it is a type of caterpillar, or perhaps it is a small rodent or snake or millipede. I don't know. But I can still talk about it. At this point Parmenides would say that I can, but in talking about it I presuppose that it has an essence, it is *some* sort of animal essentially. If it turned out there were half a dozen different sorts of things that I was talking about, some caterpillars, some bits of fuzz off hunting jackets, some little reddish-brown mice, and so on, then *each* of these would have an essence. One does not have to know or use the essence to refer to it, but it has to *have* one if one refers to it, for in talking about this thing I have referred to, I assume it is *one* sort of thing, and so *at least* one sort of thing. It is not nothing. If it is not one sort of thing, there is nothing (no one thing) that those funny wiggly things are, and I was mistaken to assume there

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was and inquire after it.

So let us come back to the argument stated in the quoted fragment. Parmenides first claims that only two sorts of things can be known, those which necessarily are, and those which necessarily are not. He then claims that we cannot know the latter, after all, since we cannot know what does not exist. We cannot even know, presumably, *that* it does not exist, though we may know, perhaps, that it is none of the things that do exist. There is no fact about it, its non-existence, precisely because it is not there to enter into any fact.²⁶ But surely there are some things that do not exist, but might have existed, or did exist, and so presumably have essential being. Are they things we can know? For instance, surely we can know of unicorns that they have four legs (if there are any), and of dinosaurs that they have three toes on each foot (though they are all gone now), since whatever the essence or nature of a unicorn or dinosaur is, it surely follows from that nature that such things have four legs or three toes. The usual answer to this would be that if we can know things about unicorns, it is because we can form our notion of a unicorn from acquaintance with horses, and with horned animals, so perhaps this is a kind of composite essence, and we can't know anything *with a simple essence* (like air or water) that doesn't exist.²⁷ Dinosaurs are a little easier, for they did exist, and whatever essence they had then, is still their essence. Even if there are no dinosaurs about to have that essence, if there were, they would. Now Parmenides's claim is that we cannot indicate or be acquainted with what *cannot* exist, not that we cannot be acquainted with what *does* not exist. What does not exist, if it *can* exist, and so can have an essence or nature, is presumably something we *can* be acquainted with (though only when it exists, of course).

So, why is it that one can know *only* what is or is not *necessarily*, what is necessarily true or false, or what necessarily is in some way? Why can't we know things that just happen to be the case, but are not necessarily so? This view does not depend on the assumption that it must be *there or be the case* to be known, for that is only deployed to rule out one of the two alternatives at the end of the passage, both of which already involve necessity. Parmenides seems satisfied simply to assert that it is so, without arguing for the position. So we have to guess. There are two likely guesses, and no reason why both of them should not be right at the same time.

In the first place, what he has in mind may very well be connected with the development of

²⁶We should observe that this is a view shared with some perfectly competent modern philosophers, such as Bertrand Russell.

²⁷This would be Descartes's, view, for instance.

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mathematical reasoning among the Pythagoreans—it has impressed him that in mathematics we get real knowledge, because we can *prove* what we claim, which means we can show it is not possible that it is false. From the definition of a triangle, stating its essence, which cannot possibly fail to belong to a triangle, we can prove various theorems about triangles, for instance, that whenever two angles in a triangle are equal, their opposite sides are equal as well. So what is knowable is the provable, and provable truths are necessary truths, the standard technique of proof being to show that a contradiction follows if it is not so, or that it follows from truths we already know to be necessary, such as the definition of triangle. What about the objects of knowledge, why must they necessarily be? Well, one might argue that if anything is necessarily true of something, it is always true of it, and it cannot be true of what is not, so the thing it is necessarily true of must be, i.e. exist. Do triangles or circles exist necessarily, then? Well, whatever leads us to say they are, it is certainly not our experience of them through the senses. Rather, we say they are because we seem to know them, that is, we know what they are, and we can always talk about them, as something like permanent possibilities embedded in space, if you wish, but still as things which always are (what they are).²⁸ So there must be an apprehensive ability aside from the senses, by which we are acquainted with such things as triangularity, say, and perceive those natures, and those natures must be there to be acquainted with in this way. And, to be acquainted with them in this way, they must have an essence—triangularity has to be something (a possible property). They are, at least in the sense that they are available to reason, the knowing faculty, as objects of reference, things that can be talked about, and it is sufficient for us to talk about them that they have an essence. Instances of them need not exist. (Perhaps triangularity is *not* available to the sensory faculty as an object of reference, for one cannot see or hear a triangle.) However knowing works, it can only make us acquainted with a thing if the thing is there to be acquainted with. But is triangularity something that might not exist? Triangles are, one assumes, but surely not triangularity. For it to exist just *is* for triangles to be possible, or capable of existence, and given that triangularity really is something, this is necessarily possible. So the upshot is that, on the model of mathematical knowledge, there is knowledge that does not involve the senses, a knowledge of necessary states of affairs provably so, and of things that necessarily are.

A second line of argument might go as follows: If we are to know something, we must be able to talk

²⁸Bertrand Russell, who is very like Parmenides in any number of ways, held that redness was something we could know in this way, as a possible property, even if it did not exist. So we become acquainted with the essence, redness, as it were, by becoming acquainted with red things, as a matter of fact. But we might deduce from other facts that red things are possible, perhaps, and then that acquaintance with red things could be bypassed. Being acquainted with redness, and with red things, then, are two different things.

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about it, and identify it in some way that is foolproof. We cannot assert about triangles that they necessarily have some characteristic, using the word “triangle,” if we are not assured that the word “triangle” always picks out all we intend to talk about and nothing else. If it sometimes picks out something else (say squares), then sometimes what *we* call triangles may not have that characteristic we have proved of the thing we are talking about. So, to prove anything about something we have to have a way of referring to it through a necessarily identifying description of it. That means that “triangle” always picks out something (say, something three-sided), so triangles necessarily are something (i.e. are three-sided). We must understand triangle, not through some accidental appearance a triangle might fail to have (the blue thing, say), but as it really is in itself, through those properties that must belong to any triangle if it is to be a triangle at all. That seems to describe how we know mathematical objects, and the only way we can really *know* anything at all.²⁹

But though this may be clear in the case of triangles, Parmenides apparently means to speak here of something that our senses detect in the world, at least one sort of stuff, say water. He wants to do natural science. Could water be said to exist necessarily? The word “exists” seems to be applied first of all to *particular* things that *causally interact* with other particular things, that take some part in the world—and it is by extension that we apply it to *anything* we might pick out for discussion, including triangles, which do not causally interact with anything, and whiteness, which it seems odd to say is a particular thing at all.³⁰ Does Parmenides think of what is as a causal agent, or a particular? If not, is he talking about existence at all? Well, there are particular quantities of water, and particular things made of water (ice sculptures), but there is something out of focus in thinking of water, say, as a particular thing. An ounce of water might be a particular thing, but surely not water, taken without qualification. Still, water exists, perhaps because particular quantities of it do. Perhaps we can only identify its essence because it is there, existing, to have its essence identified. Certainly if it never

²⁹Both these lines of argument are difficult, and they may not work at all. There is certainly a great deal more to be said about them. Parmenides, if he intended them, would have thought that something like this is right, without having a full grasp of it.

³⁰Actually, the word “exists” is heavily contaminated with philosophical theories and reflections, though one can catch it in unbuttoned uses now and again. When we do it seems very badly behaved. We only use the word ordinarily (as opposed to philosophically) when there is a suspicion that what we are talking about may *not* exist, as though we used it to make the claim that it is all right to talk about these things, we aren’t involved in some fundamental mistake in even trying to do so. So perhaps the root of the notion of existence is that we can talk about what exists, not that it causally interacts with other things. Is there some property that things can have that make them available to talk about (having an essence, or just an identifying description)? Of course, we can talk about things that don’t exist, and philosophers will even make this the topic of a paper. That is because things that don’t exist do exist (dinosaurs, unicorns, square triangles). Often we seem to conceive existence as being a part of the world—the world being? Everything we can talk about? Everything? And what is it to be a part? Does it have to take part to be a part, or only be able to take part? What would make it able to take part? But I must apologize, I fear I am *doing* philosophy now, and I undertook only to discuss its history.

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existed, we should never have known it was H₂O. For it to be there, there must be particular quantities of water there. So it seems what-is is whatever necessarily possesses a certain essence by which it can be identified, so that it is something, and it exists. Water fills the bill, even if it is not itself a particular thing. Though water must exist to be known, what makes it knowable is not its mere presence, but its *being something*, something we can understand and express.³¹ We know it if we can say what it is.

So Parmenides's argument, so far, is this:

- (1) One can only know (at most) (i) necessarily is something essentially or (ii) necessarily is not anything essentially, or (iii) necessarily exists or (iv) necessarily does not exist.
- (2) One cannot know what necessarily does not exist, so we have to take that fourth item off our list of knowables. And existence necessarily involves having an essence, so that what necessarily does not have an essence cannot exist, so we can take the second item off our list.
- (3) So all that is left that we can know is what exists or is has an essence necessarily.

But what has an essence necessarily, we have seen, would have to be, not a particular thing, since particular things can fail to exist, but a sort, like water or air, which we might say exists even if it is not found in the world, since there *is* that kind of thing even if nothing is of that kind.

This reading fits the view Plato takes of Parmenides in his later dialogues. So in the *Parmenides* Plato has Parmenides say,

if someone will not admit that there are general kinds of entities... and will not specify some form for each individual thing, he will have nowhere to turn his intellect, since he does not admit that there is a character for each of the things that are that is always the same, and in this manner he will destroy the possibility of discourse altogether.³²

The view also fits Aristotle's remark that Parmenides considered what is one in definition, and so insisted that each thing we think about be something definite, with a definition, not something indefinite.³³ This would rule out the possibility of a Pythagorean limiting void breathed in by what is, for such a nothing that lies outside

³¹For this, see Palmer (1999) 31, note 1, Kahn (1981) and (1988).

³²*Parmenides* 135b5-c2. Trans. in Palmer (2008).

³³Aristotle, *Metaphysics* I 5. In keeping with the previous note, we might say that Aristotle thought, like Plato, that Parmenides was right to insist that each thing we think about is something definite, and even that we must think about it as a definite sort of thing to think about it, but Aristotle and Plato denied that we have to *identify* what we think about by stating its real definition, allowing that we could refer to it as *whatever* falls under given sensible appearances or accidents. Still, we assume as long as we are talking about the same thing that it has the same real definition, whatever that might be. Every sample of real alcohol has whatever chemical constitution defines alcohol. John Palmer (2008)

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what exists seems to be something with no nature of its own by which it can be identified or known. It is also to be noted, though, that it leaves it open that there might be many different things of different sorts, say Earth and Fire and Water, as long as each existed, or was of a unified kind, entirely of a definite nature, and unchanging in its nature.³⁴ Moreover, each sort of thing would have to be the sort of thing it is in itself, not in virtue of some opposition to another nature. If Night is taken as the absence or opposite of Light, then all that really is (the only nature really identified here) is Light. But Night might be identified as its own sort of thing, which is possible quite independently of the possibility of Light (even if, in ignorance of its nature, *we* can only conceive it as other than Light). So Parmenides's attack is on the assumption that there is only one sort of thing that is. He probably has in mind primarily the Pythagorean system, with its postulation of what is and the impossible what-is-not to provide limits to what is. Secondarily, as we have seen, it rules out any physical explanation based in a monistic system like that of Anaximenes or Heraclitus, which allows for only one sort of underlying reality, since such a system cannot allow for change and variation in things without introducing a what-is-not, even if the Ionians do not see this. It does *not* cut against the pluralism we shall see in Empedocles and Anaxagoras.³⁵ Nor does it cut against a reformed Pythagoreanism in which the limiter of what is is provided

³⁴Aristotle seemed not to appreciate this, and to take it that Parmenides meant to assert that there was only one real nature. Plutarch, *Against Colotes* 1114D, remarks that "Parmenides...abolishes neither nature. Instead, assigning to each what is appropriate, he places the intelligible in the class of what is one and being—calling it 'being' in so far as it is eternal and imperishable, and 'one' because of its likeness unto itself and its not admitting differentiation—while he locates the perceptible among what is disordered and changing" — cited in Palmer (2008). Plutarch has his own fish to fry, and is interested in establishing that the world of Forms and Matter are equally real, and assigns this view (which he agrees with) to the Parmenides of Plato's dialogue, and Plato himself. Presumably the dialogue connects to the historical Parmenides inasmuch as the historical fellow asserted the equal reality of Night and Light, which Plutarch would have taken to stand for Form and matter. But to take the Light to be Form, and Night to be what simply lacks Form, with no real essence of its own, is to make the mistake Parmenides repudiates. Matter must have a positive essence of its own (as Aristotle points out, for other reasons, in *Metaphysics* I 9), and this means that Platonic prime matter cannot be thought or referred to. Palmer reads Plutarch as agreeing with Aristotle's reading of Parmenides, though, and notes that Simplicius later makes the same interpretation of Parmenides, which is standard among the Neoplatonists. So, assuming that it is indeed a mistake to suppose that an essence can be simply a negation of another essence, Aristotle, following Plato, assigns Plato's mistake (which he recognizes as a mistake) to Parmenides.

³⁵Just the opposite has often been supposed to be true, since Aristotle refers to Parmenides as a monist, not a pluralist. But he is monist not in the sense that he thinks that there is only *one* sort of existing thing, but rather in the sense that he thinks *each* existing thing is of *one* definite sort, not differing from itself in any way, a *distributive* monist, as it were. He does not deny a plurality of substances, but he does deny any plurality within a substance—and that is how Empedocles and Anaxagoras proceed as well. Aristotle would allow a plurality within a substance as long as it is an *accidental* plurality, and would charge Empedocles and Anaxagoras with relying on such an accidental plurality to construct their physical systems—for Empedocles it is a plurality in terms of location, which can change over time, and for Anaxagoras it is a plurality in terms of sensible appearances, so that a substance can appear to various degrees at different times and places.

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with its own definite nature, as in Philolaus.³⁶

What then, can be known about a subject of true knowledge, assuming that there is such knowledge, besides the fact that it must exist, and is necessarily always what it essentially is? Parmenides argues that what is and is knowable, precisely because it can always be known, (1) cannot be generated or destroyed, (2) is whole, and uniformly of the same kind, (3) is unchanging (and if there is only one sort of thing, unmoving), (4) and is perfectly what it is, so that in no way does it fall short of being what it is.³⁷

On the first point he may actually hold that the subject of knowledge is strictly eternal, not merely beginningless and everlasting, but outside of time altogether. In the first known reference to such a notion, if that is his meaning, he says “not ever was it, nor yet will it be, since it is now together entire, single, continuous.” But it has been plausibly suggested that he only means that it is not the case that it was once (having now passed away), or is yet to be (not ever having been), and in that case the subject of knowledge would have existed in the past, and will exist in the future, as well as existing in the present. Plato clearly took it that the subject of true knowledge (the Forms) is *strictly* eternal, so that it is outside time altogether, and cannot be said to exist at any given time at all, even though it does exist, timelessly. This is because, as he argues in the *Timaeus*, it is in no way a participant in the natural changes in the world which enable us to mark different times, the rising and setting of the Sun and the like. There is no way to distinguish different times for the subject of knowledge, for it is never different at one time or another in itself, and it cannot be placed in one time or another as a cause or effect of events at that time.

We should probably assign the invention of the notion of strict eternity to Plato’s work, for the argument Parmenides gives does not prove any more than that it always was and always will be. He points out that there can be no cause for it to have come into being, for what is can only have come into being from what is not (what in no way is), and we have seen that that cannot be spoken or thought of. Note that if it comes into being from what is, through rearrangement or alteration of what is already, that would be all right, but only assuming, of course, that such rearrangement or alteration of what is is possible in the first place. We will see

³⁶Here, though, it would have to be supposed that the limiters and the limited are both unchanging real natures, for instance, shapes and sorts of stuff in Philolaus. Philolaus allows quite perceptively that it is difficult or impossible to understand how such independent real natures are joined in particular sensibles.

³⁷The is the program laid out, and then executed, in Fragment 8. It should be noted that what is, and what is knowable, on Parmenides’s assumptions, is always taken to be a kind of stuff, or else the entirety of all that is, the entire universe. A complex particular with unlike parts, such as a squirrel or a chair, never enters the discussion. No doubt Parmenides thought that such a thing simply was the sum of a bunch of quantities of stuff, as we shall see Empedocles did, and so did not need separate treatment.

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alteration of what is ruled out in a moment, and the rearrangement of what is will turn out to rely on there being several sorts of stuff. The same arguments would apply to any part of what is, for each part of what is is—so no part of what is could fail to be, becoming what is not, or come to be from what is not, and so the whole does not increase or diminish. It is, all of it together, now, or else it could not be at all. That is, if it exists necessarily, and so is always available as a suitable object of knowledge, neither the whole nor any part of it can possibly, ever, fail to be.

As for the second point, it cannot be divided, for it is all of it alike, each part like every other, and it is not to be found in one place more than another. So it has parts, since it is a whole, but is unbroken in its extent by intervals of nothing. Its parts are spatial parts, and so what-is, if it is to be known, must, it seems, be something with spatial extent, that is, stuff, which can take on geometric shapes and properties. Probably it did not occur to Parmenides that anything could exist except stuff and what is made up of stuff. If there are several sorts of what is, different stuffs such as Light and Night, which Parmenides introduces in the second part of his poem, presumably one *or* the other sort is present at every place, so that no place is there *nothing*, but always something, and any given sort cannot be partially at a place—it is either there, or it is not, and something else is there. So nothing is found *more* in one place than another, though things are found in some places, and not found at all in others.

The introduction of several sorts of what is would also raise a question about the eternity of what is. All Parmenides has shown, it would seem, is that the temporal continuity of what is cannot be interrupted by *nothing*. Always there is, was and will be something, one of the sorts of things that is. If there are several sorts of what is, could one sort arise from another? Parmenides thought not, no more than it could arise from *nothing*, and so meant to argue that each sort of thing always is, and no part of any sort of stuff can be destroyed. Why can't one sort arise from another? Perhaps it is because whenever there are two sorts of stuff they will be opposed to one another in such a way that where one is the other cannot be. Moreover, since in thinking of each sort we identify a different essence, it is not thinkable that one sort should change into another (for change implies some underlying stuff that is first one way and then another, and there is no such thing here), but only that it be replaced by the other. It is hard to think why such a replacement would happen at all, or why it should happen at one time or place rather than another, so perhaps we can argue that it does not happen from the Principle of Sufficient Reason. In favor of this is the fact that Parmenides does deploy that principle when he asks why what is would arise from nothing, assuming it could, at one time rather than another, but we shall see that he does not mind denying the Principle of Sufficient Reason outright in some

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instances. So perhaps there is some confusion here.

As for the third point, it is unmoved, since there is no place into which it can move which is, up to now, empty of it. If there were such a place, what cannot be an object of knowledge would be there, what is not, and since such cannot be known, it cannot be known, or even conceived by the knowing faculty, that what is can move into another place. Necessity, he says, “holds it in the bonds of a limit, which encloses it all around,” so that it cannot move. Applying this to the two sorts of what is, Light and Night, it would seem that what is is unmoved, that is, all of Light and Night together, though Light might move, or Night, each by taking up a place previously occupied by the other. Why such motion should take place is something of a mystery, but here Parmenides seems to attempt an explanation when he introduces the “Goddess” in the midst of things to do the job, as we shall see, so he apparently thinks it does happen. But interchange of place is all that can happen with several sorts of what is—there is no coming to be or passing away of any of them or any of their parts, and no qualitative change. So no place can be taken up by *nothing*, for one cannot speak or think such a thing. Light is, of course, but it is not what is, all of what is, but only something that is, one thing that is, and the same is true of Night.

The fourth point is that what is is perfect, and fulfilled—that is, whatever is possible to it, is necessary to it. No possibility remains unfulfilled, so that change might be in the offing. So what is the object of knowledge is not “lacking” in any way. This rules out qualitative variation within any single sort of what is, though different sorts might be fulfilled in different ways.³⁸

A fifth point is made in the discussion of perfection. In a passage that some take to be metaphorical but seems to me literal, Parmenides argues that what is known forms a perfect sphere. The reason is that there must be a furthest limit to what is. This assumption does not seem to follow immediately from the notion that everything true of what is known is necessarily true, and we shall have to look at it more closely in a moment. Parmenides argues that to be perfect it must stretch as far in any one direction as it does in any other, that is, in every case just as far as it can. But since there must be a furthest limit to how far it can stretch (else how far it can stretch would be a nothing, and indefinable that cannot be spoken of), so that it is like itself in every direction, as it were, it extends uniformly in all directions the same distance, making a sphere. It is to be noted

³⁸This is another fundamental idea in the Western tradition, this time in Western philosophical theology. It is assumed in the New-Platonists, and then in the Christian and other theistic traditions of the West that God, who is being itself (we will try to make sense of that later), is perfect, in the sense that there is no unrealized possibility in God, so that God is entirely actual, and in way, at any time, only potentially something.

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that this argument belongs to knowledge, and so that it should be a sphere is necessary, and it should also be noted that there is no *nothing* outside the sphere limiting it, since such a thing cannot be thought or spoken. So it is a sphere because it maximizes its internal capabilities of extension in every direction, no possible extension being unrealized, *and* because there must be a limit to how far it can extend.

Repeatedly, Parmenides claims that what is known is held in the bound of limits. This is because it is necessarily what it is, insofar as it is known, at least, and so it is the way in which it is bound, held to the demands of justice (which is presumably responsible for the laws of logic), that makes it knowable. It is knowable because it can be defined, or assigned limits.

We must not take it, then, that Parmenides has provided through his identification of its necessary characteristics a complete description of what is. In fact, it is clear, because it can be proven, that there are characteristics of what is that cannot be known, the first here being its diameter, for there is no necessary truth specifying this characteristic, even though what is must have it in order to be appropriately limited, so that what is does not turn out to be merely indefinite, that is, it does not turn out to be necessary that it have a property in a certain range, while having no particular one.³⁹ Once we see the trick it is easy to extend the list of non-necessary properties for what is. What is, it seems, necessarily has a power to occupy space or possess extension, in three dimensions. So it must be some kind of stuff. So what kind of stuff is it? Whatever kind or kinds there may be, we cannot know what they are, since we are only acquainted with these things, in any particular case, through the senses, which do not provide knowledge, for what they report are not necessary truths established by the rigid limits of justice and necessity. Nonetheless, there must be such truths, it seems, and such truths are things we might have opinions about, though those opinions do not amount to knowledge. So the description developed so far of what is, that is, of what is known, is only a description of what it can be known to be, not of everything it is.

So let us turn to cosmology, and ask what Parmenides thought we could say reasonably about the world, how it was constituted, how it developed, and what drove its processes. Parmenides may have thought that we cannot prove anything positive about such questions, but that does not mean that he did not think that

³⁹So we can only talk about things which are definitely what they are, and each of which is only one thing. The whole enterprise involves the examination of the conditions under which we can talk about something. One requirement on our legitimately raising a question, presumably, is that there be an answer to it, even if we don't or can't know what the answer is. Similarly, to talk about something, there must be something we can say about it, and get it right (or wrong). In particular, if we assign it, correctly, to a given range (it's a color, say, or has a diameter) it must take on some definite, single value (at any given time in a given respect) in that range. If it has no particular color, it has no color, like an idea. If it has no particular diameter, it has no diameter.

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certain views might turn out rationally insupportable. He rejected the Ionian/Pythagorean view that there was only one kind of stuff, because he thought the observed variety of stuffs in the world could be introduced into this one stuff only by introducing a nothing into its midst.⁴⁰ Might we not introduce several kinds of stuff, then, to account for the appearance of change and opposition in the world? Each of these kinds of stuff could meet the requirements of what a thing must be to be knowable, as long as each was uniformly the same as itself, fully actualized at all times, ungenerable and indestructible, and so on. It is always possible to know these things concerning anything that *is*. But, of course, those characteristics that determine what sort of stuff it is, setting it off as different from other sorts of stuff, would be unknowable. They would have to be definite characteristics, though, that is, each sort of stuff would have definite properties establishing what it is, which it would never lack, but we could not *know* what these properties were, any more than we can know the diameter of what is. Parmenides considers this option in the second part of his poem, the *Way of Opinion*, suggesting that there might be two kinds of stuff, Light and Night:

But since all things have been named Light and Night, and their powers have been assigned to each, all is full of Light and lightless Night together, both equal, since nothingness partakes in neither.⁴¹

So there is Light and Night, and where Light is there is no Night, and where Night is there is no Light, the two together fill all of space at every time,⁴² and the two are equal to one another. Any portion of either is something that is, and so always is and does not come to be or pass away. Parmenides goes on to develop the cosmology of the *Way of Opinion* on this assumption. (Note, by the way, that this means that Night and Light in the introduction to the poem are the things that make up the world, and are in conflict with one another, and ruled by Justice, and so forth. Light seems to be identified there as what thinks or reasons.)

Here it is well to consider a serious objection to Parmenides's line of argument. Why is it that Night and Light should each be a Parmenidean being, unchanging and uniform in its nature, everlasting, beginningless, complete, and so on? He applies these characteristics to the elements making up the world by an extension of his arguments for the characteristics that can be known of what is. Presumably, then, it must

⁴⁰Fragment 8 lines 22-25.

⁴¹Fragment 9. Note that his cosmogony appears to be as Pythagorean as he can make it, drawing on a standard Pythagorean duality.

⁴²That is one way of reading it. Of course, one might read it as saying that Night and Light are *both* present everywhere at every time, which is perhaps the way Anaxagoras took it. I think Parmenides would have supposed this impossible, but Anaxagoras did not, as we shall see. The passage appears as a motto to the section on Anaxagoras below.

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be because these elements are knowable that they have these characteristics, as Plato will argue that the Forms, being knowable, must be eternal, perfectly what they are, and so forth. But, of course, they are not knowable in the sense that they can, like triangles, perhaps, be something with which we are *acquainted* through reason—at least, it would seem that Parmenides accepts that we are only acquainted with them through the senses. We will find that many philosophers sympathetic with Parmenides later took issue with this, either reducing natural kinds to mathematical kinds, so that we could be acquainted with them all through reason (Pythagorizing Platonists), or postulating an acquaintance with something other than mathematical entities through reason, the Good, perhaps (Plato), or simply the natures of particular things that we sense (Plato and Aristotle). But Parmenides himself seems unaware of the problem, and it would be unwise to pursue it further now.

Parmenides speaks of the “ordering of his words” in the *Way of Opinion* as “capable of deception,” because it names two distinct forms of reality, and of these forms, “one is not necessary.”⁴³ But if one of these forms is not necessary, how can it be spoken of or known in the first place? This has led many people to suppose that Parmenides did not intend the second part of his poem seriously at all, having already established that the things said there are strictly impossible. That means we must choose whether we take Parmenides to think that all things are unchanging and one, and the appearances of change and multiplicity in the world simply delusional, or perhaps something even wilder, allowing what is not to be somehow after all. It does not help at all that Aristotle seems to take the first option here quite seriously in his interpretation of Parmenides. There is a third option, though. Perhaps he means only that it is necessary that there be at least one such reality, not that there be two. The one that is not necessary is not in itself unnecessary, but rather, is unnecessary considered as a second form. The point is, then, not that there can be only one form, but that we are here leaving the realm of necessary demonstration. Necessary demonstration has established that there must be something we can speak of, and so at least one sort of thing, which must be what it is necessarily, but it has not established what is now supposed, that there are several, and most especially has not established that there are just these two, Light and Night. Reality is *something*-fold, for it has to be either one-fold, or two-fold, etc. But we cannot know *what*-fold it is, for it is not provable that it is any one of these options. So Parmenides assumes it is two-fold, because that would be enough, it seems, to explain appearances, and there is no point to

⁴³Fragment 8, lines 52-54.

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assuming anything more complicated than we need to explain appearances.⁴⁴ Parmenides is denying here the Principle of Sufficient Reason⁴⁵—there are these two sorts of thing, and no others, but there is no sufficient reason why this is so. It is not even observable that there are two sorts of reality, since we assume this to account for variety and change in the world, but other assumptions (that there are three things) would also account for this. It is not a necessary, demonstrable truth, and there is nothing we can know that is more basic from which it follows. It's just so, a brute fact. Notice, however, that *something* of this sort must be so. There must be one, or two, or three, or four, or whatever definite number, of underlying substances, each of some definite kind. So a brute fact that is not necessary or knowable is unavoidable. As Plato would later put it when he advanced his own account of the physical world, the theory is put forward as “something like the truth.” The cosmogony laid out in the *Way of Opinion*, then, is presented as a plausible account, as good a guess as any, better than many. It might just be right, something like it is right, and such a guess, if it seems to explain the phenomena, is as close as mortals can come to the truth, that is, truth-ascertained-with-certainty. It is presented so that no mortal will surpass the Goddess's student.⁴⁶

So mortals cannot *know* that all things are Light and Night, though they may form the opinion that this is so, and the opinion may be a correct one. If so, this correct opinion rests on information coming to them through sensory observation. But such observation is not necessarily trustworthy. So, after he has identified the two ways possible for knowledge, and ruled out the way of necessary not-being, Parmenides goes on to suggest a third way. But many think that he, in the first part of the poem, warned against pursuing this way. That is part of what impresses Aristotle. Here are Parmenides's words:

It is necessary to declare and know that being is, for it is there for being, and what is not is not. I urge you to consider this last point, for I hold you back, first, from this [second] way of inquiry.

⁴⁴Another fundamental assumption in Western thought, sometime called “Ockham's razor”—it is reasonable to assume the *simplest* explanation that works for a given range of phenomena. We shall discuss different rationales for this assumption in connection with later thinkers below. Aristotle, for instance, argues against Parmenides that we *need* to assume four basic sorts of stuff, not two, but he is satisfied that it would be unreasonable to assume any more than that if we don't need to.

⁴⁵Formulated in modern thought by Leibniz, this is the assumption that there is always a reason sufficient to prove that something is so, if we can only find it, for it would not be so unless something, as it were, made it so. We have already seen it referred to in an inchoate way in thinkers before Parmenides. Parmenides's significance is, to a great degree, that he made people *aware* of what they had been assuming, and then the bundle of prior assumptions that was clarified turned out to be problematic, because it seemed to involve contradictions, just in the same way that the assumption to be disproved in a mathematical proof turns out to be problematic.

⁴⁶See Finkelberg (1999).

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Here, presumably, we are held back from inquiring on the assumption that what is not can be postulated, and we have seen well enough what is intended here. But he goes on:

And then from this [third] also, the one on which mortals, knowing nothing, wander, two-headed, for helplessness in their breasts guides their wandering minds, and they are carried, deaf and blind alike, dazed, uncritical tribes, for whom being and not-being are the same, and yet not the same, and the path of all things runs in opposite directions. For this shall never be proved, that the things that are not are. Restrain your thought from this way of inquiry, and don't let habit, born from much experience, force you to guide your sightless eyes and ringing ear and tongue along this path, but judge by reason the contentious refutation I have spoken.⁴⁷

Parmenides then introduces the second part of his poem, in which he pursues his pluralist hypothesis.

Here I stop my trustworthy speech and thought about the truth. Henceforward learn mortal opinions, giving ear to the ordering of my words, which can deceive. They have made up their minds to name two forms, one of which is not necessary, and that is where they go astray [from what is trustworthy]. They have distinguished them as opposite in body, and assigned marks setting them apart from one another. To the one the aitherial flame of fire, light, thin, in every direction the same as itself, but not the same as the other. The other is in itself opposite to light, dark night, a compact and heavy body. Of these I tell thee the whole arrangement as-it-appears-fitting, so that no mortal may surpass you in knowledge.⁴⁸

In order to make sense of these passages together we must note first that the third way, from which mortals are banned, is *not* the pluralist hypothesis, but a misunderstanding of it. Mortals have named “two forms, one of which is not necessary.” That is, it is not necessarily the case, and cannot be proved, that there are two forms rather than one. If there is knowledge, then there is one form, at least, but that is all we can prove, all we can know. The rest is opinion, depending on the senses, explaining sensory experience, but possibly wrong. Opinion may be right, but it can deceive, as well, unlike knowledge. And so he goes on to postulate two sorts of things.

Now since all things have been named Light and Night; and their powers have been assigned to each, all is full of light and lightless night taken together, both equal, since neither has any share of nothing.⁴⁹

Now, how is it understood what Night and Light is? If one of these is understood simply as the absence

⁴⁷Fragment 6.

⁴⁸Fragment 8, lines 50–62.

⁴⁹Fragment 9.

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of the other, then it is understood as nothing, it is not assigned any definite kind at all, and cannot be thought. It may, as an object of mere opinion, share in non-being, but it must also be something in its own right. It cannot merely fail to be something. So each must have its own positive description, independent of the other, though whatever fits the one cannot fit the other. Thus Parmenides say “their powers have been assigned to each,” presumably defining powers each has necessarily, given the kind it is. It may be that the presence of the positive qualities of Light rule out the positive qualities of Night, but they cannot simply *consist in* the absence of those qualities. So for Parmenides Light is bright, Night dark, and these two characteristics rule one another out, but each must have its own reality.

The problem is that human beings sometimes assume that they can speak of what is not because they can speak of Night, which is not Light. In doing this they must have in mind what Night positively is—solid matter occupying space is perhaps intended, detectable by touch.⁵⁰ If they are thinking of Night as simply what is not Light, they are not thinking of anything, and will not be able, moreover, to put together any kind of picture of the world, since they will not attribute any powers to Night. The warning against the third option was not a warning against assuming non-necessary truths about the world. Those are unavoidable, as a matter of fact. Rather it is a warning against assuming that what is is somehow defined and made what it is by not being something.⁵¹

We know nothing about how Parmenides thought the cosmos might have developed, but we have a reliable report of its present structure in Aristotle’s history-minded student, Theophrastus.⁵² His cosmos was spherical in shape, with an outer ring of Light, perhaps to be identified with the *aether*, and successive rings moving inward, of mixtures of Light and Night, one containing the sun and stars in a fairly dry aer, the next

⁵⁰This seems to be how Plato works it out in the *Timaeus*. What can be touched can be touched even when there is no light, of course, and some things, it seems, can be seen, but not touched (like a will-o’-the-wisp, or light in general), so Plato identifies fire and earth as the basic elements.

⁵¹Quite another reading of the passage seems possible, though. Might Parmenides have Heraclitus in mind, and his contention that the road up and the road down are the same, when he speaks of their assumption that “the path of all things runs in opposite directions”? (Gomperz thinks he does, (1896) 169 ff.) In that case, these people wish to deny the law of non-contradiction, holding that what is at the same time is not. That would lead to the error I have identified as central, holding that one can fully understand the essence of something as a simple absence of another, positive essence, rather than a second positive essence (we may not be able to say what) incompatible with the first. The thing both is and is not, that is, it is not the only thing that it *could be*, while yet it *is*. Perhaps Parmenides thinks that Heraclitus can hold to his monistic view that fire is the only *arche* only because he does not mind contradicting himself, holding that, at the same time, fire is and is not fire, but water, say, in order to account for the variety in the observed world. But this is all becoming rather speculative.

⁵²The presentation of Parmenides’s cosmogony here depends on Finkelberg (1986).

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containing the moon, clouds and a damper *aer*, the next at the earth's surface, with *aer*, water, and living organisms, and then a ring of Night, the solid earth, and below it a final ring of fire, which accounts for the easily observed volcanic activity near Elea in southern Italy. This corresponds quite closely to the account we shall find in Empedocles, and Empedocles, we shall see, supplements it with an account, possibly one dependent on material from Parmenides we no longer possess, how the situation arose.

In the midst of all this, we are told, is the Goddess, who "stirs all things" and begins "the works of dreadful birth." In a characteristically Pythagorean turn, Parmenides speaks of the Goddess as mixing male with female, and she seems to be a goddess of love.⁵³ She serves, then, the same function as Love in Empedocles, and Mind in Anaxagoras. The Goddess is not a kind of stuff, nor, it seems, is she the source of the laws of nature, since she intervenes in the world by stirring things and bringing them together, depending, one assumes, on the natural effects of this stirring to produce the results she is after. We might hazard the guess that Parmenides (and Empedocles and Anaxagoras with him) does not think that a kind of stuff can contain within itself a *necessary* principle of change or internal development as a part of its nature. If things change over time, it must be due to something outside the stuff that forms the material basis of things, for each thing simply, and always, is the stuff it is. Now they can move about without changing in themselves, but why would they do that? Not because of anything in themselves, and so, especially if there is to be order in their movement, this must be due to something outside them. That this might be a person, persons being given to action, something aware like ourselves, would have suggested itself most powerfully, given traditional conceptions of the gods. And so, with a glance back, perhaps, to Thales's suggestion that there are *daemones* in all things, a dualistic system is proposed, matter with spatial location and temporal extension providing the qualities perceived by the senses, and mind, perhaps for the first time clearly distinguished from the breath-soul, providing motion.⁵⁴

Finally, Theophrastus reports that at the outer rim, as well as in the center, there is a third sort of thing, a *solid*, which is neither Light nor Night. What can that be? Parmenides leaves us a clue to this puzzle in

⁵³Fragment 12.2-6. Parmenides seems committed to the Pythagorean dualities in the chart near the end of Chapter 1, seizing on the most plausible of them for the purposes of a cosmogony, Light vs. Night, which are here characterized as Male vs. Female.

⁵⁴For this reading of the evidence, see the remarks of Windelband (1894) 75, though Windelband applied them to Empedocles first, unaware that they might be applied to Parmenides as well. The Atomist, we shall see, leave motion an unexplained accidental characteristic of atoms. Aristotle complains about this, and develops the notion of a potentiality that might be essential to a kind of thing, and realizes itself when a particular of that kind is in the right situation, and so explains change and motion as necessary and law-bound due to the natures of the things that change.

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the *Way of Truth*. There he argues that reality is a well-rounded sphere, since it is held within limits equally on all sides.⁵⁵ Unlike Xenophanes, who claimed that the totality had no limits, Parmenides finds it inconceivable that the distance to which things extend should actually be indefinite. This is the same inconceivability we must deal with if we imagine what is to be of an indefinite kind. We simply cannot speak of the indefinite, whether it be an indefinite kind, or an indefinite distance. If we are to speak or think of it, it must be defined for us. So what is extends in each direction some definite distance, that far and no further, and since it is perfect, it will stretch out as far as it can, so equally far (given that direction would make no difference in how far it might extend), in all directions, and so is a sphere.⁵⁶ Theophrastus, we guess, takes this absolute limit how far we can go in any given direction to indicate that we run up against something solid, an outer sphere, that prevents further progress, though Parmenides, of course, would not allow that anything outside what is could be out there to do that. Once more we run into a piece of radical contingency like that which governs the number and natures of the distinct sorts of being there are. What about the solid body at the center? Well, similarly, it would be impossible to penetrate inwards *indefinitely* close to the center, so one might imagine a solid body of *some* definite radius, preventing any further inward motion there. What this smallest possible radius is would be something unknowable through demonstrative argument. If this is right, it would presumably be impossible to penetrate indefinitely close to *any* point, and so space would be particulate and granular rather than continuous, consisting of smallest possible places adjacent to one another.⁵⁷

With this much clear, let us turn once again to Parmenides's warning against taking the path of those uncritical hordes "for whom being and not-being are the same, and yet not the same, and the path of all things

⁵⁵Fragment 8, lines 42–49. "Where, then, it has its farthest boundary, it is complete on every side, equally poised from the center in every direction, like the mass of a rounded sphere; for it cannot be greater or smaller in one place than in another. For there is nothing which is not that could keep it from reaching out equally, nor is it possible that there should be more of what is in this place and less in that, since it is all inviolable. For, since it is equal in all directions, it is equally confined within limits."

⁵⁶ Note that the Pythagorean limited, not the unlimited surrounding it, is identified here with what is. I adopt the line of David Sedley (1999) 121. Sedley suggests a sphere is the only figure that can be defined without mentioning some limit preventing its stretching out "as far as possible" in some given direction, and so without reference to a limiting nothing for what is.

⁵⁷Here it is well to note that two senses of "possible" are floating about and must be kept straight. Something smaller than the smallest possible is not impossible because there is some contradiction in the notion of a thing that size, or because it is unthinkable that anything should be that size. The sort of possibility and impossibility that figured in the first part of Parmenides's poem is not at issue here. Rather it is impossible *given the way things contingently are*. Philosophers often distinguish from logical necessity and possibility and natural necessity and possibility, allowing it to be logically possible, but not naturally possible, that two masses not attract one another in accord with the law of gravity, say. If it were not logically possible, then we could prove the law of gravity without sensory observation, as we do mathematical theorems, and that, of course, is not something we can do. In the logical sense, the law of gravity could have been false, but we observe it is true. For Parmenides there is a smallest naturally possible thing, and a largest.

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runs in opposite directions.” One might have thought Parmenides and those who followed him closely, such as Empedocles, would have abandoned the scheme of the Ionians, in which the world is driven by the conflict of opposites. Such a conflict makes it just too easy to take one opposite as the absence of the other. But in fact the conflict of opposites remained basic in everyone’s thinking. Empedocles ameliorates the situation a bit by introducing four elementary stuffs, but the four seem to be defined, as is amply apparent in Aristotle’s form of the Empedoclean doctrine, in terms of opposites, the wet and the dry, the hot and the cold. Perhaps, if we assume that whatever stuffs we introduce are capable of degrees of mixture, this cannot be avoided, and is no problem. If one stuff is A, and the other B, we will immediately generate a range of possibilities, from pure A to pure B, with every degree of A and B between. Perhaps one of the two, A, let us say, is detectable by one of the senses, while the other is not. So Light is detectable by sight (the eyes contain some portion of Light, perhaps), but Night only by touch, which cannot, in its turn, detect Light, for it is the function of body, which is what Night is, to touch. From the standpoint of sight, then (which is due to Light’s recognition of Light), Night is nothing, and from the standpoint of touch (which is due to Night’s recognition of Night), Light is nothing. Light is presumably the purest of fire, while air, mist, and water are mixtures of light and night. So human beings tend to a certain illusion, that one of these is definable as the mere absence or the opposite of the other, due to reliance on the senses—Light is what is, Night what is not.

We have a fragment from Theophrastus’s *On the Senses*⁵⁸ which, working within the framework of the *Way of Opinion*, states that everything that exists has some measure of knowledge.⁵⁹ Even corpses, which are not (i.e. are Earth or Night), perceive what is not, that is, cold, silence, and Night. What is, the Light or, as Theophrastus reports it, Fire, perceives what is, and we apparently perceive the world we do because we are a mixture of Light and Night, of Fire and Earth. (Here what-is-not is not what-is-not-for-reason, as in the first part of the poem, but what-is-not-for-Fire and its sensory capacities, which include hearing and vision and the ability to feel warmth.) If there is more of Light in us, we perceive more of what is, and if more of Night, more of what is not. One should read this as a development of Ionian notions about knowledge, knowledge of like by like, as Theophrastus puts it. That is, we know whatever is made of the same stuff we are, as

⁵⁸Fragment 1. Theophrastus was the successor of Aristotle in the Lyceum, and so is early enough so that his reports are of considerable value. In the course of his discussion he quotes one fragment from the poem, and makes a number of remarks suggesting that he has the poem before him as he writes.

⁵⁹So, Fragment 16, “For as on each occasion is the temperament the much-wandering limbs so is thought present to humans: for the same thing is that which thinks, the nature of the limbs, in humans in both each and every one: for the greater is thought.”

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Anaximenes and Heraclitus held. Moreover, it is tempting to develop an account of Parmenides's views concerning the survival and salvation of a person after death, if we may speak in such terms, modeled on Heraclitus. What is needed is for us to realize our identity with what is, Light or Fire, and upon death, the Fire in us unites with the Fire surrounding the world, becoming pure, and experiencing the unchanging awareness of what is, characteristic of the highest mystical experience of reality itself.

It seems to have been the opinion of Theophrastus, and indeed of Aristotle before him, that the *Way of Opinion* was presented by Parmenides as a stopgap which in fact contained a fatal logical flaw. It takes Light as reality, and treats Night as the mere absence of light, as non-being, a thing without any positive qualities of its own to define it. I have rejected that reading of the situation. What Parmenides intended, I think, was that we are tempted to identify the dead with those who are not, death being a matter of the Light's being separated from the Night which composes our earthy bodies. So it need only be supposed that our true, perceiving selves are Light, not that Night is in fact a mere absence of Light. We might then be tempted to say that after death, what is not (not *us*), that is, the no longer animated body, perceives things like it, other portions of Night, which will thus be what is not (not *us*). Whatever leads us to suppose that Light is what is, and Night is what is not would introduce incoherence into our thoughts about the world, for each must be what it is in its own right. So mortals in particular, those subject to death, have a source of confusion here. They project, as it were, their own subjective view of death, rooted in their identification of themselves with Light, onto the world, and so see body or Night as what is not, rather than merely another kind of what is. But in death nothing ceases to be—it is only that two realities are separated from one another.⁶⁰ We have seen Parmenides speaking of mortals wandering about, dazed and confused, taking what is not and what is to be the same, because they rely on their senses. The point seems to be that mortals mistake Night, which *is* something, for what is not anything, because it is not detectable to their senses (or to particular senses such as sight).

Plato spoke of Parmenides in the *Sophist* as “father Parmenides,” the one who first raised the issue how what is not can be, and first saw the distinction between necessary and contingent truths, and between knowledge and its object, the realm of necessary being, and opinion arising from the senses, and its object, the contingent natural order. It is fair to say that Parmenides invented metaphysics, and his work established salient

⁶⁰This is a lot to build on a little evidence, but it does save Parmenides from contradiction, and does explain some passages in the fragments. Moreover, it provides Parmenides with a spiritual doctrine, for he now has something to say to us about death and its unreality. Moreover, this *may* be what Aristotle and Theophrastus intended. At least they speak vaguely enough so that one could read this into what they say. Moreover, it provides a source for Plato's notion that death is merely the separation of soul and body from one another.

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problems for Western theory of knowledge for millennia to come. It is perfectly reasonable to regard him as the founder of Western philosophy.

3. EMPEDOCLES OF ACRAGAS

Of all mortal things none has birth nor any ends in
accursed death, but only mingling and interchange of what
is mingled—birth is the name given these by men.

Empedocles, Fragment 8.⁶¹

The poems of **Empedocles (ca. 495 - ca. 435)**, *On Nature* (3000 lines in three or more books) and *Purifications* (2000 lines in two books),⁶² were written in dactylic hexameters, like Parmenides's poem, suggesting divine inspiration and serious religious intent. Later accounts of Empedocles's life are dominated by hostile tales based on his supposed claim to be a fallen god, and tell us little about him. He probably made a living as a physician⁶³ and a teacher of rhetoric, and is reported to have influenced Gorgias. Of aristocratic background, he seems nonetheless to have pursued democratic politics, was known as an orator, and participated in the overthrow of a tyrant. As a result, in his later years, he was an exile from his native Acragas (now Agrigento) in Southern Sicily. We will examine first the more philosophical and scientific sides of his work, and then look at its religious import.⁶⁴

⁶¹Translation from Kirk, Raven and Schofield (1983).

⁶²Primavesi (2008).

⁶³In *On Ancient Medicine* 1, 12, and especially 20, a Hippocratic treatise (late 5th century), philosophy is mentioned (by name) and the theory of the four elements, an *hypothesis* about *physis*, arguing that serious medical practice should not pay much attention to such stuff. It mentions Empedocles as a recent thinker who argues that we must know the origin and constitution of human beings to understand how to cure diseases, and objects that one rather learns about nature through the study of medicine. That means, of course, that some physicians (and, the author says, sophists) were paying attention to such stuff, and making their own contributions to physical speculation—that is, assuming the treatise is not a late forgery, reflecting later medical empiricism, as some scholars have suggested, because of its skepticism about the four humors theory and its application to the treatment of disease.

⁶⁴For Empedocles, see Kingsley (1999), (1994a), (1994b), A.A. Long (1974), O'Brien (1969), Solmsen (1965), Kahn (1974b). A new fragment of Empedocles's was discovered in 1990 at the University of Strassbourg, and published in 1999. A translation and analysis can be found in Trepanier (2000). It supports the assertion that the *Purifications* was simply the opening portion of *On Nature*, so that Empedocles wrote one poem, not two. Primavesi (2008) sums up the new picture of Empedocles's theology we get from recently discovered sources, also discussing two other new fragments and a recent reevaluation of catalog of his works in Diogenes Laertes and the *Suda*. We have some 500 lines from Empedocles's poem, more material than for any other Presocratic thinker.

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Empedocles followed Parmenides in all essentials, rejecting any reference to what is not, taking this to entail the rejection of the void and any variation in the density of what is, and holding that every characteristic of anything that is essential, so that a given sort of stuff cannot take on different qualities. He also, however, insists that the senses inform us reliably of variations in the qualities of what is, so that earth, aither, fire, and water, the four roots of all things, can be distinguished from one another through their essential sensible qualities. These four are beginningless, indestructible, and equally balanced in power and quantity. (They are of equal age, and each has its own honor, and they rule in turn—that is, no King can be established among them, as none is eldest, and so, as in any good democracy, they alternate in office.⁶⁵) As in Parmenides, all other sorts of stuff arise as mixtures, he does not say they “are” but that they “become,” and everything found in the world is structured from the four roots. The creation and destruction of everything else that may seem to be is nothing more than the mingling of these four and their subsequent separation. Only the four elements really are, and all the rest are but temporary *situations* involving the elements, not *things* strictly so-called. Thus Empedocles takes the four world-masses of the Ionians and revises them to meet Parmenidean requirements. Perhaps, observing that the Pythagoreans identified four with justice, Empedocles thought four the right number of elements if the universe was to realize justice and be a proper cosmos. Four might be identified with justice because it adds to the conflict between two the two means between those two that reconcile them, like the fourth and the fifth within the octave in a musical scale.

Since he rejected the possibility of a void, Empedocles argued for the possibility of motion even if there is no empty space and no possibility of fitting more into a given space through compression of what is already there. Movement will take place as long as a *circulation* of material occurs so that all available space remains equally full at every stage. As the cause of motion Empedocles introduces two new elements into his picture of the world, Love and Strife. Love and Strife, though they have location, are not intended to be fifth and sixth material elements. They have location, it seems, only in virtue of their influence on earth, air, fire and water. Strife, one could argue, had been with us all along in the Ionian systems, or at least in Heraclitus. Empedocles thought that a second principle of action had to be introduced because if Strife ruled the four elements always, then they would, under its influence, eventually separate from one another completely, forming concentric spherical layers of fire, earth, water, and aither. After that, no further change would take place. Perhaps such an outcome could be avoided as long as the elements can transform one into another, as Heraclitus would have

⁶⁵Fragment B 17: 27-29, as commented upon in Vlastos (1947).

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it, and the struggle between elements was a matter of each trying to alter the others into itself, but that view of Strife had to be given up to adopt Parmenidean views. In Empedocles's system, no element can be changed from what it is, and so Strife has to operate solely by moving things around. Thus he interpreted Strife as the tendency of the elements to avoid one another and associate only with their like, and, on that conception, if Strife alone ruled, complete separation and immobility must eventually ensue.

So Empedocles postulated not only Strife, but Love, which encourages the elements to mix with one another, the two working together to produce a repeated cycle of events. When Strife dominates, the four elements are separated into concentric shells, but then Love begins to move into the sphere, and to mix the elements together, until finally Love dominates entirely, producing a static, even-handed mixture something like Anaximander's Unlimited. This mixture gives way to increased separation into lumps of one or another single element as Strife enters, and these lumps come together in a whirlpool to form the concentric shells once more. Love and Strife act like Anaximandrian opposites. They compete, and, since they are both immortal and equally matched, the result is an unending see-saw of dominance by one and then the other.

Empedocles held that each sort of stuff, whether it be bone, wine, blood, or whatever, could be defined as a mixture of the four elements in a definite proportion. An actual piece of bone, for instance, would consist of many very small nuggets made up of the four elements in the suitable proportions. These nuggets don't break up in any ordinary physical process, but only when bone was transformed somehow into another substance. Each nugget was made up of smaller pellets consisting of a single element, there being a smallest size that a portion of a given element can attain to. Thus *complete* mixture of the elements with one another is never attainable, even at the height of Love's rule. We can imagine the elements being divided progressively into smaller chunks, but, of course, an infinite number of divisions cannot occur (particularly in the restricted time that Love maintains control before Strife reenters the sphere), and at the end of it all uniform chunks of a certain size must still remain.⁶⁶ Thus it is quite impossible for Love to dominate absolutely, and since the four elements remain within the world, all that Strife can do is to produce a world in which they are distributed in just four masses, arranged in concentric spheres. It cannot break off contact between them entirely, and so it is also quite impossible for Strife to dominate absolutely.

It is Love that binds the elemental pellets together into the larger nugget. Empedocles thus postulated an analogue of our modern molecules, which break down only in chemical changes. In ordinary physical

⁶⁶Aristotle speaks of these as "divisible but never to be divided," that is, they are conceptually divisible, and each has a definite size, but *as a matter of fact* they never actually will be divided. *On the Heavens*, 305a4.

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processes, in which substances move around, but are not altered, his explanations usually depended on references to “pores” or channels. There seem to be two ways to understand these. Perhaps the molecules of a given substance show more or less attraction to one another, so that they could separate a greater or lesser distance from one another, and still hang together in a single mass. Or perhaps the pores are channels within a more or less rigid structure, but channels that are always filled with appropriately sized particles that can move, like pipes filled with water. Moreover, they might align together, as in a crystal, or form a disorderly jumble, as in a piece of earth. So if a stream of fire particles, that is, a beam of light, were to strike the right sort of stuff, say water, or glass, it might slip easily between the molecules in it and pass out the other side without breaking the stuff up, if fairly wide channels are easily formed. Or, it might find no ready passages at all if it would be required to break the stuff apart to get through it. In that case it would be reflected, or it might penetrate a little way in before getting stuck. In such cases we would have ordinary, opaque materials. Very active fire might break the molecules apart from one another, in the way that a strong stream of water scatters gravel, and so cause water to boil, or even bring about chemical change by penetrating into the molecules themselves and breaking them apart, as when wood burns. Fire is the active element, the one responsible for most of the changes that occur in the world, and the Sun drives most natural processes.

The Empedoclean world-cycle retains elements of Pythagorean cosmogony. If we start with Love dominant in the perfectly mixed sphere, which Empedocles calls the One, we find Strife on the outside of the One, and then, like the Pythagorean unlimited entering the limited, Strife begins to enter the One and break it up. It does this by causing each of the elements to separate from what is unlike it and aggregate to its like. A gradually increasing whirling motion results, beginning at the periphery, and the heavier elements settle to the center, as in a whirlpool (so here he follows the Ionian model). Eventually the elements are entirely separated into layers, with earth at the center. Then Love, trapped in the center, begins to reenter the Cosmos from the center, and its influence increases until all is blended perfectly and a single living being, a god embracing the whole world, is established. Then the cycle resumes, as Strife enters once more at the center, “shaking the God in all his limbs.”

At present, it seems, we are near the end of the period of increasing Strife, or perhaps at the beginning of increasing Love.⁶⁷ First aither (that is, what we might call air) separated out as an outer sphere, and then fire,

⁶⁷As Empedocles says in Fragment 17, there is a double coming-to-be of mortal things, and a double passing away, for the union of the four roots brings one generation into being and then destroys it, and the separation of the elements brings another into existence, and then destroys it. I assume that these two processes are mirror images of one another, so that the present stage of the

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which is heavier, separated out below it. The fire caused the outer aither to become crystalline, baking it, and left pockets of fire embedded in it, the stars. It then pooled at the bottom, forming the sun, and in doing so, set the whole system of crystalline spheres that had formed into revolution. The revolution will go faster and faster, contributing to the separation of the four elements. At the center there is also fire, which is observable in the volcanic activity and hot springs so prevalent in Sicily. The fire in the center does not separate out at first because the rotation is not fast enough there. Things move faster on the edge of the rotating mass, and so the separation begins there, and then gradually moves inward. Water is gradually being squeezed out of the earth, and the fire is gradually finding its way into the sphere below the aither. (*Aer*, at this time, is still conceived as a form of water—as mist and fog. Our air forms the lower reaches of aither.) Living things arose when fire trapped below the earth forced its way out, leaving in its path mixtures of the elements like that in the God. Empedocles must have noted that living things, to survive, need all the elements, moisture, warmth and light, solid earthy substance, and air, so that living things breathe. This suggested to him that the source of life is whatever is responsible for mixing these together in the right proportions and the right way, and it is this source he calls Love. From this mixture of the four roots, various tissues form, blood, flesh, bone, and so on, and these combine together in various ways, those combinations that happen to be well adapted for survival continuing and reproducing, while the others perish.⁶⁸ Love, of course, is responsible for the structures that form in animals as well as the blending of stuffs that produce the various tissues. Indeed, Love must have been a model for Aristotle in his conception of Substantial Forms, which are responsible for both the formation of tissues and the organization of the body of an animal or plant. It may be that Empedocles sees the development of the biosphere, providing a home to parcels of Love, as the turning point in the process, so that the biosphere will gradually expand until Strife is once more pushed to the edge. The world, as it were, breathes, pulling the air and fire into the center to combine with things and form living beings, and then pushing it out to the edge under the influence of Strife, leaving the inner parts without life.

It may be that the dominance of Love in the One does not mean that the mixture of all things is uniform, but rather that it forms an organic unity of many different sorts of things, the world becoming a single living being, or perhaps a perfect ecological union of living beings. Empedocles spoke, notoriously, of parts

world occurs within each, though that would not have to be true, of course. In any case, Empedocles's reference to the current crop of creatures having fallen from heaven, because they trusted in Strife, suggests that we are in the period of increasing division.

⁶⁸This account follows Kingsley's work, though, as anyone reviewing the literature will realize, there have been many different interpretations given of Empedocles's cosmogony.

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of bodies forming first, and only later becoming associated, so that legs and heads were lying about in separation before they became joined in animal bodies. The picture seems absurd, and is mocked in Aristotle. Even Lucretius, who follows Empedocles closely, will go no further than to hold that monstrous births were more frequent in the past. Perhaps Empedocles's intention was that the first attempts of love to form animals were incomplete, and so the results were short-lived. The result would have been monsters, perhaps even the formation of heads or limbs detached from bodies, because of a shortage of one or another of the elements, since thorough mixture had not yet taken place (or no longer took place), not even at the interfaces of the elemental masses where mixture was most effective. Drying up, or a shortage of air or fire, does, after all, result in death. But perhaps this cosmic process is instead an image of the formation of this gigantic animal, the various animals which are its parts uniting into a single complex living systems, in somewhat the way that the individual cells of the body unite into a single organism. In that case Love not only produces a mechanical mixture of things, but produces ecologies and organic bodies with interacting and interdependent parts.⁶⁹ If this is not what is intended, and the biosphere we know is a temporary affair on the way to total separation of the four roots, we have no indication in the surviving fragments how Love accomplishes the reintegration of things once their separation by Strife into concentric is complete. But since Strife seems to begin with a rotation that produces separation (and is reinforced by separation), perhaps love begins with a slowing of the rotation, which allows things to mix, as the slowing down of a centrifuge might, reversing the process of separation.

Empedocles, like the later Atomists, sought out mechanical explanations even in the realm of biology, and though Love seems to serve as the principle of organization in living things, it apparently performs its feats of organization through mechanical processes, with the aid of a system of natural selection that would account for the apparent design in things. Love tries on *every* combination, but those which are well adapted to survive and reproduce are the combinations that persist. In his system the separation of elements in the whirlpool from the Ionians is used to explain the gross anatomy of the world, while a subordinate and simultaneous mingling of the elements at the earth/air interface explains the origins of the biosphere.

The Pythagorean-Orphic complex of religious belief we have already observed in Italy has another representative here in Empedocles, with his doctrines of reincarnation and our origins in a fallen divinity to which we can hope to be reunited. Strife is a force for evil, and Love for the good. The dominance of Love

⁶⁹Indeed, it is hard to take the notion that Strife, when it re-enters the sphere, shakes the God *in all his limbs* literally if God is one uniform mixture throughout.

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is prepared by creatures' atonement for their sins under Strife, for the fallen god who trusted himself to Strife must endure many lives as plants and animals, and only with the progress of evolution is he later born as men, and then prophets, physicians, poets and princes among men. In the end, it seems, all merge together into the One, only to split apart again under Strife in the next cycle. The Rule of Love and the Rule of Strife each lasts for 6000 years, and the state of unity, the Sphere, as well as the period of complete separation, during which the four Gods rule, each lasts 4000 years. Empedocles identifies the God who falls and then is restored as Apollo. The four elements, when entirely separated from one another, are identified as bright Zeus (fire), life-bringing Hera (air), Hades (earth), and Nestis (water), "whose tears are the source of mortal stream." long-lived gods just as the Sphere is. Which is which is a bit difficult to make out. Apollo, or the transmigrating soul is apparently Love (and so immaterial),⁷⁰ who is said to be entirely expelled from halls of the four gods, and to rejoin the divine company with the emergence of the Sphere. Apollo is split apart into many souls, which endure repeated incarnations until they all merge once more in the whole. Thus with Empedocles, all the rest of us too are the exiled God. This theology is evidence that already the Homeric religion is being treated allegorically by intellectuals, the Gods being identified with the world masses.⁷¹ The Pythagorean themes here are clear, the cycle from One to Many and to One again, and the divinity and transmigration of the soul (Pythagoras was identified with the Hyperborean Apollo) with the necessity of purification from its sins of violence and strife to finally restore itself to the divine company.

Empedocles makes Love responsible for knowledge. He follows Parmenides in the usual Ionian assumption that like knows like, an assumption that works well enough for Heraclitus, for instance, who assumes that all things are Fire. But Empedocles faces a problem that doesn't worry Heraclitus, for how can the different elements know one another? And what are *we*, who can know them all? Perhaps the answer is that the elements do *not* know one another, and we ourselves, who *do* know each of the elements, must have portions of each as constitutive parts, all united by Love. Empedocles in fact held that our thought and perception are due to the blood around our heart, blood being an even mixture of all four elements. So, having separated one part of the native activity of Heraclitus's Fire, its will, as it were, into its own category as Strife, Empedocles separates another part of its native activity, its knowing, as a function of Love. The symbolism here suggests that one knows others only through Love, through living with them and drawing them close, through

⁷⁰Here I follow the suggestion of Cornford (1926), O'Brien (1969).

⁷¹For Empedocles's theological side, I use Primavesi (2008).

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merging with them into one. The Spherical God who exists knows, perhaps, nothing except itself, there being nothing else to know at that point. This God would realize the One God of Xenophanes, in competition with nothing else, and so with an inactive will, embracing all things, every portion of it knowing the whole. Empedocles unites the religious sensibility of the Ionians with that of the Orphic and Pythagorean tradition.

Empedocles's explanation of the everyday sensory knowledge that we have of the world rests on the channels. All things are continuously giving off streams of particles, it seems, and when a stream of particles from a particular thing makes contact with another, those particles are recognized by what is similar to them within that other. Thus, as Parmenides had said, all things are capable of knowledge, but only what is a mixture of every sort of thing can know the world in general. The sense organs are fundamentally filters, which block some, coarser, effluences coming from other things outside them, and admit others into their inner recesses, where they come into contact with the blood. Yet other effluences are so fine that they will pass through the organ without making any contact at all, as a neutrino might pass through a house—it seems a collision has to occur for awareness to arise. All the senses apparently report to the heart through the veins and arteries, and thought and sensation take place there. Empedocles takes it that sensible qualities are real and as they appear. We can reduce some colors to a mixture of others, perhaps, but color is in things, not merely an appearance produced by a thing's structure.

But is it really the blood that does the thinking and knowing? If so, then it would seem that, if the self is what is conscious, it is destroyed when one's body dissolves. But Empedocles did not think it is, so he must have thought either that the self is not the blood or any part of the body, or else the self is not the subject of consciousness. Now Empedocles identifies Love as that which is responsible for the blending of the blood. Love exists independently of the body, and survives its dissolution, but is within the body, and responsible for its organization. So is it Love that is aware of the world and thinks about it, or is it the body crafted by Love that does this? If, as seems likely, it is Love that is conscious, then the shape its consciousness takes seems to depend on the stuff in which it is present, and the impressions conveyed to that stuff from the effluences from other things.

Another problem may be resolved if we assume that Love, and not the body, is what is conscious. Aristotle⁷² points out that there is no one formula of mixture for the human body, since bone, blood, muscle and so on all presumably have different formulae. Love may contribute to the formation of the body, but unless

⁷²*On the Soul* I 4, 408a13 ff.

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it has some sort of plan within it for producing all these various kinds of stuff and then arranging them in the right configuration, it seems hard to make it *the* source of the structure of the body. But Empedocles presumably imagined that the Love which is ourselves could and did dwell in many different bodies. He did not think that what *I* am is in its essence human. My humanity is only a temporary characteristic of the portion of Love which I am, shaped in its knowledge as it is by the body it has currently contrived for itself. No doubt it contrives other bodies at other times, depending on conditions, and above all on the degree to which it is impeded by Strife. So he could grant that Love is only one factor contributing to the formation of the human body, and still, as long as he holds that it is Love, and not the body, that knows and experiences what I know and experience, he could identify that portion of Love with myself.

One might wonder why Empedocles, given his religious temperament, allows the part he does in the world to Strife, the principle of evil that assures a perfect world never exists, or at least that it exists for no more than a little while before being spoiled. Of course, Strife must be allowed a role if the variety and activity of the world of experience is to be accounted for. But that does not answer the deeper question. Why is there evil? Empedocles would surely have replied that Justice demands that Strife be given its due. Justice, on the Greek notion of the thing, demands fairness and even-handedness, and, indeed, guarantees that the long-term outcome will be fair and even-handed, since it guarantees that every attempt to overreach will be punished, but Justice does *not* aim at the good. It is as fair to bad and irrational powers as it is to any others. This point underlies much in Greek tragedy and myth. Even the irrational and shameful must have its place, for if we try to eliminate it entirely, to be perfectly virtuous, retribution will come. So Hippolytus in Euripides's play, devoted to the virginal huntress Artemis, tries to remain virginal himself, incurring Aphrodite's wrath, and the goddess infects his mother with lust for him. It is his rejection of this shameful lust that works his ruin. The irrational and shameful is *in fact present*, and so must be given its just due, just as a thoroughly unpleasant faction within the state must be given its just due if there is to be political peace. One might have thought that Love would satisfy the demand for fairness in Empedocles's scheme, evicting Strife, since those who love one another would not trespass on one another's prerogatives. But the impulse toward Strife, too, has its prerogatives, since it is real, and Love cannot satisfy those prerogatives in any way other than allowing Strife its day, which it will not do unless it is forced to by Strife. So even if Empedocles sees the perfect union of Love as the only end to be desired, so loving the ideal that he has no room to love the actual, imperfect world, despite its opportunities for involvement, struggle, and virtuous action, even if he abhors Strife, he still gives Strife its *just* due.

We might speculate further. It could be pointed out that the perfect world cannot be made available

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to the individual if it always remains perfect. As we noted with Anaximander, the price of existence for an individual is strife. So individuals can come into relation with the perfect world only if they have a view of it as their goal, a goal in which they will lose their individuality, and so be consummated in what might look to be their destruction. Perhaps Empedocles's world is one in which perfection occurs cyclically, but all the rest of the cycle draws its meaning from that perfection. The individual cannot be a part of perfection, but it can be oriented toward it. That orientation requires that perfection be actually achieved, but once it is achieved, the individual must reassert itself, and fall away again, else its life is at an end. Perhaps Empedocles' picture of the world was constructed on physical lines, but the outcome of the construction can be seen as an attempt to realize a religious conception of the world as essentially good as it can be, given the fact that the good must accrue to the individual, and the individual's life must be sustained by Strife.

I have been treating Empedocles as something of a rationalist, looking for a "scientific" world view that will support his Pythagorean religious vision, but it is clear that he, like the Pythagoreans and Parmenides, was something more as well. His poem describes him as a magician, who is passing on his art to a single disciple, as magicians do. He claims that he will teach the young man to control the weather, raising storms and making droughts to take vengeance on his enemies, and bringing rain, healing, and extension of life, to his friends. He even claims he can raise people from the dead by going to Hades to fetch back their souls. Such powers were impious in the traditional Greek view, especially the power to raise the dead—there is too much hubris here. A connection with Asian Shamanism seems inescapable, all the more given that from very early on Empedocles was supposed to have learned from the Zoroastrian magi. Empedocles is perhaps the first fully formed image of the magician-scientist. His approach is rational, inasmuch as he wants to learn as much as he can about the natural world, with a view to finding the place of the human soul in it. But he makes the assumptions of sympathetic magic, that the world is somehow dominated by spirits, personality and intelligence, and that the human soul is itself a part of this world, and at least potentially a god. He is intensely interested in ritual, and draws in a rather catholic fashion on all sources, borrowing whatever he can use or make sense of from different traditional religious practices. The cosmological world view he develops is a saving and magical gnosis, that must be understood to develop magical powers and become immortal.⁷³

There is a story, very early, that Empedocles died by leaping into Etna. He wanted to disappear so that it would appear that he had ascended to heaven, but the volcano coughed up a bronze sandal revealing what

⁷³So Kingsley (1999) Ch. 15.

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he had done. This seems to be a hostile rationalization of a mystery ritual. Probably he was involved in an initiation rite involving death and rebirth, which took place on the lip of Etna. He may have descended into a subterranean chamber. The bronze sandal is a sign of Hecate, the goddess of the underworld whose help is sought in the rite. So he perhaps leaped (symbolically) into a purifying fire, and was reborn immortal and divine. This sort of thing was characteristic of Orphic and Pythagorean practices.⁷⁴

4. ZENO OF ELEA

In reality the book is a sort of defense of Parmenides's argument against those who try to make fun of it by showing that, if there is a One, many absurd and contradictory consequences follow for his argument. This book is a retort against those who believe in plurality; it pays them back in their own coin, and with something to spare, by seeking to show that, if anyone examines the matter thoroughly, yet more absurd consequences follow from their hypothesis of plurality than from that of the One. In such a spirit of contention I wrote it while I was a young man...

Zeno speaking in Plato, *Parmenides* 128C⁷⁵

Before 450 the Pythagorean view of the world made things numbers, and held that arithmetic, the science of numbers, provided the key to understanding the world. Around 450 someone discovered the existence of incommensurable lengths, that is, two lengths such that no unit length is to be found providing a common measure for the two. What this means is that the two lengths in question are not both integral multiples of the same unit length, however small the unit length might be. Such lengths stand in no numerical ratio to one another, and so cannot be dealt with using the theory of proportionate numbers at all. An example of two such lengths are the side and diagonal of a square, for the square root of two is not expressible as any numerical ratio.⁷⁶

⁷⁴Kingsley (1999) Chs. 16-18.

⁷⁵Translation from Kirk, Raven and Schofield. Plato's *Parmenides*, 126a-128c, is our major source for Zeno's life.

⁷⁶The proof is as follows: If there is a numerical ratio of the side of a square to its diagonal, let it be n/m . Now we know by the Pythagorean theorem that $m^2 = 2n^2$. Since n and m are integers, $m^2 = 2n^2$ is an integer, and therefore it must contain the factor of 2 a definite number of times, either even or odd. But m^2 contains a factor of 2 an even number of times (possibly 0 times), while $2n^2$, the same number by our assumptions, contains a factor of two an odd number of times (possibly only one time). So the assumption that there is such a ratio of integers n/m has led to a contradiction, and cannot be true. That there is only one way to factor a given integer was known in the 5th century. The proof appears in Euclid X, Appendix 27, and seems to be mentioned as an example of reduction to a contradiction in Aristotle, *Prior Analytics* I 23, 41a23 ff. But this proof may not be the one initially proposed,

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This discovery meant that one could not understand even something as commonplace as a square if confined to talk in terms of whole numbers and their ratios. The assumption that everything quantifiable could be dealt with in terms of units of a definite size had turned out to be false. The reaction of later Pythagoreans was to shift away from an arithmetical theory of the world to a geometrical one, treating a point, which has no size and is not designed to be a unit of measure at all, as the indivisible one from which the cosmos is constructed.⁷⁷ This resolution of the problem is presupposed by **Philolaus (ca. 470–ca. 385)**, the one Pythagorean who wrote a general account of the world from which some fragments have survived. In the place of the traditional void, he assumes points, which he conceives as limits or limiters of the stuff filling space (or of space itself). Some limiters are derived from more basic limiters, and these, such as lines, which are probably generated by the motion of a point, and have points as their limits or boundaries, that is, the starting and ending points of the motions defining them. Similarly, surfaces might be generated by the motions of lines, and solid figures by the motions of surfaces.⁷⁸ (We will look more closely at Philolaus later in this chapter.) This sort of thing happens in Euclid, who wrote much later, but whose work, a summing up of Greek mathematics at the time, contains much that goes back to earlier times. Euclid often defines lines and surfaces as loci, that is, the result of a motion of a point or line restricted in some definite way. Thus a circle is the locus generated by a

according to most historians of mathematics. Rather, one of several geometrical proofs, depending on intuitions gained from observing a constructed figure, may have been used. In effect, it would have been shown that if two lines are commensurate, successive divisions produced by a certain construction would reveal the precise length of the common measure after a finite number of applications of the construction; but it is discovered that the divisions in question go on indefinitely in the case of a right triangle, so that no common measure must be there to be found through the construction. The earliest geometrical argument seems to have been conceived as a matter of finding a construction that makes the conclusion intuitively evident (a view that persists into the 16th century and later in Piccolomini, and even in the 18th in Kant). See Lloyd (1979) 105-115 for details of the proofs, one using Euclid X 2–4. On the other hand, it seems likely that mathematical arguments were made in the theory of numbers independently of geometry early on, and, on the assumption that the lengths of any finite set of lines could all be expressed as a definite number of unit lengths, with the selection of an appropriate unit, the theory of numbers might have been thought to underlie geometry rather than the other way around. But our sources are scanty, and by the time the earliest of them were produced, this view of things was already rejected due to the discovery of incommensurable lengths, and so the procedure was turned on its head. The well known effort of Euclid was already underway to make arithmetic and theory of numbers a part of geometry, the geometry of unit lengths.

⁷⁷One should not imagine that this indivisible one was conceived as an infinitesimal or some such thing. What the discovery of incommensurables showed was that the units of length, say, were not naturally occurring, minimal lengths, but rather arbitrarily imposed units of measure, made long or short at the will of the geometer. For the implications of this see the discussion of Anaxagoras below. As a result, geometry was constructed by the brilliant Greek mathematicians without reliance on numerical measures for lengths, areas and volumes. Instead, they used congruence of figures to define equality in length and area, and similarity to establish proportions even when the ratios of incommensurable lengths were involved. For a good account of this work, which is fully developed in Euclid, see Edwards (1979) 6-15.

⁷⁸A line is generated by the motion of a point, since it is continuous, and so a mere collection of points will not do the trick, since however large it is, there will be points between those points, and, so it is indefinite (infinite) collection. Points do not *compose* a line, but mark the limits of the motion that defines it.

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point moving in such a way as to remain always at the same distance from a second, fixed point, and a circle spinning around on one of its diameters generates a sphere. In Philolaus, atoms limited by lines and surfaces are constructed, apparently in the shapes of the five regular solids.⁷⁹ This new Pythagoreanism avoided one of Parmenides's lines of argument, since it no longer needed to postulate a void, a nothing, to explain structure. Zeno of Elea's arguments against plurality and motion might have been constructed to drive home a Parmenidean critique of the new, geometrical Pythagoreanism.

Zeno of Elea (active about 460 BCE) was probably a close associate of Parmenides, though some twenty-five years younger, so that he is usually described as Parmenides's pupil.⁸⁰ His book (its title does not survive) contained a remarkable set of arguments, a half dozen or so of which have been preserved,⁸¹ intended to show that not all things can be pluralities. He denies that "things are many," which sounds like he means that there is only one thing. But the intention is not that, but that things are not, each and every one of them, many. Some things are one without being many. Given that the book is intended to defend Parmenides, that would mean not that he thinks all things must be undifferentiated, or there can only be one thing. Rather, it would mean that *each ultimate* reality will be one thing, and not somehow indefinite, and certainly not a mere nothing.⁸² Whatever is many is a collection of these realities. Zeno turns the Parmenidean notion that whatever is must be a definite, single thing to a consideration of pluralities. His arguments do not insist that there cannot be a plurality at all, but they do insist that any plurality must consist in a *definite* collection of unities, and from this concludes that things cannot be indefinitely divisible, so that space is not a continuum, and motion cannot exist. He points out that the indefinitely divisible cannot be identified with any definite collection of parts.

In one of his preserved arguments he assumes things are indefinitely divisible in order to show this impossible. If everything is indefinitely divisible, then everything has parts, and nothing is one, but each thing is a plurality of parts. Of what size is the ultimate part of such an indefinitely divisible object? Zeno argued that such a part cannot be a point, of no size at all, for such a thing,

⁷⁹This is how things are developed in Plato's *Timaeus*.

⁸⁰For Zeno, the best review of the literature is Huggett (2010) and (1999) ch.3, and an excellent collection of articles is Salmon (2001). Matson (2001) takes something like the view presented here, and, for the majority traditional view of Zeno's arguments, see Lee (1936), and the articles in Furley and Allen (1970, 1975) and in Vlastos (1993) vol. 1.

⁸¹Given the probable length of Zeno's book, we may have most of what was in it in the surviving accounts and fragments.

⁸²That is the interpretation that also makes the most sense of "Zeno" in Plato's *Parmenides*, which will be discussed below in Chapter 5.

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if it should be added to something else that exists, would not make it any bigger. For if it were of no size and was added, it cannot increase [that to which it is added] in size. And so it follows immediately that what is added is nothing. But if when it is subtracted, the other thing is no smaller, nor is it increased when it is added, clearly the thing being added or subtracted is nothing.⁸³

Can we, then, postulate an ultimate indivisible part of some thickness?

But if it exists, each thing must have some size and thickness, and part of it must be apart from the rest. And the same reasoning holds concerning the part that is in front. For that too will have size and part of it will be in front. Now it is the same thing to say this once and to keep saying it forever. For no such part of it will be last, nor will there be one part not related to another. Therefore, if things are many, they must be both small and large; so small as not to have size, but so large as to be unlimited.⁸⁴

In what sense are things “so small as not to have size”? We should take this to say that we can always identify a set of parts of a given thing each of which is smaller than any specified size, by dividing it up into a great enough number of equal parts. At least, that is something the argument would prove. How might this be considered an absurdity, though? It might look absurd in itself, but there is no contradiction in here, and one gets used to the idea after a while. Perhaps Zeno thought that it followed that if we ask what *the* parts of a thing are, assuming that *the* parts would have no further parts, but would be the smallest parts. The answer is that there are no such parts, and this might seem absurd. If, on the other hand, *the* parts is the sum of all the collections of parts, however small they may be, this might seem impossible (see the next paragraph), because it would be a collection of an indefinite number of things, which Zeno would have rejected on Parmenidean grounds.

In what sense are things “so large as to be unlimited”? Usually this part of the argument has been read to show that there is something, some one thing, that is indefinitely large, because it has an infinite number of parts, which fits the Greek words well enough, but, it has often been pointed out, does not follow, if by “large” we mean possessing magnitude. Moreover, it is plausible that Zeno, given that he was familiar with the new geometry, would have understood that it does not follow. After all, the lengths of the totality of all the parts identified in the argument, say the first half of a line segment, and the first half of the second half, and the first half of *that* first half, and so forth, clearly adds up to the length of the original line segment, which is finite and

⁸³Simplicius, *On Aristotle's Physics*, 139.9.

⁸⁴Simplicius, *On Aristotle's Physics*, 141.2.

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a definite length. Moreover the two parts we divide it into add up to exactly the original length, and the twenty parts we divide it into add up to that same length, as do the six million parts we divide it into, and so on indefinitely.⁸⁵ In what way then might things be so large as to be unlimited? If we attend to the requirements of the argument, and Zeno's background in Parmenides's thought, it seems clear he must mean that each thing would have an unlimited number of parts, that is, that each and *every* thing (including the parts of things) has an unlimited number of parts. And as we have just noted, this does follow in the sense that each thing will always have more parts than any specifiable number. But why is this absurd? Well, one might suggest that to a Pythagorean it would seem absurd that there should be nothing that can be identified as a simple unity, and so no definite collection of simple unities, to be found. But our account of traditional Pythagoreanism does not support this, for we have noted that the Pythagoreans did not seem committed to the view that there were absolutely simple unities.⁸⁶ Indeed, Zeno probably directed his arguments against geometrically oriented Pythagoreans who would have accepted such consequences. The problem would rather be that Zeno himself thinks this is absurd, on *Parmenidean* grounds, because it involves a pretended reference to an indefinite collection, a collection that cannot be defined as a definite collection of a definite number of elements.

What does "things are many," the assumption reduced to absurdity, mean here, then? It means, not that there are many things, each a definite thing with its own nature and limits, but rather that *whatever* is a reality is intrinsically many, *because it is a reality*. Would anyone have held such a view? Anyone would have who accepted that all things of any size are divisible, as an Euclidean geometer would, and who thought that the only things there are are things of some size, things that are spatially extended. According to such a person, bodies, lengths, areas and volumes, things with spatial dimensions, are *by their nature* divisible into smaller bodies. In that case, Zeno says one cannot speak or think of these things, for they would either be collections of an indefinite size of nothings, or, if that is absurd, collections of indefinite size of parts of various definite sizes, but indefinitely small definite sizes.

There is a way out here. We might deny that "totality of the parts of the thing" refers to anything at all, a perfectly defensible position that we shall see might have been held by Gorgias and Anaxagoras, and later Aristotle. That there are an indefinite number of collections of parts does not mean, perhaps, that a super

⁸⁵That is, the sum of the infinite series, $1/2, 1/4, 1/8, 1/16 \dots$ is finite, despite the fact that there are an indefinite number of elements in the series, for it is 1.

⁸⁶To assume that they did would be to attribute to them a sort of atomism that has been argued for in their case, but seems impossible to defend from the sources.

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collection can be formed of *all* of these, for any collection that can be formed must be of a definite size, and formed from a finite number of other definite collections. Only collections of a finite size can be formed, perhaps, though of any finite size one cares to name. This is one way of putting what Aristotle would later claim is the solution to Zeno's argument—there is a potentiality for divisibility here which can never be *fully* realized, but can always be realized just one step more. But it is a little hard to see this, if it is so. It is quite possible, perhaps even likely, that Zeno was satisfied to stop with the indefinite nature of a many as a clear absurdity, and did not see it necessary to explore exactly why indefinites of this sort are to be regarded as absurd. That they were indefinite was enough for him, and we did not need to demonstrate they are also contradictory.

Getting at the point in another way, Zeno argued,

If things are many, they must be as many as they are and neither more nor less than that. But if they are as many as they are, they would be limited. If there are many, things that are are unlimited. For there are always others between the things that are, and again others between those, and so the things that are are unlimited.⁸⁷

Even if things are many, but say, of a definite, indivisible size, they would still present a problem if we imagine them in space as the geometer imagines it. They would have to be separated from one another by something, or else they would be one. Two points, after all, must be at some distance from one another, and have space, a definite distance, between them, and a third point within that stretch of space that is not identical to either of the two. At least, this must be if they really are two points. If there is no distance between them, then they are the *same* point! (The argument is open to the same objections as the first argument, of course.) Thus, the adoption of a purely physical atomism, it seems, cannot get us out of the difficulty. What is needed is perhaps a geometrical atomism, postulating a shortest possible length for geometrical lines, for instance.⁸⁸

If this is the right analysis, then Zeno should be satisfied with the reply that there cannot always be

⁸⁷Simplicius, *On Aristotle's Physics*, 140.29.

⁸⁸It is at least possible that Zeno has an even more sophisticated point in mind. If two spheres, say, are touching, does that mean, say, that they *share* a point, the same point belonging to both spheres? Or is the contact point not really part of the sphere at all, so that a sphere is, let us say, only the volume contained within its limits, which stand outside it? On the first view, one might suppose that if two spheres are contiguous, they have merged into one thing, the contact point welding them together, as it were. If we suppose that something must separate the spheres, it cannot be the contact point, which *joins* them. So they would have to be a certain distance apart, and so not contiguous after all, and separated by something between them, and since that thing would join them unless it is itself separated from both, the infinite regress is begun. If we try the second view, and make the cube the interior volume alone, then we have made it indefinite, since we cannot say where the last point in the cube is as we move outward. Parmenides's universe is a sphere, but it has a definite radius, and presumably includes the maximum point to which what is can extend. So Zeno may have seen an impossibility in a solid figure being taken to be simply its interior, for then the maximum extent to which a line can stretch within the figure would be undefined.

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something between any two things. There must be directly contiguous realities. Presumably something must mark the boundary between these contiguous things, but that could be a change of the sort of stuff that is present. So a portion of air and a portion of water, say, might be contiguous, and *no third thing need separate them from one another*. There is no need to introduce surfaces, planes and points as limiters coming between realities and setting them off from one another. If there is such a need, the limiters themselves must be realities, and we end up in Zeno's infinite regress. The reply of Aristotle to this sort of thing is that the divider or limiter is not itself a reality. But what is it, then? He does not assume that it is to be found between things, but rather that it is the boundary or limit of a thing, a feature of a substance, not itself a substance. Aristotle objects to the Eleatics that they consider nothing real except substances, and take all descriptions to define essences of substances, and it is on this ground that he could object to this particular argument.

Zeno might well have held, then, that things must have a smallest, indivisible size, and be directly contiguous to one another, without any separators. So what exactly is the smallest size? We are in the same situation here we were in with Parmenides, when we asked what the radius of the cosmos is. The answer seems to be that it must be of some definite size, but what size it is cannot be settled by reason. The indivisible kernel at the center of Parmenides's cosmos will be of this smallest size, just as the cosmos is of the largest size, and that these are the smallest and largest, that they cannot be divided or increased, will simply be inexplicable brute facts.⁸⁹

The second group of arguments we have from Zeno bears on motion.⁹⁰ If we take it that Zeno is working from the Parmenidean presuppositions already identified, these arguments should show that there is something indefinite about movement through space as understood by the geometers. Zeno would presumably have no difficulty with motion taken as a matter of being in one place, and then in another, and so on. So, assuming that the world consists of a finite collection of contiguous undivided things, it could happen that two of these things exchange places, as it were, and we could give an account of the observed world with all its change on that basis.⁹¹ But we ordinarily make assumptions about motion that go beyond that. First, we assume that if something moves from one place to another, it has passed through all the intermediate places. This is

⁸⁹The picture presented here might well match Empedocles, as well.

⁹⁰These are reported in Aristotle, *Physics* VI 9.

⁹¹Or, we might even deny that such an exchange of places is possible, but allow, as Empedocles did, a circulatory motion. Still, if we trace the line of motion of our circulating matter, they will turn out to be "quantized" on this view, not continuous, and a leap from one place to an adjacent place will be needed as the basis of the motion.

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no problem, perhaps, if we take it that there are intermediate places only if there are things between the two things that exchange placed in a motion, and that these places are precisely the places where these things are located. In that case, the moving object has to move by stages, always exchanging places with contiguous things, and there will only be a finite number of intermediate, non-overlapping, places through which it will move. But for the Pythagorean geometer there is always another place between any two places, since space is indefinitely divisible. (I assume here that two places may overlap or be continuous, but as long as the limits of a place are between the extreme limits of the two others it is an intermediate space between them.) We have already seen Zeno work with this assumption in the last argument considered above, and it underlies the argument called “The Stadium”—if space and time are infinitely divisible, and not composed of indivisible units, then we cannot run from the starting point to the goal in a stadium, for we must first complete half the distance to the goal (we must at some point be at the midpoint), then half the remaining distance, and so on, before we can reach it. But that means an indefinite number of distances to be covered, and one will never be able to go through them all in a definite time, a time consisting of a definite number of smallest units of time. At some point, a thing does *not* get to the next place by going to the midpoint first. There are directly adjacent places.

“The Arrow,” a companion argument, seems to work even if we take the position that time is indefinitely divisible, so that the Stadium will not work. It depends on a second problematic assumption we make about motion. Here it is asked when it is that the arrow flying through the air moves. At any given moment, the arrow is at a definite place, and at a subsequent moment it will be at another definite place. But, of course, it is through the motion that a thing gets from one place to the next, and so the motion must occur between the indivisible units of time. But at every time, that is, every present instant, the arrow is at a definite place and nowhere else, so there is no actual time (no present moment) between the two times in which it is moving.⁹² It is never actually moving, for it *is* always in one definite place, and yet it moves! Say we insist, as Zeno no doubt would, that there must be a shortest period of time if periods of time are real and can be spoken of, else a period of time would always consist of further parts, and no definite unity would ever be encountered. In that case, of course, the arrow must remain in one place during the entirety of the indivisible

⁹²Aristotle observed that, taking time and space to be infinitely divisible, there is actually a stretch of time between any two instants, and so the thing can move during this period of time, taking up all the intermediate places between its departure point and its destination.

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period of time, or else it would be several places at once.⁹³

Zeno also considers relative motion. In “the Achilles” it is asked, along the lines described in the Stadium, how it is that Achilles could catch a tortoise if the tortoise is once given a head start, since the Swift-footed Achilles must first catch up to where the tortoise was when he started, then to where the tortoise had gotten while he was getting there, then to where the tortoise had traveled during this second leg of his trip, and so on *ad infinitum*. Thus, on the assumption that time and space are indefinitely divisible, a relative motion would involve an indefinite collection of increasingly smaller movements.

The fourth argument against motion, “the Moving Rows,” seems to assume that space and time are both composed of indivisible units, as Zeno supposes they must be, and imagines two rows of objects, each occupying one unit of space, moving past one another in opposite directions, and a third, stationary row by which their progress can be measured. It is like two sets of runners running in opposite directions along a course with distance markers set up on it. Each moving row proceeds at the speed of one spatial unit every temporal unit, which is presumably the maximum speed a thing can move at, since to move any faster, it must skip over intervening units of space to get from one place to another. With these assumptions, it turns out that some objects in the two moving rows pass one another without ever being adjacent to one another, even though they manage to be adjacent to each of the stationary objects at some time or other. Thus the relative motion of the two rows seems impossible. Here Zeno could have simply granted the conclusion, allowing that the relative motion can occur, and it is not impossible for a “moving” object to pass another “moving object” without ever being adjacent to it.

Or, reading the argument as Aristotle does, if an object in one of the moving rows must be opposite each object in the other moving row for at least one temporal unit if it is to pass it, it turns out that each moving row is moving at half the speed it is moving. To see this, consider what happens as an object in one of the moving rows passes, say, ten stationary spatial Ones at the rate of one spatial one per unit of time. It will pass twenty moving ones in the same time, and if it must be opposite each of these twenty for at least one

⁹³This argument comes closest to catching what may be the gist of Parmenides’s Fragment 8, lines 19–21. The Greek text is a difficult exercise in tense, but might be translated as, “How could what-is be then [when it is] in the process of coming to be in the future? How could it be about to come-to-be? For if it is about to be [or: just now coming to be] it is not, nor is it if it is going to be. Thus, coming-to-be is extinguished and perishing unheard of.” The idea seems to be that at any given time things are as they are, and that is the end of the matter. A thing cannot *now* be in a state of “being about to be.” What, after all, would be the difference *now* between something that merely is and something that is also about to be or in a state of having just become? The difference must be located in what goes on in the future or the past, not in something *happening right now*. Here we can see the source of Plato’s notions about becoming as opposed to being, and Aristotle’s connected notion of potentiality that he employs in his definition of motion. Both deliberately contradict Parmenides’s view here that no change can be happening *right now*.

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temporal unit, it will have traversed ten spatial units, and twenty spatial units, each at a speed of one spatial unit per temporal unit. So it will have traversed the same distance in ten, and also in twenty, temporal units. So the row's velocity is twice the row's velocity. The assumption that must be rejected, of course, is that in the relative motion, an object in one moving row travels at a maximum speed of one spatial unit per temporal unit. In fact, it has to skip every other unit, and so travels two spatial units per temporal unit, though, of course, it does not pass through that space, since it is never opposite one of those two units at all. So absolute motion, relative to space itself, if Zeno allowed such a thing, might have a maximum velocity, one indivisible unit of space per indivisible unit of time. It does not follow that relative motions cannot be faster than that. It could be twice as fast if the two things are moving precisely in opposite directions.⁹⁴

The upshot is that motion, indeed, any 'continuous' change, is impossible. Of course, one might say that Zeno does not mean to reject movement, but only to give a dissident account of its nature, one that violates the assumptions we have identified, but Zeno seems to have thought those assumptions were a matter of everyday common sense, that they really do define motion for us. So motion is supposed to exist by deluded mortals, but they are mistaken. Everything is where it is at the time it is there, and nothing is ever in a 'transitional stage' of motion between two places.

The undivided units of time and space that Zeno argued for were rejected on all hands, even Democritus backing off from it, and though isolated thinkers have appeared from time to time to defend Zeno's position, the view that space and time are indefinitely divisible and motion continuous has been accepted by the vast majority of thinkers. Aristotle, following Anaxagoras, resolved the Stadium by pointing out that the *time* in which the runner accomplishes the task of running to the goal is infinitely divisible, just as the *distance* run is, and so there is plenty of time there to traverse the infinite number of spaces identified by Zeno. There is some separate portion of the whole time for each part of the distance to be run, and moreover, a portion of time proportioned to the length of the distance in question. So one has three minutes, say, to run the first half of the mile long course, and a minute and a half to run the second part of the course, which is a quarter mile run, and forty-five seconds to run the next eighth of the course, and so on. All of these times add up to six minutes, just as all the lengths add up to a mile. Perhaps it takes an infinite time to run the course, but for these

⁹⁴Or, alternatively, perhaps Zeno thinks all motion is to be regarded as relative to some object or other, so that there is no "framework of space itself" to define absolute motion. If that is his view, there is presumably no speed limit at all, since the objects moving in one row can leap over any number at all of objects in the second row. But we don't have enough information to do anything more than explain possibilities here.

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purposes, six minutes is an infinite time. But not all the arguments could be handled so easily. To deal with them, Aristotle was forced to follow Plato in supposing that there are, for a given moment in time, not only facts about what is the case at that moment, but also facts about how things are changing at that moment, which make no reference to what happens at a later or earlier moment.

It should not be simply assumed that Plato and Aristotle were being absurd in such a claim, and that motion at a particular moment can be reduced to talk about locations at different moments in the past or future. For one thing, the mathematical analysis needed here (of such phrases as “immediately after this”) had not been worked out by Plato and Aristotle, and the means to work it out were not available before the later Middle Ages. For another, even given such an analysis, there seems to be a physical reality to rates of change at a particular moment, for a rate of change at a particular moment can have causal consequences, not only directly in the motion of the object, but also, for instance, in the interaction of a charged particle with electric and magnetic fields. Velocity *at* a given time plays a real role in our accounts of physical causation, in basic physical laws, and it seems very hard to insist that such accounts talk about the causal effect of what happens over some period of time, if we do not want to allow causation at a distance in time, not to mention causation of past events by future events. But the structure of space and time is quite a problematic topic for Physicists today, and until they get straight on what should be said here, it is foolish for Philosophers to assert that one or another approach is simply impossible, unless they can identify in it a clear formal contradiction. That, of course, is what Zeno tried to accomplish, but he did not succeed.

Who was the target of Zeno’s arguments? I have suggested already that it was the new geometers that postulated continuous, indefinitely divisible lines, when looking at the arguments against indefinite totalities. Those against motion could well be aimed at the same folks. If, like Philolaus, they take a line to be something described by the movement of a point, rather than a collection of points, this might escape the first set of arguments, but now it is open to the arguments against motion, since the only sort of movement that will describe a line will be the continuous movement, presupposing that the point has the characteristic of moving at a moment in time, that is attacked in them. We might suggest, then, that Philolaus responded to Parmenides in defense of Pythagorean thought, or adopted the views of someone who had, and that Zeno attacked those views. It seems that Zeno’s views are consistent with Empedocles, who holds to a smallest possible piece of each of the four roots, and that Philolaus, Anaxagoras and the Atomists are anti-Zenonian thinkers, accepting that whatever is a definite thing only in application to kinds, not in application to quantities, times or distances.

5. THE ATOMISTS

By convention sweet, by convention bitter,
by convention hot, by convention cold, by
convention color: but in reality atoms and the void.

Democritus, Fragment 9.⁹⁵

Some gave in to both arguments: to the argument that everything is one if what-is signifies one thing, by saying that what-is-not is; to the argument from dichotomy, by positing atomic magnitudes.

Aristotle, *Physics* 1.3, 187a1–3.

Democritus would appear to have been convinced by arguments... drawn from the science of nature... For to suppose that a body (i.e. a magnitude) is divisible through and through, and that this division is possible, involves a difficulty. What will there be in the body which escapes the division? If it is divisible through and through, and if this division is possible, then it might be, at one and the same moment, divided through and through, even though the dividings had not been effected simultaneously... let it have been divided. What, then, will remain? A magnitude? No: that is impossible, since then there will be something not divided... But if it be admitted that neither a body nor a magnitude will remain, and yet division is to take place, the constituents of the body will either be points (i.e. without magnitude) or absolutely nothing. If its constituents are nothings, then it might both come-to-be out of nothings and exist as a composite of nothings: and thus presumably the whole body will be nothing but an appearance. But if it consists of points, a similar absurdity will result: it will not possess any magnitude. For when the points were in contact and coincided to form a single magnitude, they did not make the whole any bigger... Moreover, where will the points be? And are they motionless or moving? And every contact is always a contact of two somethings, i.e. there is always something besides the contact or the division or the point... Since, therefore, it is impossible for magnitudes to consist of contacts or points, there must be indivisible bodies and magnitudes...

Aristotle, *On Coming-to-be and Passing-away* I 1.

Leucippus of Miletus wrote books called *The World System* and *On Mind* about 440 BCE, but died

⁹⁵Translation from Kirk, Raven and Schofield (1983).

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soon afterwards, so that his disciple **Democritus** was left to elaborate his thought. Democritus, a contemporary of Socrates, ran a school at Abdera (of which Protagoras was also a citizen), and wrote widely on every subject. He acknowledged his debt to his teacher in the title of his chief work, *The Little World System*.⁹⁶

The foundation of the Atomist system is the view that bodies cannot in fact be divided indefinitely. This leads to the conclusion that there are indivisible bodies, “undivideds” (*atomoi*), of which all other bodies are composed. But if the atoms cannot be divided at all, but only moved about so that they are in contact or separated from one another, then no division in fact ever occurs in the world at all.⁹⁷ The reason why they thought this, though, was not, what we found Parmenides suggest, that otherwise there would be a reference to what was in no way defined. The Atomists allow for an indefinitely large universe, and an indefinite extension of time past and future. They also allow an indefinitely divisible space in which atoms move about, so they must have been unimpressed by Zeno’s arguments as well as Parmenides’s, then, probably for reasons akin to those found in Anaxagoras. So why did they deny the divisibility of matter? It seems they thought matter, if it were indefinitely divisible, given the indefinite past time that has already passed, would by now have been divided completely, so that nothing would be left.⁹⁸ It would now consist of Zenonian nothings, which cannot add up to something. Given an indefinite past time, all the breaking up of matter into parts that can occur would already have occurred, and so it must be that there is a limit to the divisions that can be made.⁹⁹ So, the underlying realities must be indivisible units of material, the “*atomoi*.”¹⁰⁰ It is not that *space* is only finitely divisible, so that there is a smallest possible space. Indeed, empty space is nothing, and it is

⁹⁶For the Atomists, see Bailey (1928), Furley (1967), Bodnar (2001), Hasper (1999), C.C.W. Taylor (1997a), Eric Lewis (1999), and Sedley (2008). For the primary Greek sources, see Kirk and Raven (1957; 1983).

⁹⁷So Eric Lewis (1999).

⁹⁸Bodnar (2001) reads it thus.

⁹⁹The argument is invalid. Imagine that the undivided particles are now of a certain size, and that for every ten thousand years we go back in time, they double in size. Then, as we go back in time from the present, no impossibility will ever occur, given that space is indefinitely extended. Of course, one might argue that if we went “all the way back” we would have an infinitely large object, but one can’t go all the way back. One can go indefinitely far back, but that only means that however far back we go, we can go farther. If things continue this way into the future, it can continue indefinitely without any impossibility, as well. The peculiar fact is that it is (logically) possible to divide indefinitely, even if it is not possible to ever have completed such a division, as Aristotle says in *Physics* 3.6, 206a18–21, when he claims that the “potential” being of an infinite division cannot actually be realized.

¹⁰⁰Aristotle, *On Coming-to-be and Passing-away* I 1, quoted at the head of this section.

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indefinitely divisible.¹⁰¹

Democritus did not imagine that all atoms are the same, but rather that they came in different shapes and sizes. In fact, there is no reason why they shouldn't be of any shape or size at all, and so one could assume that they come in *every* shape and size. What made a particular atom indivisible, then, if not its being of the minimum size? It must be that it fills space uniformly, without leaving any gaps or flaws along which a division can occur. A continuously connected mass is indivisible. It should be noted that the stuff that makes up an atom is all of it the same kind of stuff. Moreover, none of it is divisible.¹⁰² When two atoms are separated nothing is divided, for they were never one to start with, the point of separation marking a boundary between two things.

The stuff that fills space to make up an atom is all the same then, and it also has no sensible qualities. If it were assigned sensible qualities, it would seem the assignment must be arbitrary, for the same thing appears in one way to one person, and in another to another. So the same water may appear hot or cold depending on whether one's hand is chilled or heated. To avoid that arbitrariness one can only insist that there are no sensible qualities, or, as Anaxagoras does, insist that *all* sensible qualities exist in realities as they are sensed. The latter seems, at first blush at least, to imply that things have contradictory qualities, and the Atomists take the former line. They suggest the real property of the water that accounts for its warm and cold appearances to different people must be the same in both cases, and reject the notion that likeness of the perceiver to the perceived explains perception, for there is no reason to say that either of the two contrary appearances reports more reliably than the other the real qualities of the water in itself. The senses are aggregates of atoms so constructed as to detect other atoms, and nothing in a collision between individual atoms would make one atom aware of

¹⁰¹That is, one supposes, space is not a physical entity with mass or bulk, and so is divisible in a different sense than a mass or bulk is, that is, it is divisible into smaller regions of space. Why wouldn't the argument just proposed for masses or bulks apply to regions of space? Perhaps it is precisely because space is nothing (or, perhaps we should say, not a something, that is, not a bulk or mass), and so all the Zenonian nothings can go ahead and add up to nothing if that is what happens, without imperiling the existence of space. That seems, at least, to be Aristotle's reading of the matter. But perhaps the void is not itself space, but rather something, some nothing, located in space. This would be a direct slap at Parmenides, of course, and a continuation of the view of the Pythagoreans attacked by Parmenides and Xenophanes, but there is no direct evidence for the view, and if we want opposition to the Eleatics, the Aristotelian version, with its indefinitely divisible space, certainly provides that, and parallels what seem to be later Pythagorean developments in Philolaus, for instance. That there is a void that is a sort of stuff seems to have been rejected by everyone after Parmenides.

¹⁰²Sedley (2008) points out that the argument here might trace all the way back to Parmenides, who argues that it is undivided, since all of it is alike (Fragment 8 line 22). This could mean that there is no principle by which we can divide it into this sort and that, since it is all alike, but it might also mean that if any part of it is divisible, then every part of it would be, leading directly to Zeno's impossible conclusion if we assume that things are (each of them) many, i.e. divisible into parts.

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another. So it is a complex of atoms, an animal with sensory organs, that gives rise to sensible appearances, and those appearances are produced in it by other complexes of atoms, the objects of perception. Atoms can only be characterized by their shapes, and by the fact that they are physically indivisible, and so utterly unchangeable. They can, however, move about, and when one atom comes into contact with another, it rebounds from it immediately in a collision, or may become entangled with it. Atoms move, and they change their motion only when they impinge on one another.

The atoms move, according to Democritus, in precisely the way that Zeno had held was not possible. In order to move, they must move continuously through an indefinitely divisible space, and must always go through all the intermediate places to get to another place. Space, though real, is not a thing, but a nothing,¹⁰³ and it has no properties, no bulk or color or temperature, for instance, and so it can be divided indefinitely. Its parts are not *things*, and so need not be definite. Now movement cannot occur by two atoms in a plenum simply exchanging places instantaneously, as Zeno seems to have envisioned it, for that would entail something moving to a place without moving through the intervening spaces. So movement presupposes a void through which the motion can take place. That all things consists of atoms located in a void is demonstrable, given the fact of motion. When two things come right up against one another, then they must bounce off one another, for one cannot penetrate the space occupied by the other, and like any hard objects colliding, they will not stick to each other. One might expect some principle of the preservation of motion to explain why they don't just stop dead still, but change direction, but none seems to be given. It is simply observed that solid objects behave that way. Atoms "stick" together only when they become entangled with one another, so that hooks on them catch each other. This is consistent with the atoms vibrating in such a way that, even though they are hooked together, they never actually touch for more than an instant, and so for no period of time. This instant would be the only instant in which change would occur, for there would be an instantaneous change in direction for the atoms as they rebound from one another.¹⁰⁴

¹⁰³So he holds not-being exists, according to Aristotle *Metaphysics* A 4, 985 b 4. It seems the void is conceivable, it has shape and extent, for instance, and so is not quite ruled out on genuine Parmenidean grounds as a nothing that cannot be spoken of. But it is no kind of stuff. So Democritus's point would be that Parmenides was mistaken if he thought that the only thing there could be was kinds of stuff. This is not so distant from Philolaus's introduction of limiters, which are not kinds of stuff in the way the unlimiteds are, but geometric shapes.

¹⁰⁴It has been argued by some that two atoms cannot touch even for an instant, since they would then be continuous with one another and so would become one indivisible thing, and could not separate again. I am assuming that as long as the touching is instantaneous, they won't stick. But if that is not granted, then it would have to be claimed that the atoms never quite touch, but repel one another at a certain small distance. So C.C.W. Taylor (1997a) 204–5.

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I have spoken of Democritus up to this point, and indeed the dearth of information about Leucippus is such that even some in the Ancient world assume he never existed. But Lucippus is assigned in various sources cosmological doctrines distinct from those of Democritus (agreeing with Axaximander, for instance, that the Sun is above the stars, rather than below them), and may have differed in another, deeper way, concerning the matter of space. It seems that among the attacks made by Melissus on the various naturalistic philosophers, one targeted someone who claimed that there is a void (the empty), into which what is must move if it is to move at all.¹⁰⁵ Now Democritus is rather too late to be Melissus's target, and moreover, his argument that what is not does in fact exist, and is empty space, seems to be a response to Melissus. Perhaps Melissus is attacking Leucippus, who had not made the point about nothing being possible as long as it is something (space) empty, but taken the void to be rather like the evanescent, almost not there, Light of Parmenides, as opposed to Night, which is solid and detectable by the touch. Melissus may be objecting against Leucippus that the void cannot be a sort of stuff so thin, as it were, as to offer no resistance to motion, but must rather be no sort of stuff at all. A follower of Parmenides would hold that everything that is is a kind of stuff, as Empedocles and Anaxagoras did, and perhaps Leucippus was a follower of Parmenides. In that case, Democritus, like Philolaus, made a more radical move away from Parmenidean physics, insisting that Leucippian empty space, which is nothing (no kind of stuff), is nonetheless something.¹⁰⁶

As for the cause of this motion, the Atomists allowed nothing of the nature of Empedocles's Love and Strife, or Anaxagoras's Mind. Motion was simply a quality of the atoms. The atoms could not change in themselves, but they could change in their spatial relations to other atoms, and so movement is natural to them. No laws of motion are proposed, though it seems something like a rudimentary mechanics must have been in mind, with atoms proceeding in a straight line and a constant velocity between collisions, and collisions occurring somewhat as we observe them to occur with macroscopic objects such as billiard balls. It must have been assumed that nothing damped the motion of the atoms over time, so that the total quantity of motion,

¹⁰⁵Fragment 7.7.

¹⁰⁶This is the view argued plausibly in Graham (2008). Perhaps Leucippus held that there was something empty, as opposed to full, identifying space as a kind of *empty* stuff (no phenomenal properties, no resistance, but occupies space), but a non-Parmenidean kind, since Parmenides argues that all is *full* of what is, so that where it is there is some resistance, mass, phenomenal qualities and the like. To be kindest to Parmenides, we would suppose that he thought that only what occupies space and *fills it with something* is conceivable. This certainly seems possible, at least as far as the understanding of him by Empedocles and Anaxagoras goes. Aristotle certainly finds something akin to this absurd in the postulation of the void (and supposes that if it really offers no resistance to motion things would move infinitely fast through it).

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if one can speak so vaguely, remained constant, with completely elastic collisions¹⁰⁷—else, by now all motion would have been exhausted and things would have come to a standstill.

The Atomists seem to take it that identifying kinds of stuff as the ultimate things making up the world, as Empedocles and Parmenides had done, is a mistake. There is only one kind of stuff that can be conceived, namely what occupies space, and it would be a mistake to identify different sorts of stuff by differing sensible qualities, which are no guide to reality as it is in itself.¹⁰⁸ But there must be a multiplicity of realities to explain the world, and there must be change. So the underlying reality is not a kind of stuff, but the physical object made up of stuff. The ultimate realities are particulars, not kinds. To be fair, for Empedocles it may be most reasonable to say that the ultimate realities were *masses* of stuff, in particular since these masses had to be of some definite size for us to think about them or refer to them. If we could talk about water per se, as opposed to a mass of water, then no specification of the amount of water would be necessary to settle what we are talking about. But if the reality is not the kind, but the mass of stuff of that kind, to say the reality is a definite, unchanging thing we must specify its size and shape. Democritean atoms have a definite, unchanging size and shape, and so are also true, fully defined realities in the Parmenidean sense.

Are the atoms strictly indivisible, or only as-it-happens undivided? One can ask for each point in a single body whether it is logically absurd that it be divided there, and the answer is always that it is not. One can also ask if it is logically absurd that it be divided at every point at which it is logically possible that it be divided, and of course it is. So it must be that something puts a stop to the division process even while it remains logically possible to divide further.¹⁰⁹ What does that, perhaps, is the nature of bodies. A body is *one* thing, *because* it cannot be divided further into parts, despite its having a definite volume. It is *not*, therefore, strictly a collection of parts, for a collection of parts is formed when the parts come together and dissolves

¹⁰⁷These perfectly elastic collisions would involve no deformation of the atoms colliding, though, and the rebound and change of direction would be instantaneous. The not-directly-observable ideal that explains observations need not be another world of Forms, as in Plato. It can be simply small enough not to be directly observable, and then the line of argument from the rationally ideal to the behavior of the observable can be mediated by the observable's being constituted of the ideal, rather than its imitating it. If the hitherto ideal realities become directly observable due to the advances of technology, one always has room to back up a little, and postulate a set of yet smaller ideal things constituting what is newly observable—assuming that the newly observable turns out not to be so ideal in its behavior after all once we get to take a look at it. That is how progress in fundamental physics seems to work.

¹⁰⁸In modern physics, the underlying stuff is of one sort, I suppose, and distinguished into kinds, not by differing sensible qualities, but by different effects on the motions of other things.

¹⁰⁹For this point, see Hasper (1999), and his analysis of *On Generation and Corruption* I 2. Bodnar (2001) suggests that if we speak in Aristotelian terms, the atoms must each have an individual substantial form specifying its shape and size and reaction to collisions with other atoms.

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when they fly apart. All the things we observe with the senses, though, and we ourselves, are collections of bodies.

Even if the Eleatic restrictions are met for the realities making up the world, the atoms, the Atomists denied the Eleatic arguments as applied to space, and as applied to the number of atoms. There is no reason why space should not have an indefinite extension, as long as no atom, no actual thing, is indefinitely extended. The atom, when it reaches a supposed edge of the universe, can always go on further beyond that point, and we can conceive this happening and talk about it, so space is extensible indefinitely, even if an atom has a definite boundary. Space is generated, one might say, (or better, presupposed) by the movement of atoms. Moreover, space, again, not being a thing, is infinitely divisible, for if we assign any size to an atom, of course we can speak of half that size, half the distance between the two edge of the atom, and the like. For the atom to be a definite sort of thing, as it must, we must be able to speak that way. So the place occupied by an atom is further divisible, even though the atom is not. But, of course, this means that a place can always be further divided in thought, not that it can finally be completely divided into an indefinite number of parts in thought. All geometry needs or assumes in Euclid, for instance, is that a line can be extended or divided whenever there is a need to do this. It never argues from an indefinite extension or complete division actually accomplished.

The necessity of atoms and the void if there is to be change and motion is recognized by reason, and we may form theories around these assumptions to explain sensory appearances. Say a mass of atoms is perceived as green—this is due to interaction between it and the sensory organ, and a change in the sensory organ will produce a change in the perception. It is not in fact green, unless we mean by ‘green’ that it is such as to produce a certain appearance in eyes of this sort. To be such is to emit certain effluences that enter the eye and interact with it in one way rather than another, and this requires only that the atoms have shape and movement and arrangement. Similarly, we are able to think about atoms as extended, applying all the laws of geometry to them—but all this has to do with how they can be conceived, how they appear to the mind, which is a perceiving organ just like the eye. Infinitely divisible space is, apparently, a kind of appearance produced by our understanding of the movement of indivisible atoms. The reports of the understanding, because it observes things, as it were, in much greater detail, are to be preferred to those of the senses—they are taken at face value, whereas one explains through accounts involving atoms and the void why the senses make the misleading reports they do.

The Atomists held that nothing comes out of nothing, so that what truly is can never be destroyed. Thus what can be destroyed must be nothing more than an arrangement of more basic, indestructible existents.

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In this, of course, they followed Parmenides, and they drew Parmenides's conclusion that there was no beginning to the universe, to the totality of what is, even if the Cosmos, the organized natural system of which we are a part, had a beginning, and will come to an end. Indeed, they may well have noted the contradictory way in which Parmenides seemed to treat time and space, insisting on the everlasting existence of what really is, and at the same time denying it indefinite spatial extension.

They also held to determinism, because they thought every event has an explanation why it occurs, and this explanation must be causal. So everything that happens must have a cause why it happens sufficient in itself to produce the event, else the putative cause would not, by itself, explain the event—we would have to supplement it with a further account explaining why it produced the event in the situation at hand rather than failing to do so. Thus any attempt to avoid determinism inevitably leaves some event unexplained. Democritus argued that we speak of things happening by chance only because we do not know the cause, and so cannot anticipate the event. Moreover, he held that the causes of events are always entirely physical—the whole explanation for an event is to be found in the arrangements and motions of the atoms that preceded and entered into it. Things do not ever happen of themselves to accomplish a purpose, though, of course, some physical being may have a purpose in mind and takes steps to accomplish it. But when a person brings something about with a purpose, the event will nonetheless be predictable on mechanical principles, for a person is only a complex physical mechanism, and the person's purpose is only a state of that mechanism. Knowing that state, we can predict the mechanism's actions, and if we know enough about the person's environment, we can predict the outcome of those actions.

We have noted repeatedly how the Eleatics argued we *must* encounter brute facts that cannot be explained. Democritus pushes explanation just as far as it will go, even in view of brute facts, through the principle that all genuine possibilities describable in general terms are always realized.¹¹⁰ So if there is no reason that could limit how many atoms there are, there must be an indefinite number, and more can always be postulated. If there is no reason to limit the size of atoms, then indefinitely large atoms exist. Indeed, it is suggested that every possible arrangement of atoms occurs somewhere in the world. If we want to know why *this* arrangement occurs *here*, only a causal account is to be found, which, of course, presupposes some earlier arrangement here.

¹¹⁰If the possibility is described using an expression referring to this or that particular thing or particular place or time, then not all possibilities can be realized. Somewhere there are elephants three inch tall, if such are possible, but that does not mean they are found *here* and *now*, or that *Jumbo* in the Milwaukee zoo can be and somewhere is such an elephant.

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So Democritus holds that there is always either a causal explanation, or an explanation a priori, for every fact. The brute facts advanced by the Eleatics, the minimal and maximal distances, the number and kinds of stuff there are, are ruled out as facts by Democritus. There is no maximal or minimal distance (though nothing is indefinitely large or small) or atomic size. There are no kinds of stuff, only stuff, and the notion that kinds might differ in accidental qualitative characteristics is due to an illusion fostered by the senses. There are no real qualitative differences, nor can such be understood save as subjective illusions. On the other hand, the Eleatic denial of the indefinite as real is maintained. Each thing is of a definite size and shape. On these issues Democritus plays things out more consistently than we have seen the Eleatics do.

The basic principles of Atomism were defended by Democritus as metaphysically necessary truths. This is how it *must* be if there is to be a reality lying behind experiences. But the Atomists avail themselves of argument to the best explanation when they can. So every part of an atom is completely full, with no variation in density. This should be evident a priori, of course, since every place is completely filled or not, and if it is not, that is because some parts of it are completely empty, and others completely full, but it is also argued from observation, since we attain a maximum density in most things, after which the stuff is no longer compressible. The easiest way to explain that is to admit that we are only filling up the empty spaces as we press the incompressible atoms together, and can compress it no further after all the empty spaces between the atoms are full.¹¹¹

Aristotle remarks in one place that Democritus's atoms interact only when they are in contact—that is, it is when they are in contact that they alter one another's motions—because then “they are no longer one, but two.”¹¹² This clearly makes a good deal of the notion that a one cannot change, but a plurality can, a notion of Parmenidean origin. (It seems that the contact is only momentary, so that there is no period of time during which the two are one.)¹¹³ A one is a reality, and the characteristics it has in itself are therefore all essential, identifying characteristics. It also assumes that whether we have a one or a two is a question about reality, not about how we look at reality. For there to be *really* a two is for there to be contact between two things at a

¹¹¹Of course, the maximum density of different sort of stuff will vary, because of the different percentages of empty space *within* the atoms of the different kinds of stuff. Atoms cannot be deformed, so those with holes inside them will not compress into as dense a mass as those without.

¹¹²*On Coming-to-be and Passing-away* I 8, 325a31-6.

¹¹³Philoponus, a late commentator on Aristotle, states that Democritus thought the atoms were *always* separated by the void, and so *never* came into contact, even, it seems, for an instant. This would necessitate some sort of repulsive action at a distance, and directly contradicts Aristotle, so it seems to me the way I have explained it is a much more likely account what Democritus intended.

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point of divisibility, so that it is possible for them to separate from one another, thus producing a change, not in what they are in themselves, but in the composite they form, through a change in their relations to one another. It seems possible that even more is going on here, though. It may be that motion or change in the sense identified by Zeno, the property of being in movement at a given instant, is what belongs to atoms in contact, inasmuch as their change in direction of motion when they rebound from one another is instantaneous, and occurs without passing through intervening stages (they don't swing around over a period of time in order to change direction, for instance). Also, of course, movement of a single atom, change in its distance from other atoms, would be real motion, occurring at each instant in the period of time during which the atom is moving. The denial of Zeno's position would give point to the assertion that Atoms interact or affect one another only when in contact, instantaneously.

The details of natural explanation in Democritus are not particularly important for our purposes, but we can note that he supposed the atoms to have an indefinite number of shapes, which can happen without their rising to any visible size, given that space is infinitely divisible. Some have hooks of various sorts that enable them to become entangled with other atoms and form solids, others are smooth, and so form gases or liquids. The atoms with hooks can form semi-permeable membranes,¹¹⁴ which might gather within them whatever smaller, penetrative atoms they encounter, and, it seems, hold them within itself, like a balloon holds air. Thus smooth atoms may be restrained to a certain space by a surrounding membrane, as presumably occurs with the atoms of the mind, and the atoms of fire and air in the Cosmos. The Cosmos formed as a whirling mass of atoms in the infinite expanse of space, and many Cosmoi of various kinds are always arising and being destroyed. Some have no Sun or Moon, some lack all moisture and life, and so forth.¹¹⁵ A Cosmos like our own is held to grow and change by taking in atoms from outside itself, and it goes through a life cycle, eventually losing all its moisture and "dying" of old age. The details here are closely modeled on Milesian speculation. Like-sized and -shaped particles tend to group together when they are whirled around in a sieve,¹¹⁶ and it is the same in the Cosmos. The masses of water, earth, air and fire separate out in the whirl.

The soul is corporeal, made up of the same sort of atoms as fire. Both animal motion, and sensation

¹¹⁴One might compare the situation to that of a weir, a trap for fish so designed that the fish can swim into it, by brushing past flexible sharpened stakes pointing inward, but then cannot swim out again without impaling themselves on the stakes.

¹¹⁵Diogenes Laertius IX 31.

¹¹⁶The explanation of this, of course, is *not* that like-sized things attract one another.

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and thought are explained from the behavior of these atoms. Sensation and cognition are explained through mechanisms, and thought is taken to have the same causal basis as sensation. In both cases images are formed of things in appropriate organs. Democritus may have argued that these images are communicated through some medium (presumably composed of atoms), perhaps through something like pressure waves, as we conceive sound is transmitted, but later Atomists, perhaps following Empedocles, said that things throw off films retaining the shape of the original, which strike the sense organs and leave their impressions there. What we know of the world we know through the changes it produces in our bodies. These changes may not much resemble their causes, of course, and so many sensory qualities, color, heat, sweetness, and the like, cannot be taken to resemble the things that seem to have them. They are “conventional,” that is, agreed on only among members of a given species that share a common sort of sensory apparatus, and so experience similar sensations of the same thing. So Democritus agrees with his countryman Protagoras at least as regards the senses—they provide no knowledge of a public reality external to the mind. This raises a serious question how it is that the Atomists can know their own theories about reality to be true. They hold that mind, and not the senses, is responsible for our knowledge of reality. Forms are emitted by things and register themselves on the mind, and these provide us with knowledge of the characteristics we attribute to reality, the full and the void and the various shapes and motions the full is capable of.¹¹⁷ It is not clear from our scanty evidence how Democritus proposed to establish that the appearances to mind are more reliable than those to the senses, given that essentially the same mechanism seems to be involved. In addition, Democritus said that the downfall of the senses would spell the downfall of the mind as well, for the mind depends on the senses for its information about the world.¹¹⁸ So Democritus must have thought that the senses were in some way reliable as informants about the world, but that reason alone could establish where and to what extent they are reliable, depending on principles acquired on its own without sensory aid.

Probably Democritus took it that all sensation is, like every other interaction, a matter of collisions and mechanical transformations and deformations. We know about things outside us because they impress their shapes (or changes in shape) on some receiving portion of an organ of perception. His model here seems to be

¹¹⁷Thus Sextus Empiricus, who, when he quotes Fragments 6–10, remarks that he is speaking only of the senses in these places, but nonetheless his arguments should abolish *every* sort of apprehension (*Against the Learned* VII 135 ff.) He then quotes Fragment 11, distinguishing the bastard knowledge provided by the senses from the legitimate knowledge arising from reason. At VIII 6–7 and 56 Sextus compares Democritus’s view to Plato’s, since both suppose that only intelligible things are real.

¹¹⁸Fragment 125.

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hearing, which was well understood to pick up the vibrations of an object through the medium of the air. If air can transmit vibrations through a series of blows, as it were, surely a differently designed organ, the eye, could pick up the shape of an object that was responsible for striking such blows, as a blank picks up a shape from a blow when a coin is struck. It may well be, though, that the shape produced is not exactly the shape of the object producing it, if detail is lost in the medium that transmits the shape, or the shape cannot be accurately stamped on the receiving organ. What is needed for accurate perception, then, is, first, a receiving organ sufficiently flexible so that it hinders nothing in the impression received. Apparently the mind was assumed to be the finest and most flexible of organs. In another way, though, its accuracy of reception is indicated by the fact that it forms ideas only of shapes and numbers, of space full or empty, for the Pythagoreans were right that our understanding grasps only the mathematical. The *qualitative* feels that fill up perceptual space in vision, taste, and the other senses, and that stand in place of vibratory motion in hearing, must be a result of the organ's peculiar response, depending on its peculiar constitution, to the shapes that strike it—not an impression from the object so much as an alteration idiosyncratic to the sort of organ receiving the impression—otherwise only shape would be perceived. It is by turning our attention to how the sensory organs work, and so what all the different organs receive in common that we get away from these peculiar alterations in the substance of the various organs and hit upon the fact that information transmission, occurs through the transmission and impression of a *shape* on the perceiving organ. Here, one might suppose, what is produced, or rather transmitted or re-produced, is the reality itself, not something corresponding to it in some unpredictable manner within the particular organ affected. That would be the only way to explain why this method of transmission *always* works.

In any case, it seems clear the Democritus was not a skeptic, but did think that the senses could only provide information about reality if we approach their reports attempting to understand how the information supposedly received through them could be transmitted. If we explored this, we would find much that must be true if any explanation at all was to be found, and much that might be plausibly asserted as providing the best available explanation of the sensory information we have. The truth might lie hidden in the depths, and the senses might be misleading, or the truth might be unclear to them, but that does not mean the truth is unattainable, or that we cannot assess just how far the senses are to be trusted, if we bring reason to bear on the question, focusing on what explanations of the appearances are genuinely possible.

The Atomists' view of knowledge and the mind introduced a new theory of perception and knowledge entirely at odds with what had gone before. For the Atomists, knowledge and perception arise due to changes

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produced in the perceiver by what it perceives. There is no hint here that the perceiver knows itself first of all, and all else only insofar as it is similar to itself. Indeed, a mechanism by which the perceiver can know itself is difficult to contrive. As we shall see when we examine Anaxagoras, this view, imported into the world of real sensible qualities of most early Greek thinkers, implies that like is not known by like, fire is not known by fire, for like does not change what is like it. Rather, the knower knows what is unlike itself, so that fire, the hot, will know and perceive the cold when it encounters it, for the cold will alter the hot when it comes into contact with it.

The sensible appearances, then, only provide a guide to reality if one understands the nature of the organ that produces them and the nature of the impact on the organ, and neither of these things is the least bit evident from the sensible appearances themselves. As Plato describes the situation in the *Theaetetus*, the sensible appearance comes to be *between* the reality and the perceiver, and tells us nothing about either as it is in itself. If one did despair of reason stepping in to provide enough information to reconstruct the sensory organ and its object, and so undertook to rely on the senses alone, the relativism of Protagoras would be the natural outcome. No sensory appearance could be challenged, each would be how things appear to *she* to whom it appears, but none would tell us anything about a common reality.

The depth of the theoretical shift here can be better appreciated if we reflect on the Empedoclean question whether it is Love or the body contrived by Love that enjoys sensory awareness. Empedocles, it seems, thought that Love perceived, somehow, through the body. But it is very hard to see why Love should be altered, so that it perceives one thing rather than another, just because the body is altered, when the blood in the sense organ comes into contact with effluences from what is without. The Atomists perhaps detected that Empedocles's view verged on incoherence. Is it the body as such that perceives? This would mean it perceives because it is altered, having come into contact with certain effluences that affect its organs. Or is it a certain element in the blood that perceives the light? Then that element always perceives the same thing, what is like itself, and one might wonder how it is that changing appearances are produced at all in it. Perhaps we are to imagine that the light perceiving element within the eye sometimes perceives its like and sometimes, when there are no appropriate effluences entering the eye, does not. It could work something like computer memory, each element of which is on or off, but which stores information, considered as a whole, because of the patterns of ones and zeroes formed by its elements. But *what* works this way? Surely it is a larger, structured body composed of the elements, not the individual elements, nor even an even-handed mixture of them in the blood. And it is very difficult to see how the pattern of perceptions and failures of perception in the organs

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which gives us our sensory knowledge of things can be transferred to Love, unless we take it that Love is somehow parceled out and structured into a shadow-organism like the body it inhabits. Even then, does Love know what is similar to it? But none of the four elements, presumably, are similar to it. The only way the Atomists could see to resolve all this, it seems, was to grant that it would not be the eternal and unchanging (and therefore unperceiving) Love that perceives, but the body constructed by Love. And once we see that bodies can be constructed from atoms without bringing Empedoclean Love into the picture, we see that we ourselves are parts of the natural world, that know and perceive through the natural effects of other things in the world upon them. Our selves are not immortal, and the world itself is not intelligent.

So it is not surprising to see the Atomists claim that, although there is a soul that moves the body, and so is responsible for its actions, this is not to suggest that the soul is somehow immaterial, or that it could exist independently of the body, for the body is necessary to hold it together, contained within membranes made up of larger, intertwining atoms. There is also no suggestion here that the body has its own desires and soul another set of desires, as in Plato. The soul is responsible for any excesses, including excessive pursuit of physical pleasure, of which the person may be guilty. Democritus calls the soul “divine,” but he apparently means to indicate nothing more by this than its power to rule the body and itself. If we would live well, we must attend to the soul, the divine in us.¹¹⁹

The views of Democritus on the gods, insofar as we can separate them from the views of Epicurus, seems to be that they were images (*eidola*), and alive, of gigantic size, with some interest in human affairs, although they had not made the world and were not in control of it, nor immortal. Perhaps the intention is that the gods are only human phantasy, ideas passed down from others, but influential ideas with a life of their own. Or perhaps they are somehow left over from real giants that once lived. They may be exceptionally powerful minds that somehow managed to maintain coherence even after the dissolution of their bodies, and can only influence things now through their appearance to minds still inhabiting bodies. But the fragments concerning the matter are much too sparse for us to be sure.

The virtue appropriate to the soul is “cheerfulness,” a quality of imperturbability, “in which the soul continues calm and strong, undisturbed by any fear or superstition or other emotion,”¹²⁰ which renders the soul immune to external shocks. Great movements of the soul, resulting in disorganization and relaxation of the

¹¹⁹For Democritean ethics, see Vlastos (1945, 1946).

¹²⁰Diogenes Laertius IX, Democritus xii.

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stuff making it up, are bad in their effects and to be avoided. What men find to be pleasant or painful depends to a considerable extent on their individual characteristics, and so are different for healthy and unhealthy souls. The good is not pleasure, then, but the imperturbability of soul that follows on a tightly organized arrangement of its atoms. (Perhaps the gods achieved unusual feats in this arena, and so were able to survive the deaths of their bodies intact. Such a view is well-attested in Stoicism.) This tight organization, however, seems to be associated with its own kind of pleasure. “The good and the true are the same for all men,” Democritus asserts, apparently with Protagorean relativism in mind, “but the pleasant,” mere appearances of goodness, “differs for different people.” He suggests that those who do wrong are rendered more unhappy than those who suffer it.¹²¹ He also holds that living within a well-organized, virtuous community is necessary for happiness.

Democritus insists that a person’s nature as a human being is established by learning. Those who do not learn are at the mercy of chance events, but those who learn and benefit from the arts can avoid chance misfortunes (though not necessary ones such as death). Hard work is best for a person, for indulgence leads to susceptibility to the relaxing pleasures that damage the soul and so are followed by pain, while work produces another constitution, which seeks by preference pleasures of the more long-lived sort not followed by pain. The person who learns, then, not only acquires individual technical skills so that those ills that occur by chance become avoidable, but comes to have wisdom, and so prefers and maintains the hardened, cheerful soul that takes pleasure in its effectiveness and, habituated to labor, finds it easy and more pleasant than rest. This all seems very close to the opinion of Socrates, except that Socrates perhaps identified pleasure as the aim, holding that the sort of pleasure that follows on a Democritean “cheerful” soul is best, because it creates the least disorder in the soul and has the least adverse long-term consequences, and so leads to maximal pleasure in the long run. Indeed, Democritus’s ethics, together with his insistence on a knowable reality in opposition to the Sophists, would seem to establish him as an ally of, and quite possibly a source of, Socratic views.

6. ANAXAGORAS OF CLAZOMENAE

But since all things have been named light and night, and their powers have been assigned to each, all is full of light and lightless night together, both equal, since nothingness partakes in neither.

Parmenides, Fragment 9 from *The Way of Opinion*.

¹²¹Fragment 45, Bakewell.

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Neither is there a smallest part of what is small, but there is always a smaller (for it is impossible that what is should cease to be [as it would if it were composed of parts of no size]). Likewise there is always something larger than [a proper part] that is large. And it [a large part] is equal in number to the small [that is, both are one], for each, in itself, is both large and small [both composed of parts, and one].

Anaxagoras, Fragment 3.¹²²

Anaxagoras of Clazomenae (ca. 500-427 BCE) immigrated to Athens from Clazomenae. Clazomenae was a part of the Persian Empire, but many of its citizens would no doubt have preferred to have been free of the Persians. So perhaps Anaxagoras was a refugee from Xerxes's Persian army who switched sides in 480 BCE, the year of the Battle of Salamis. In any case by around 460 he was in Athens.¹²³ He was a friend of Pericles, the democratic leader of the Athenian state at the height of its power, and moved in the highest circles. Though heir to a considerable fortune, he wasted it away through his inattention to business. Probably near the beginning of the Peloponnesian War in the 430's, the Athenian courts convicted him of impiety because of his naturalistic account of the heavens,¹²⁴ and he died in exile at Lampsacus in 427/8. Near the time of his death the Lampsacenes reportedly asked their distinguished guest what privilege he would like to be granted by the city, and he replied that the children of the city should be given a holiday every year in the month when he died.

Anaxagoras seems to have been an essentially physical thinker, who arrived at his views by reworking an Anaximandrian tradition in view of the Eleatics. He adopted the Eleatic opinions that nothing could come out of nothing, and coming into being and passing away are only the mixture and separation of eternally existing, unchanging sorts of stuff. He did not think, however, that there was a definite number of kinds of stuff, whether one or many, but insisted that there is an indefinite number, in fact making every sort of stuff that we find in the sensible world an elemental kind incapable of creation or destruction. Moreover, he rejected

¹²²Translation adapted from Kirk, Raven and Schofield (1983).

¹²³For Anaxagoras, see C.C.W. Taylor (1997a), the articles in Furley and Allen (1970, 1975), in particular Vlastos, "The physical theory of Anaxagoras," and Schofield (1980). Diogenes Laertius reports an *On Nature* in two books, in the new prose style, from which 16 passages in book I are quoted by Simplicius, mostly in his commentary on Aristotle's *Physics*. We also have a good deal of information about him from Aristotle and Theophrastus.

¹²⁴He seems to have held that the heavenly bodies were not divine, but were merely material objects, fiery stones and the like, and there is a story that he predicted (!) the fall of a meteorite at Aegospotami in 467 B.C.E. No doubt the intention was that he could point out that this supported his view, or predicted that such things were possible.

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the distinction between kinds of stuff and their qualities, and took every sensible quality extended in space as a kind of elemental stuff as well, so that along with iron, linen, wood, water, and the like, he included the hot, the red, and the sweet, following another tenet of the Eleatics, treating every description of a thing as essential, and denying the possibility of accidental qualities. All these Aristotle named *homoeomerous* things, things with like parts. Some have puzzled over why he allowed kinds of stuff at all, given that all the qualities by which these kinds are distinguished are treated as irreducible realities in their own right. Surely the stuff does not provide a substratum for the qualities, as they do in Aristotle. The answer is perhaps that the kinds of stuff, though otherwise undetectable to the senses, have dispositional properties that affect sensibles. Fire, for instance, might have the quality of heating, of increasing heat where fire is found, a power that does not belong to sensible heat or brightness.¹²⁵ The more fire in a place, the more heat. The more milk, the more whiteness, sweetness, milky odor and so forth.

Anaxagoras's insistence on an indefinite number of homoeomerous things reflects his skepticism regarding any attempt to explain one sort of stuff as a combination of other, unlike sorts of things. He argues that everything must be present in everything because everything comes out of everything,¹²⁶ and he does not think, for instance, that iron might somehow come out of the ore in smelting by the rearrangement of the earth, air, water and fire in it, or by a rearrangement of atoms, for these things don't have most of the characteristics associated with (increased by the presence of?) iron themselves. Iron can only arise by being separated out, and must already have been in there. He does not see how the real nature of iron, say, could be described without referring to those ferrous properties that iron appears to have, its color, ability to become a magnet, and so on. If we describe it in terms of atoms, or a ratio of the four elements, we simply have left out what makes it iron, not said what it *really* is. In particular, he seems to reject the Atomists' distinction between secondary and primary qualities. Every quality must be as it appears, else its appearance is simply inexplicable. One might associate talk about atoms, their locations and shapes and motions, with talk about

¹²⁵This dispositional quality is not something that heat has considered in itself, presumably, but Anaxagoras had to postulate that different *homoeomeries* respond to motion in different ways, and he might have supposed mixtures in which a given *homoeomery* was dominant might also affect adjacent mixtures of another composition in different ways. None of this would have involved the *homoeomeries* being active in themselves, or their acting on other *homoeomeries*, but only the action of one mixture on another. So this would be consistent with the positions laid out in the remainder of this discussion. But, of course, the suggestion is entirely conjectural.

¹²⁶The same view, restricted to the body, is presented in the Hippocratic treatise *On Regimens*, which holds that every part of the body contains elements from all the other parts. This work also seems to resonate with Heraclitus in its insistence that opposing processes are always present in any phenomenon. See Van der Eijk (2008).

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colors or tastes, but one cannot say that such and such atoms in these places with these shapes and motions *are* those colors or tastes. So one cannot explain how the appearances, what those things really are, arise simply by the rearrangement of *other* things. Anaxagoras remarked, according to Aristotle, that his associates would find things to be just as they supposed, that is, if they were to be aware of reality as it is, they would not find it differs from the appearances of it they had already enjoyed.¹²⁷ So when he says “appearances are the sight of the non-apparent,”¹²⁸ he does not mean only that the senses provide a clue to how things really are, but that sensory appearances put us in *direct* contact with how things really are. Of course, Anaxagoras’s approach would appear to undermine the attempt to develop a chemical science, for instance, or any explanation of sensory appearances at all beyond this: that is how things are, and somehow the same characteristics were transferred to a sensory organ, so that the color of the object is reproduced in the eye, for instance, and so comes in touch with mind, and so the person becomes aware of it. This is precisely the account of the senses we get in Aristotle, and his insistence that sensible qualities appear as they really are, at least as long as the sensory organ does not introduce alterations and distortions, stems from Anaxagoras.¹²⁹

In addition to these homoeomerous things, Anaxagoras asserts that ‘seeds’ were present in the beginning, before things were separated by Mind. At this time aer and aither comprised all things, because the mixture was uniform everywhere as yet, and aer and aither are proportionally more abundant than the other homoeomerics. Perhaps the seeds were intended to be seeds of all the various biological kinds, which somehow direct the putting together of the natural artifacts that are animals and plants from various kinds of stuff. This view seems problematic if we take it that Mind underlies the awareness and motion of biological things, unless, of course, the seeds were themselves portions of Mind. Or, perhaps more likely, the seeds might have been the non-evident portions of homeomerous things other than aer and aither, which would later become evident to the senses when the whirlpool initiated by Mind had moved the lighter elements outward and the heavier toward the center, so that heavy elements began to dominate there and make themselves known.¹³⁰

Anaxagoras insisted that space is infinitely divisible, and then argued that each and every one of the indefinite number of kinds he is dealing with may be, and is, present in every finite region of space. The

¹²⁷*Metaphysics* 1009b26-28.

¹²⁸Fragment 21a.

¹²⁹For this paragraph, see C.C.A. Taylor (1997a) 199.

¹³⁰This is Aristotle’s reading of the matter in *De Caelo* III 3, 302a31.

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indefinitely large number of kinds present no problem, since they can form indefinitely small proportions of the whole. So half of what is here may be iron, one quarter wood, one eighth the hot, and so on, indefinitely. Since every region of space, however small, has every quality and kind of stuff present in it, there are no pure samples of any quality or kind of stuff at all. However, some kinds of stuff and some qualities in any given region of space may be greater or smaller in quantity, nonetheless, and so will make themselves more or less manifest to the senses, while others will fall below the threshold of perception and remain entirely undetected. Hence our senses suggest to us as we gaze on the smithy's work that all that is present on the anvil is hot iron, when in fact there is bone and cotton as well, and even the cold, though in small quantities.¹³¹

The intention, it appears, is to satisfy Parmenides's demand that every portion of what is, that is, of spatially extended matter, be entirely what is, and in no way what is not. Since every portion of what is is a mixture including every sort of what is, no quality or kind of stuff can be denied of it. Thus Anaxagoras thought that reality satisfies Parmenides's demands in his *Way of Opinion*, where he seems to have taken it that he claimed each thing partakes both of Light and Night, of everything that is (misinterpreting the passage),¹³² and yet all the while appearances to the senses remain explicable, if misleading as to the constitution of reality. The senses, because of their weakness, he says, do not perceive things as they are, meaning, it seems, that they do not perceive what falls below the threshold of perception, so that we, relying on the senses, conclude that there are many things that any given quantity of matter is not. This might well be inspired by Parmenides's *Way of Seeming*, for it is to the extent that we are not, that is, that we lack the ability to perceive, that we perceive what is not, that is, the apparent absence of a quality or stuff. Our senses perform a kind of abstraction for us, separating out in the appearance to us what never occurs separately in reality. Only the gold appears when we examine the coin, and the milk, though it is there, does not appear. Thus, the weakness of the senses prevents our judging the truth.¹³³

Also here is a response here to Zeno, the opposite from the response of the Atomists. Instead of granting that an infinite division of masses of stuff over an indefinite period of time would be absurd, and so must be ruled out by positing a limit to the division, he simply takes it that it is not absurd, any more than an

¹³¹Aristotle, *Physics* 187b1–7.

¹³²The passage is placed as a motto at the head of this section. It has been argued above that this is a misinterpretation of Parmenides, of course.

¹³³Fragment 21.

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infinitely divided space is absurd. Thus, the assumption of an indefinitely extended past time, which convinced the Atomists that there are atomic bodies, convinced Anaxagoras that bodies are infinitely divided and so thoroughly mixed together that everything is found in every region of space. Anaxagoras seems to take Parmenides up on his insistence that there must be more than one sort of stuff to explain appearances, but asks why there should be any limit to the number of kinds of stuff. Finding no answer, he arrives at his physical system, noting that he has an *a priori* justification now for the *apeiron* of Anaximander as the root reality from which the cosmos must arise. In general, we shall see that Anaxagoras sees nothing wrong with indefinitely large numbers, or indefinitely small divisions, even though he seems to hold on to Parmenides's view that each thing must be of a definite kind and have a definite essence. Indeed, he seems to think this view entails an indefinite number of kinds.

How does Anaxagoras respond to Zeno's objections to the indefinite divisibility of space? First, he insists that however small a portion of what-is we might consider, we can always find a smaller, namely, the smaller parts from which it is made up, and however large a portion we take, there is always a larger, something of which it is but a part. Now although each thing is of some size, and has parts, it turns out that the sum of all things taken together, that is, what-is absolutely considered, is indefinite in respect of the number of its parts, and in respect of the smallness of its parts. To put it a little differently, Anaxagoras insists that there is no One to be found in nature. A One is simply some region of all things taken together that we choose to consider as One. But we must introduce ones into nature if we are to understand it. Now consider the arguments of Zeno. How can there be an indefinite number of things, say an indefinite number of parts in the race course? Anaxagoras's reply is that as things are in themselves there is no number at all of Ones or parts to the race course, but once we decide how to divide the race course up, say into yards, there will be a definite number of parts. But we could divide up the race course differently, into rods or inches, and then it would have a different number of parts. If one wants to know how many parts there are, we can only answer that that number is indefinite, undetermined, until we specify the kinds of parts that are meant. This would not be so if the race course had parts *by nature*, but it does not. It has parts *by convention*, due to the way in which we choose to regard it. To put it yet differently, and in a form of which Aristotle was fond, we could say that it is infinitely divisible, but that this indefinite divisibility is only potential, that is, it cannot *actually* be divided into an infinite, or indefinite, number of parts, so that we are all done with the dividing. Even so, the race course's divisibility cannot be understood as divisibility into any definite number of parts, and it is in that way it must be understood as a divisibility into an indefinite number of parts.

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Now, in order to understand reality, we not only divide it up along conventional lines into Ones, so that we can apply arithmetic and geometry to it, but we also introduce notions of kinds of stuff and various qualities from our sensory experience, notions which are never exemplified in reality. In effect, we have a notion of the hot, or of bone, which is of something ideal. We imagine what is just hot, or just bone, with no admixture of anything else, or at least of any contrary. To describe how things are in reality we have to make use of such idealized notions, for we describe it as a mixture of an indefinite number of qualities and sorts of stuff, as though those qualities and kinds of stuff existed in a pure form somewhere, and we could draw off a certain quantity of each and mix them together. In fact, none of these things ever exists in a pure form, just as no One ever fails to be a many. So our sense-derived concepts, like our mathematical concepts, are of things that do not occur in reality or our experience in any pure form, and yet *must* be introduced into our picture of things if we are to describe and deal with the world at all.¹³⁴

To this account of matter, honoring what he took to be Parmenides's insistence that every portion of the reality we can think or talk about must be like every other, Anaxagoras joined an innovative theory of perception. He rejects the traditional view that perception is of what is like the perceiver, arguing that it is, instead, of what is unlike the perceiver. It is air that is colder or hotter than we ourselves that is perceivable, and the jelly of the eye is colorless in itself, and so is easily affected by color, and that is what makes it appropriate in an organ of vision. The underlying premise is that perception occurs by the action of the perceived on the perceiver, as the Atomists had suggested, but his theory avoids the skepticism of the Atomists about the reality of sensible qualities in things. Empedocles made the sense organs contrivances to take advantage of the natural perceptive nature of the elements of things. They perceive only because the elements in them perceive their like, and so the person who knows is conceived by Empedocles as an equal blend of all the elements, so that it perceives all things equally. Just as the perception of the lukewarm is a perception of the mix of hot and cold, so the perception of the red is a perception of a certain mix of fire with other elements, and requires an equal responsiveness to all the components of the thing perceived. Yet, as we have argued, there is something odd in saying that the elements, even mixed together, constitute the perceiver, and Empedocles seems to drift towards the view that it is not the blood, the even mixture of elements, that is

¹³⁴Zeno can't object to the introduction of notions that do not correspond to or follow from the reality we speak and think of, for Parmenides and he himself introduced such notions, for instance, when they spoke of the radius of the cosmos. We must assign it some definite radius, yet there is no way to establish what that radius is through reason. The senses, as it were, force the choice upon us, and might even inform us, though without certainty they are right, what choice to make. For Anaxagoras, too, the senses decide what qualities and stuffs there are, and where to make the divisions of things into ones.

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aware, but the Love responsible for the mixture and found in the midst of it. The Atomists dropped the notion that the elements naturally perceive their like, and the notion that there is something besides the elements which is the actual perceiver. For them, the perceiver is the complex, taken as a whole, and not any element of it, nor any organizing principle found in it. Anaxagoras apparently could make no sense of that part of the Atomists' view. The elements of the sense organ must constitute a natural perceiver, but he agreed with the Atomists that perception occurred through a causal connection between the perceiver and the perceived, and perception of like by like did not seem to him to cut it as a causal mechanism. So he suggested that the perceiving elements of the sense organ differ from what they perceive. The hot heats the perceiver up, and so makes itself known, the colored changes the pupil of the eye to something temporarily colored, and so makes itself known, and so on. In Plato we get some indication that certain so-called followers of Heraclitus took perception to be a form of motion or change, and we can probably transfer this idea to Anaxagoras. It is the change in the perceptual organ that results in perception. If the organ remains in the same state for a while, then perception fades. He even says perception is a kind of pain, an irritability, that occurs when something is attacked, and partially changed to its opposite, as water is partially turned to fire when it is heated.

But again, like Empedocles, Anaxagoras was uneasy with the notion that the mixture of the elements, taken as such, was the underlying perceiver. Just as Empedocles introduces the organizer of the sensory complex, Love, as what becomes aware, so Anaxagoras introduces Mind. Empedocles's Love qualifies as a perceiver, somehow, by being the principle responsible for the mixture of things, and, presumably, through dwelling in the midst of the mixture it has brought about. How it inherits the perception each element has of its like within the mixture is, of course, difficult to explain. Anaxagoras claims that Mind knows every sort of stuff, and every quality in the world, and so it must be *unlike* them all, and the sense organs must be the tools used by mind to perceive.¹³⁵

¹³⁵**Alcmaeon of Croton**, a physician who lived perhaps in the generation before Anaxagoras, apparently held that knowledge was of unlike by unlike, and provided some account of the relation between the senses and thought (*phronesis*, not Anaxagoras's *nous*) in human beings. He agreed with Anaxagoras not only in these matters, and also in holding that soul is always in motion, and that motion apparently circular, since death is due to the failure of the soul to connect the beginning to the end, apparently resulting in a cessation of its characteristic motion. (Aristotle, *Problems* XVII 3, 916a33) (Or perhaps, as Gomperz (1896) 151 suggests, the intention of this remark is that the cycle from youth to old age cannot arrive again at the beginning, with youth restored, but instead ends in dissolution. In that case, it may be that the motion of the soul is not circular at all for Alcmaeon.) But in any case the chief part of the human soul, at least, is deathless, as are the souls associated with the heavens, which never cease revolving. (Aristotle, *On the Soul* I 2, 405a30) Anaxagoras was developing notions about mind or soul already present in a pre-existing medical tradition. It is also to be noted the Alcmaeon appears to be the first to recognize the brain as the center awareness and intelligence, noting in animal dissections, it seems, the chief sensory nerves terminating in the brain, which he took to be conduits for information, as well as the effects of concussion, in support of his view. For Alcmaeon, see Kirk and Raven (1957; 1983). He

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But the difference between Anaxagoras's Mind and Empedocles's Love go deeper than that. Mind is utterly different from every kind of stuff, and kinds of stuff, since they mix together, are similar.¹³⁶ Kinds of stuff are real natures of a Parmenidean sort, that is, they are unchanging in their natures. Being unchanging, they are not capable of interaction with one another (neither can change the other), but only of mixing. Mind is capable of action upon the other kinds of stuff, but it acts without changing them as they are in themselves. It only changes the compound of stuffs, the mixture, by altering the proportions in the mixture. It does this by introducing a rotation in stuff, from which forces of separation emerge in accordance with the natures of the things separated. Perhaps it does this by occupying places where nothing else is found, and moving *of itself* in a circle. If anything else were to do this, it would simply mix itself with the things it advanced upon, without moving them. But Mind, being unmixed, would push the stuff ahead of it as it moves, and so produce a circular motion. It could do so by revolutions around a center, or it might do so, if it is of the right shape (certainly not a sphere!) by simple rotation, as a propeller does. But since Anaxagoras asserts that mind is found *in* compounded things capable of perception, though only unmixed, of course, it seems the first option fits better than the second.

Alternatively, it might be that mind occupies the same place as other things, imparting rotation to them, and becoming aware of changes in them, but does not mix with them, and has no sensible qualities. Thus it would be possible to have two things, unmixed, in the same place at the same time, as the Stoics would later assert. On this view mixture would presumably occur when the presence of different proportions of the mixed items determines the quality of the mixture, so that the proportions of the hot and cold determine the temperature of the mixture. The presence of mind in the same place as the other elements in the mixture does not alter any quality at all belonging to it. It only imparts motion to it, and perhaps perception and thought as well. We should take it that Anaxagorean Mind is so utterly unlike kinds of stuff that it has no permanent nature at all, other than being the source of a circular motion and subject of perception, and possibly also the source of the motions and physical organization of animals and plants, if this is not somehow to be traced back to a circular motion in the soul. It is not the motion/perception itself, it seems, since it is said by Anaxagoras

seems to have influenced, or been influenced by, the Pythagoreans in much of this. Most of our information about him is from Theophrastus's *On the Senses*, from which we also learn of Anaxagoras's corresponding views.

¹³⁶Here note the argument of Diogenes of Apollonia, discussed below.

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to be “the finest of all things,”¹³⁷ and so apparently soul is a kind of stuff. Such a motion might create a unity in the body that shared in it, and it would have a location (where that moved body is), even if it is improper to say that it is “mixed” with the body, as though it were a qualitative sort of stuff. The very first motion introduced into the uniform stuff of the world would in fact be undetectable if we simply looked to how things are from one moment to the next, for things are precisely the same from one moment to the next. But the motion has a reality despite its indefinite nature, for it produces a centripetal force that separates out heavier stuffs into the center of the whirl.¹³⁸ It can only be detected in things, at first, by noting the separation resulting from this centripetal force. After some separation has occurred, one could identify various different parcels of stuff by the proportions of their mixtures, and trace their motion relative to one another, but the motion cannot be simply identified with this change in how the world is to be described from one moment to the next, for if that is all it is, it could not get started anywhere in a uniform world. Moreover, many things could be distinguished by their proper motions, above all the circular motion by which they hold together as a single unity, moving about as a whirlpool might, preserving its form as it moves from one place to another. The universe has things within it as a larger whirlpool has smaller whirlpools within it.

Pursuing this idea (and abandoning, unfortunately the fragments and testimonia for pure speculation

¹³⁷Fragment 12, which is worth citing in full: “All other things have a portion of everything, but Mind is infinite and self-ruled, and is mixed with nothing but is all alone by itself. For if it was not by itself, but was mixed with anything else, it would have a share of all things if it were mixed with any; for in everything there is a portion of everything, as I said earlier; and the things that were mingled with it would hinder it, so that it could control nothing in the same as it does now being alone by itself. For *it is the finest of all things and the purest, it has all knowledge about everything and the greatest power; and Mind controls all things, both greater and smaller, that have life.* Mind controlled also the whole rotation, so that it began to rotate in the beginning. And it began to rotate first from a small area, but it now rotates over a wider and will rotate over a wider still. And the things that are mingled and separated and divided off are all known by Mind. And all things that were to be, all things that were but are not now, all things that are now or that shall be, Mind arranged them all, including this rotation in which are now rotating the stars, the sun and the moon, the air and the aither that are being separated off. And this rotation caused the separating off. And the dense is separated off from the rare, the hot from the cold, the bright from the dark and the dry from the moist. But there are many portions of many things, and nothing is altogether separated off nor divided one from the other except Mind. Mind [i.e. every existing portion] is all alike, both the greater and the smaller quantities of it, while nothing else [of existing portions of stuff] is like anything else, but each single body [i.e. portion of stuff] is and [always] was [i.e. there was no time when things were unmixed] most plainly those things [those homoiomerous kinds] of which it contains the most.” (The translation is from Kirk and Raven (1957), with the square brackets containing my own explanatory additions.)

¹³⁸It would not produce an entire separation, of course, but would increase the percentage of each parcel occupied by the heavier elements near the center, and those occupied by the lighter elements farther out in the rotation. Perhaps it is worth conjecturing that the mind could always have been involved in its rotatory activity, influencing smaller and smaller volumes as we go farther back in time. Given infinite divisibility it is easy enough to specify that it influenced, say, half the volume it does now one million years ago, and half that volume a million years previously and so on ad infinitum. Then we could avoid the question when and why Mind began its rotatory efforts, and still allow that any designatable space, as long as it does not contain the actual center of the rotation, is at some time unaffected by mind. Perhaps that could be squared with a loose reading of “it began to rotate first from a small area . . .” in Fragment 12.

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about Anaxagoras's thought), motion not only affects the composites in the world, but is also capable of perceiving, though what it perceives is, in the end, only itself, and not the real permanent natures of the stuffs that make up the world. Perhaps the reason for saying this is that the motion changes as things begin to separate out. The motion becomes faster, and it widens its scope, drawing more material into the whirlpool, perhaps because the heavier stuff settling at the center increases it. (A spinning motion *will* speed up as the spinning object becomes more concentrated in the center, as any figure skater knows.) But that suggests that the motion, if it is to respond to the new situation must, as it were, be aware of it. So motion is aware of itself, and of changes in itself. Motion's self-awareness would explain what is going on at the foundation of the senses. A thing, that is, a mixture with its own motion (soul, substantial form), detects its opposite because it is its opposite that produces a change in it (by altering the proportions of the mixture), and this change is what the soul, this self-mover, is made aware of. So the soul does not know the pure elements as they are in themselves, unchanging, but only as they occur in mixtures, revealing themselves when their proportions shift, that is, it knows things as they appear to it.¹³⁹

We will find that Anaxagoras's theories of mind or soul as a self-mover with circular motion, of the way in which we have to describe the world in terms of ideal realities never found perfectly exemplified in it if we are to understand that world, his notion of perception as a form of motion, and his defense of the infinite divisibility of things, all had considerable futures ahead of them, crucially influencing the thought of Plato, Aristotle, and the Stoics.

Archelaus was a student of Anaxagoras who succeeded him as head of his school at Lampsacus, and is said to have taught Socrates. He is reported to have agreed with Anaxagoras's views on matter, but to have claimed that mind is mixed with the other homoeomerous substances, and to have traced the beginnings of motion not to the motion of mind, but to the natural tendency of the hot to move away from the cold and aggregate to itself. Thus he abandons what we have identified as the most radical element of Anaxagoras's metaphysics, his postulation of mind as self-moving mover without a nature of its own. The cold binds things together, he thought. The hot first aggregated together at the center, and melted the cold, producing water. At the center itself it was so hot that it vaporized the water, producing air, and even burnt it up, producing

¹³⁹Thus "sensation takes place by opposite qualities, for like is not affected by like," as Theophrastus has it in his discussion of Empedocles in his *De Sensu*, Fragment 27. That is, a motion or soul perceives the motion that constitutes itself, but this motion arises only by the interaction of its body with opposite bodies outside it, so that a motion is initiated in that body. Note that *nous* is aware of motion or change, as well as being responsible for it. It is not aware how things are in themselves, unchanging over time, at least, not through the senses.

earth. The air controls things in its rotation, and the heavenly bodies, especially the sun, as well as fire (sparks thrown off from the center?) have rendered the air clear and transparent.

7. PHILOLAUS AND PYTHAGOREANISM

After these Pythagoras changed the study of geometry, giving it the form of a liberal discipline, seeking its first principles in ultimate ideas, and investigating the theorems abstractly and in a purely intellectual way. It was he who discovered the subject of proportions and the construction of the cosmic figures . . .

Proclus, *Commentary on Euclid's Elements*¹⁴⁰

And indeed all the things that are known have number; for it is not possible for anything to be thought of or known without this.

Philolaus, Fragment 4.¹⁴¹

Philolaus (ca. 470– ca. 385) wrote a general account of the world from which some fragments have survived, and it seems to be from his book that Aristotle got most of his information on the Pythagoreans.¹⁴² He said that everything arose from the fitting together of limits and unlimited things, where “unlimited things” are limitable, but are not limited of themselves. Although we cannot say anything about limits and unlimited things if we consider simply “nature in itself” or “the being of things,”¹⁴³ we cannot say what they are in themselves, we can identify some of them. The cosmos arose with the “hearth,” the central fire, the first of things fitted together from limit and unlimited.¹⁴⁴ Here the unlimited is fire, and the location at the center is

¹⁴⁰Translated in Cohen and Drabkin (1948) 35. Pp. 41–44 contain the extant evidence for early Pythagorean geometry.

¹⁴¹Translation from Kirk, Raven and Schofield.

¹⁴²For Philolaus, see especially Huffman (1993), (1988), and (2001), Nussbaum (1979), Burkert (1972) and the other references on the Pythagorean movement in Chapter I. Philolaus seems to have been the only Pythagorean who produced a book, and Aristotle reports his doctrines, corresponding to those in the genuine fragments, as belonging to some of the “so-called Pythagoreans.”

¹⁴³Fragment 6.

¹⁴⁴Fragment 7. Archytas, a Pythagorean contemporary with Plato, is praised by Aristotle for offering definitions in terms of form and matter (1043a14-26). Aristotle's examples are windlessness, which is stillness in a quantity of air, and calm (on the sea), which is evenness of the sea. Huffman suggests that Archytas constructed his definitions from unlimiteds and limiters, following Philolaus's lead.

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the limit. Time, breath and the void were “drawn in from the unlimited,”¹⁴⁵ so these things are to be placed together with sorts of stuff and opposed qualities such as the cold and the hot as unlimited things—instants set the limits of time, place and shapes the limits of stuff and qualities. Philolaus insists that limits cannot in any way be derived from unlimited things alone,¹⁴⁶ thus preserving the characteristic Pythagorean insight that structure, the arrangement of the different sorts of stuff, must be employed in our explanations of the world, and not only the character of the original stuff itself. If all things were unlimited then there could not be knowledge or understanding.¹⁴⁷ For Anaxagoras, the world consists of unlimited things and mind, and limits entered the picture through the different strengths with which various unlimited things affect the mind, once the mind’s attention isolates some portion of what is as a unit. Thus limit arises from the mind. Philolaus objects. The limit cannot be merely a matter of appearances, imposed by mind, but must somehow be an extra-mental reality found in the things that are understood. It must actually be there to be recognized by the mind. The explanatory structure occurs outside the mind in space and time, and Philolaus leaves it open that there might be structural aspects of things that we are unaware of. Moreover, he will not identify any fundamental set of unlimited things as basic—this is beyond human knowledge. He rejects Anaxagoras’s confidence that no one unlimited thing reduces to others, although he leaves the exact nature of that reduction, if it can be made, open. He also leaves open the way in which the limiters and the unlimiteds are fit together. Perhaps this is recognition of the difficulties in the assumption (rejected by Anaxagoras) that we identify objectively given unities in things, rather than imposing unity by our own take on things. Of course, neither limits nor unlimited things are themselves particular things, so that they are not joined together in the way that particular things are.

The limit and the unlimited are bound together by a harmony, Philolaus says, because they are completely unrelated to one another as they are in themselves, and so require the introduction of a harmony if they are to be held together in some order.¹⁴⁸ The intention seems to be that the introduction of harmony brings them into relation to one another. Now the only worked-out example we have of harmony is a musical scale.¹⁴⁹ The sound (high and low pitched) is presumably the unlimited, and the length of the string producing

¹⁴⁵Aristotle, Fragment 201.

¹⁴⁶Fragment 2.

¹⁴⁷Fragment 3.

¹⁴⁸Fragment 6.

¹⁴⁹Fragment 6a.

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it, which is describable numerically, the limit. But no order in the sounds comes out of the mere fact that there is a continuum applicable to sound that provides a limitation of sound to the place on the continuum. What is needed in addition is a harmony, that is, the introduction of numerical relations in terms of their pitch in a structure made up of sounds located along the continuum, which, through the introduction of geometrical or arithmetical means, “harmonize” opposites found along that continuum. Hence, the fifth and the fourth harmonize sounds an octave apart from one another. So, generalizing, we might say that space and time provide a framework, which is mathematically describable, within which particular instances of unlimited things can be located, but for a cosmos or order to arise, there must be a collection of unlimited things related to one another within that framework in mathematically suitable ways. Of course, following his tradition, Philolaus applied the harmony discoverable in sounds to the structure of the cosmos as a whole, the same structural relations holding in very diverse material continua. But with this worked-out example before us, we can still ask how one harmonizes between the limiting and the limitable themselves, for the example only suggests how we might find a harmony between various already limited portions of the limitable. Surely the limitable must already be limited before a harmonization and order can arise within it. Perhaps we can see how harmony brings disparate things into relational wholes, but what brings the limit and the limitable into a relational whole such that one limits the other? Here one might anticipate Plato, taking the limiting as Ideal Forms, and trying to work out how they can be brought into relation with the Receptacle, with matter or the indefinite,¹⁵⁰ but Philolaus did not think the nature of this harmony, necessary as it was, could be understood. In particular, he did not conceive number to be something separated from the things which were subject to number.¹⁵¹ A number is always found in the world as a number of things.

Philolaus identified in each area of investigation the smallest number of principles (*archai*) necessary to explain things there. In investigating the cosmos in general, limits, unlimited things, and harmony, are the principles. In investigating disease, blood, bile and phlegm (a mean between blood and bile) are the principles, in investigating life, genitals explain life in general (a mean between generations), the navel (root) explains the functioning of plants (a mean between the not yet existent and the full grown), the heart the functioning of animals (a mean between body and movement and perception), and the brain the functioning of human

¹⁵⁰In particular, see Plato's *Philebus*.

¹⁵¹Plato, *Republic* 531C; Aristotle, *Metaphysics* 987b27–29.

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being.¹⁵² His tendency is to think in threes, since he is always looking for the harmonizing factor that leads to an order, a cosmos, between two opposed things.

Of equal interest with his explanations of Pythagorean physical theory are Philolaus's remarks on the question how we know all this. Philolaus does not give an account of the sources of knowledge showing how the knowledge that all things are subject to number occurs, because he does not know how this would go. Instead, he insists that unless all things are *somehow* subject to number, we could not know them. He *assumes* we can know things, and then inquires *how* this is possible, rather than proving that we can know in the first place. He bases his metaphysics, his account how reality is ultimately constructed, on the assumptions that we *can* know about the world, and that there is only *one* way to account for this fact. The strategy is not new, for Parmenides had used it earlier to arrive at very different results, and it was implicit in earlier Pythagorean thought. Why should he have supposed that things must be mathematical to be knowable? He was no doubt impressed that we can prove things in mathematics, establishing their truth and the necessity of their truth without reliance on the senses or testimony. He was also impressed by the empirical discoveries in musical harmony, and he must have concluded that when we look into our own natures to discover the *logos* of things, as Heraclitus would have us do, we find, not the rule of Strife, but an intuitive understanding of mathematics revealing the source of the reconciliation between opposites within the strife. Philolaus clearly takes mathematics to provide an understanding of the world that goes beyond anything provided by the senses.

For Philolaus the realities of Parmenides, the sorts of stuff we always speak when we speak about anything at all, are not actually known by us at all. In order to be known, something must have some structure, and a stuff, of itself, has none. What is known are things made up of stuff by the imposition of limit. We do in fact know, and what we know about is the world we sense. Behind that world lies the unlimited things and limits, which we do not know. We neither know what these are in themselves (as opposed to how they appear), nor how they are joined together to make up the things we experience. Knowledge is a matter of understanding structure of something with which we are acquainted, it is not involved in simple acquaintance with something that has no structure to understand. And so Philolaus remarks that, though we can insist that the world must arise from the unlimited, that is, from matter or space with its geometric limiters, we cannot know the nature of the unlimited and its limiters, since they are eternal. The point seems to be that the limiters and unlimited are not things that are perceived by us (not changing, temporal things), even if we must

¹⁵²Fragment 13.

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hypothesize them to account for what we do perceive. So we can only know the properties they must have (i.e. their ability to limit and be limited) to account for what we can perceive, not the natures that underlie or explain those properties. Moreover, the manner in which the limiter and unlimited are joined is unknowable by us, though this harmony of the two was, of course, necessary for a Cosmos to arise. We cannot *perceive* how the two are joined, since we can perceive only the natural objects resulting from their joining, nor can we *reason out* how they are joined, since their joining is not a necessary fact about their being, but something that supervenes on their separate and independent natures, natures that we cannot know in the first place. Thus an analysis of the conditions of knowledge draws limits to knowledge. We can have knowledge of what we experience, and metaphysical knowledge of the existence, at least, of certain things that we cannot experience, but that reason tells us must be there if knowledge of what we experience is to be possible. This skepticism about our knowledge of the most ultimate reality places Philolaus squarely in the 5th century BCE. It suggests that in the end, even our knowledge of ourselves does not penetrate to the eternal and unchanging being that lies behind nature, since we ourselves are subject to change, and even self-knowledge is knowledge of nature. Against Parmenides he insists that we can only know reality as an object of experience, and so the putative knowledge of what is is an illusion. Its illusory character is shown by the lack of content in that knowledge. Parmenides' play of appearances, which *must* appear to human beings, must also, if there is any knowledge of reality at all, be supposed to provide that knowledge. Reality must, then, really be sliced up into countable things, and the spatial structure introduced into reality must be supposed to explain its appearance.

There is considerable philosophical depth in Philolaus's response to Parmenides. At the very least, we can see a philosopher here who knows when a problem has *not* been solved. But did it have any influence in the ancient world? It did on Plato, whom we shall find amenable to the limited skepticism about ultimates Philolaus proposes, and this limited skepticism survives into later Platonism, in which it was a commonplace that the highest realities cannot be grasped by sense or intellect, for they underlie the very possibility of knowledge and experience, and so can only be approached by seeking out what must be so if knowledge of reality is to occur through experience at all.

Archytas of Tarentum was a Pythagorean contemporary with Plato. The Pythagoreans retained influence in Tarentum, and Archytas, a popular general there, was able to send a ship to help Plato, who had been forcibly detained at Syracuse by Dionysius II, in 360/361 BCE. Archytas was notable as a mathematician for solving the problem of doubling the cube, using a new technique involving moving three-dimensional constructions with cylinders and cones. Hippocrates of Chios had already reduced the problem to that of

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finding the two mean proportionals between the cube and its double. (This is equivalent to finding the cube root of two.) His work marks how sophisticated mathematics had become in the hands of the Pythagoreans by this time. He applied mathematics to the explanation of nature, as one would expect a Pythagorean to do, remarking that it can discern truths about existing particulars, since it discerns much about the nature of the world. He sees astronomy and music, in particular, as open to the investigation of the mathematician, and is responsible for the classical classification of arithmetic, geometry, astronomy and music together as associated sciences (the “Quadrivium”).¹⁵³

In one fragment Archytas remarks that calculation should be used in politics as well, to provide an “equal share” to the rich and the poor, the powerless and the powerful.¹⁵⁴ How this works we do not know, but the notion that justice in one of its forms involves a kind of equality between the parties, which might be established by calculation, occurs also in Aristotle’s discussion of the notion.

8. MELISSUS OF SAMOS

Parmenides seems to fasten on that which is one in definition, Melissus on that which is one in matter, for which reason the former says that it is limited, the latter that it is unlimited.

Aristotle, *Metaphysics* I 5

Melissus of Samos (fl. ca 450 BCE) is known to political history as the victorious commander in a naval battle of 441 BCE, at the beginning of the Samian revolt from Athens and the Delian League.¹⁵⁵ He has been considered by some a follower of Parmenides, but if he was, he misunderstood his master’s conclusions, and presents his own argumentation, inconsistent with Parmenides, to support what he takes those conclusions to be. It is much more likely that he was an independent thinker, or even, perhaps, a satirist imitating what he took to be the merely paradoxical reasoning of the Eleatics to make it clear how absurd its conclusions would be if they were followed out.

His thought is known from a prose work of which a number of fragments survive. His argument does

¹⁵³Fragment 1 (Diels-Kranz). See Freeman (1947) for translations of the fragments, Burkert (1972) for details of Archytas’s views.

¹⁵⁴Fragment 3 (Diels-Kranz).

¹⁵⁵For Melissus, see David Sedley (1999).

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not proceed, as Parmenides's does, from requirements on what is known, nor does he speak of what is necessary or possible. He does begin with an argument that what is cannot come into being or pass away, echoing one conclusion from Parmenides, at least in verbal form—it would have to come into being from what is not if it came into being, but in no way can anything arise from what is not.¹⁵⁶ No argument is provided in the material at our disposal that what is cannot pass away. Probably he suggested that it would have to pass away into nothing.

Do these arguments depend on Parmenides? Well, Parmenides, to quote him, had said that “this shall never be proved that things that are not are,”¹⁵⁷ and “that it is, and it is not possible for it not to be, is the way of persuasion.”¹⁵⁸ So, if we ignore the context of these remarks, and fail to fill in the elliptical expression with Parmenides's intended reading of “what is” as “what is knowable,” we can easily arrive at Melissus's principles, that what is is, and is all that is, for what is not is not. The rejection of anything that is a mixture of being and non-being, that is, anything that is something and is not something else, is whatever in one respect and not in another, is something, but could fail to be that under other circumstances, is motivated in Parmenides by his restriction to his considerations to what is knowable, in the first part of his poem, and the restriction and the rejection are lifted in the second part of his poem, as we have seen. But Melissus does not motivate the rejection in any way at all—apparently he just hopes that no one will notice the third alternative. Gorgias, we shall see in the next chapter, suggests that it might be motivated by taking “what is” to be the *totality* of what is in any way at all, but then argues that the resulting conclusions are completely untenable, and decides, it seems, that such a totality must be unintelligible, or at least it cannot be understood in the way things that are merely parts of the totality of what is can be. Realities are only understood by reference to *other* realities.

Melissus goes on to argue to the non-Parmenidean view that what is must be unlimited in magnitude, in the same way as it is unlimited in its temporal existence. The suggestion is no doubt that a parallel argument can be made—if what is had a limit in space, it could be limited only by something, not nothing, and so we

¹⁵⁶This is true enough if “what is not” is what in no way is, but if what is not is what is not this, though it is that (not a horse, though it is some tissue belonging to a horse), so that it both is and is not, there should be no problem conceiving how something that is a horse might arise from what is not a horse.

¹⁵⁷Parmenides, Fragment 7.

¹⁵⁸Parmenides, Fragment 2.

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would find what is beyond the limit limiting what is.¹⁵⁹ That a parallel argument can be made would suggest that Parmenides was implicitly contradicting himself in making what is eternal, but limited in size. The point seems to be a good one, and could have been made by the Atomists, who, of course, hold to an unlimited space and an unlimited past time as well. These assumptions are central to the Atomists' view of things, for they deduce the existence of atoms from unlimited past time, and the void from the observed fact that there is change. The unlimited void is deduced from the motion of the atoms, which will not stop at any supposed limit to space for no reason. (So it is supposed that there must be a cause for any change in motion.)¹⁶⁰ Perhaps Melissus got his argument from the Atomists, or from reflection on their system. In any case, if he had Parmenides in mind while making it, and understood him, then it seems he must have been intending to refute Parmenides by showing that when he argues that what is always was, he provides us with all we need to show that what is is indefinite in spatial extent as well.

Then Melissus departs yet further from Parmenides, arguing not only that what is is unbounded, but that whatever is unbounded must be one, because if it were two, it would have boundaries, namely the boundary between the two that make up the one, and so would not be unbounded.¹⁶¹ This is plainly fallacious, for it has been proved that what is is unbounded only in the sense that it has no *external* boundaries in space or time, and this would not rule out *internal* boundaries between different sorts of what is. Aristotle is plainly contemptuous of Melissus's arguments, and the fallacy at this key point was certainly apparent enough. In any case, he goes on to argue that if what is, or the One, were to differ from itself anywhere, it would then be two

¹⁵⁹David Sedley (1999) 125–127, suggests that the second portion of what has usually been taken to be the argument for temporal infinity is actually meant to argue for spatial infinity, as follows: What is would be limited *only* if it began to grow at some time, and then ceased at some time, and had only attained, therefore, a certain size. But it never did begin, but has always grown, and so it must be unlimited in size. The argument is surely fallacious, but it might have drawn on Ionian presuppositions, which make the Cosmos begin at some time and grow, drawing on the infinite outside it as it does so. He would be pointing out that what is is not limited to such a cosmos, “for what is not all would not be able to be always” (end of Fragment 2). The first argument, for temporal infinity, also draws on Ionian presuppositions, and Sedley suggests that Melissus was addressing an Ionian audience—hence the reported title of his work, *On Nature or On What Is*. Perhaps another line of argument yet could be suggested, namely that if there is infinite time, then it must be possible for something to move in a single direction at a fixed speed forever. But then there can be no limit to space.

¹⁶⁰Maybe things could be arranged in such a way that, given the laws of motion and the arrangement and shapes of the atoms, all motion is in fact restricted to a limited space. That is, it might be that whenever an atom approached the limit of the space concerned, it encountered another atom and, as a result of the collision with it, was reflected back into that limited space by the collision. At least I can see no reason to say it is impossible. But there is no reason to suppose it must be the case if we have already given up the notion space is indefinitely divisible. Whatever allows it to be indefinitely divisible (that is, that it is nothing) no doubt allows it to be indefinitely extended.

¹⁶¹Diels-Kranz Fragment 6. The non-Parmenidean character of this view should be evident. Parmenides would have insisted that the one was *bounded*, for it had to be a definite kind of thing.

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(say, the red and the green), and so bounded—thus what is is all alike, always and everywhere. Parmenides never drew such a conclusion. If Melissus thought he did, perhaps he misread him in the same way we have seen Anaxagoras did above.

Indeed, Melissus claims, if what is were even to have bulk that fills space, it would not be all alike, but divisible into parts, so that it would not be one. (In contrast, Parmenides thought that what is, to be knowable, must have the capacity to fill space.) Thus the One is not corporeal, or, it seems, even extended. Perhaps he thought that the One was all of it entirely in each and every place and time, so that neither places nor times nor parts of the One occupying them can be distinguished. (If this was his view, it would still be the case that the One is not limited in space or time—its being non-limited need not imply that the one is indefinitely extended, for it might not be extended at all, and so be free of limits. Thus Melissus's opening arguments and their conclusions remain standing even on the assumption that all of what is is present at every place and every time.)

At this point it is clear that Melissus is simply ignoring Parmenides's focus on what is knowable, and his recognition that what is must have certain characteristics that are not knowable, since they belong to it contingently, not necessarily. For Melissus *all* the characteristics of what is are knowable, and follow necessarily from its being. The criticism Aristotle makes of the Eleatics, that their understanding of what is gives no purchase to natural explanation of the appearances to the senses, certainly applies to Melissus, even if it does not apply to Parmenides or Zeno.

Melissus goes on to refute the various opinions of the 5th-century pluralists, who we have seen considered themselves in agreement with Parmenides.¹⁶² Against Empedocles and the Atomists, he already has an argument, but he also denies that the order or arrangement of things can change, both on the ground that the order must *be*, and so cannot change, and on the ground that the things ordered, which must be, would have to change in some way if the order does. But what is cannot change without production of an internal boundary in time. Again, what is cannot vary in density, and so Anaximenes is wrong, nor can it be empty, as the Atomists' void would be.

In the midst of all this, he argues that the One does not suffer pain. It seems an odd thing to insist on, but the argument occurs within a series of refutations of the physical philosophers, and so is likely to be one more such refutation. Now we have seen that Anaxagoras held that mind knows all things because it differs

¹⁶²Diels-Kranz Fragment 7.

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from all things, and its coming-to-know is due to a sort of pain which mind experiences upon contact with what is not mind. This would mean, of course, that mind and everything else (the physical world?) are two different things, and Melissus would hasten to deny this. Why can't what is feel pain? Well, first of all, if it feels pain it cannot entirely be, for it must somehow lack something, and indeed, it must even be unlike itself, since it is due to some lack in itself that it comes to feel pain. Whatever is, then, since it must be entirely, and without boundaries, cannot feel pain, and so the Mind of Anaxagoras is impossible. Anaxagoras was very difficult for Melissus to refute, for, taking a similar view of Parmenides's thought, he argued that what is is unchanging, unbounded, never mixed with the void, and all alike, insofar as every portion of it contains every kind of stuff and every quality. It is only in the relative strengths of its different powers to affect the mind that what is varies from itself, and so Melissus argues, in effect, that what is cannot be affected, that is, changed, by anything.

In one final fragment,¹⁶³ Melissus argues that if there were many, they would all have to be as he says the One is. In particular, none of them could change from what we first determine it to be when we first make reference to it. The white could not become black, air could not become fire. The reason why things could not change is not given, so it may be that the arguments we have already seen are to be used here. The white cannot change because it is *one* thing, and if it changed, or were different from itself at different places, then it would become several objects, and no longer be one. "They could not change if they were real, but each thing would be just what we believed it to be, for nothing is stronger than true reality." This view has been taken to lie behind Atomism, which supposedly makes the atoms little Melissan ones. It seems more likely that Melissus had little influence on any of his contemporaries, except to the degree that his arguments are perhaps adapted to showing that what is cannot be known by some of the Sophists, as we shall see.

One view taken of Parmenides by some later thinkers find his views to be Melissan, rejecting the reality of the sensible world entirely, and making the reality that is known a single, undifferentiated unity outside space and time. In Plato's *Parmenides*, which does not take this view of him, we have seen it is suggested that some people made a mockery of Parmenides's arguments concerning the oneness of what is, by drawing absurd conclusions from it. It seems quite possible he had arguments like those of Melissus in mind, if he took it that Melissus did not mean his arguments seriously, but only as the developments of absurdities to establish the impossibility of Parmenides's view. Or perhaps he intended that Melissus, even though he accepts them, derives what are in fact absurdities from Parmenides's views, and what were recognized as such by others who

¹⁶³Diels-Kranz Fragment 8.

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held that things are many. Zeno's intention, as we have seen, was to return tit for tat, by proving that absurdities follow from the assumption that things are many.

We shall find that later Neoplatonic and Neopythagorean thinkers sometimes took it that there must be something perfectly one lying behind all things, and assigns this One Melissan properties. They generally make this one unknowable (save that we can know it must be), or even place it beyond being, or at least beyond conceivability. It is sometimes asserted by such thinkers that they are simply reporting Parmenides's One, here. Perhaps, if we trace their views back before Plato, we should identify this One as Melissan, and insist, as Plato did in his *Parmenides*, that Parmenides never held such a view, even if some had said he did.

9. DIOGENES OF APOLLONIA

My opinion, in sum, is that all existing things are
differentiated from the same thing, and *are* the same thing...

Diogenes of Apollonia, Fragment 2¹⁶⁴

Diogenes of Appollonia lived as a physician in Athens about 440-430 BCE, where he wrote several books defending Anaximenean views against the criticisms of Anaxagoras and Empedocles. He assumed, with the other thinkers of his day, that the fundamental, underlying reality was stuff, individuals being formed from this stuff, and that the most fundamental sorts of stuff could not be destroyed or altered to another kind of stuff. He seems also to have assumed that a void is not possible, and he does not obviously place any reliance on variations in density or consistency. Thus far he was in agreement with Parmenides and Empedocles, but unlike them, he did not think the world could be made up of a number of essentially different kinds of stuff.

There must be just one kind of stuff because otherwise things could not change from one into the other, or mix with one another ("oil and water don't mix," we say), or help and hinder one another, as air and water help a plant by providing nourishment (that is, changing into plant tissue), and as fire hinders wood by destroying it (that is, converting it to fire). The argument does not look strong, since Empedocles can explain these things (on the assumption that the kinds of stuff involved are not elements, but mixtures), and his explanations seem as reasonable as those of Anaximenes, even if it is hard to see how we could be sure either was right. Probably Diogenes relied especially on the transformation of Empedoclean elements one into another, but Empedocles would deny that this happened, and it is hard to see how one could demonstrate that

¹⁶⁴Translation from Kirk, Raven and Schofield (1983).

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it did, as long as the possibility was open that the elements as we encounter them in the world are in fact mixtures. Air, for instance, might be mixed with molecules of water, which would be attracted to one another, coalescing into rain drops, under the right conditions. Air need not itself change into water.

Diogenes suggests that the key here is to distinguish the “essence” of a thing from its “accidental” qualities. (The terminology is borrowed from Aristotle, but it accurately expresses Diogenes’ thought.) The essence of a thing is what it must be to continue to exist at all. So water must always be water, no matter what else it is, and if it “changes” to hydrogen and oxygen, then it is no longer, but has been destroyed. It is of its essence to be water. On the other hand, while retaining its essence, it may well take on various accidental characteristics. It may become hot or cool, or, more dramatically, vaporize and condense, or freeze into ice, and through all this it remains water. Diogenes argues that the underlying stuff making up the world is of one sort, air, which has a definite *essential* nature, as Parmenides required, but differs from itself, as it were, as it takes on different accidental qualities in different situations in accord with its nature. That is why all things can become all things, so that nourishment occurs and the rest—there is only one thing, and it takes on all sorts of accidental qualities in different situations.¹⁶⁵

In the details, Diogenes follows Anaximenes closely, though he is apparently aware of Anaxagorean and Atomist speculations. So he claims that the world arose by the air thinking, which is the same as its engaging in a circular motion, heavier things accumulating at the center of the vortex, and lighter things at the edge. Opposing Anaxagoras, it seems, he argues quite explicitly that air itself thinks, and sees no need for a separated Mind to set things in motion. He says that the stars are like pumice stone, which is related to fire in its volcanic origin, of course, and suited, perhaps, to hold fire within its many cavities and bubbles. Taking note of a meteor that fell at Aegospotami, he claimed that meteors fall from the heavens, and so there must be many dark, rocky objects up there. His root conviction, it seems, is that the old views have been rejected too quickly for insufficient reasons, and his ambition is to return to them as closely as possible while answering modern objections.

¹⁶⁵Perhaps Diogenes’ opinion is not so far from our own, for we hold that all physical things are forms of, or somehow related to, energy. One might also argue that it is implicit in the Atomists, for they hold to one kind of stuff, the stuff that makes up the atoms, which has a variety of accidental properties, namely the shapes of the different atoms, which produces the variety to be found in the world. Unlike Diogenes, though, and like Anaxagoras, they take it that the opposites apparent to the senses do not actually characterize reality as it is in itself, though reality is somehow such that if we sense one opposite we cannot at the same time sense the other. The explanation why sensory opposites of various sorts cannot be sensed at the same time is explained nowadays, as the Atomists would have done it, by reference to the details of the structure of our sensory systems. So we can perceive green and blue in the same place, but not red and green, and this is now explained not as a some kind of logical truth, but rather a fact due to the structures in our eyes that are responsible for the perception of color.