

ACKNOWLEDGMENTS

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1. INTRODUCTION

Ancient tradition says that Thales of Miletus predicted an eclipse of the sun. Although we know none of the details of this supposed prediction, the event (an eclipse in 585 BCE) has traditionally marked the beginning of philosophy and science in Western thought. Aristotle, who was one of the earliest to think critically about the history of philosophy, speculated about why this kind of inquiry should have begun in Miletus, a Greek city on the Ionian coast of Asia minor (in what is now Turkey); like later scholars who have asked this question, Aristotle was unable to find an answer. So the circumstances surrounding the beginning of philosophy remain unclear; perhaps the question is unanswerable. Nevertheless, Thales, the titular first philosopher, stands at the beginning of a great tradition of rational inquiry and critical thought about the world and the place of human beings in it that continues to the present day.

Thales was the first of a succession of thinkers known as the Presocratics who lived in Greece in the sixth and fifth centuries BCE.¹ These thinkers do not belong to any unified school of thought, and they differed dramatically in their views. Yet they share intellectual attitudes and assumptions and they all display an enthusiasm for inquiry that justifies studying them as a group. It cannot be merely Thales' reported prediction of an eclipse that can justify our thinking of him as the first Western philosopher and scientist—after all, both the Babylonians and the Egyptians had complex astronomies. Nevertheless, for Aristotle and those who came after him, Thales, and his fellow-Milesians

1. The name "Presocratics" comes from 19th-century classical scholars, who saw a fundamental break between the interests and methods of our group of thinkers and Socrates (470–399 BCE), and who regarded Socrates' interests in ethics as a radical advance in Western thought. Few would now agree with that evaluation, and it is worth pointing out that several of our Presocratics were actually contemporaries of or younger than Socrates. So, as a descriptive label, the name "Presocratics" is misleading, but as a designator for a recognized group of thinkers, it is quite useful, and I shall use it here in that sense. For more on this issue, see articles in Long and in Laks and Lougnet.

Anaximander and Anaximenes, shared an outlook that truly marks the beginning of philosophical inquiry. Part of this was a willingness to speculate and give reasons based on evidence and argument. Another aspect was a commitment to the view that the natural world (the entire universe) can be explained without needing to refer to anything beyond nature itself. For instance, Thales seems to have thought that everything is from water (although it is not clear whether he thought that water is the origin of all things, or that everything really is water in some form or another). This may strike us as a naive and overly simplistic claim. Yet Aristotle saw in Thales' views something that suggested that Thales had reasons and arguments for them:

[T]hey do not all agree about how many or what kinds of such principles there are, but Thales, the founder of this kind of philosophy, stated it to be water. (This is why he declared that the earth rests on water.) Perhaps he got this idea from seeing that the nourishment of all things is moist, and that even the hot itself comes to be from the moist and lives on it (the principle of all things is that from which they come to be)—getting this idea from this consideration and also because the seeds of all things have a moist nature; and water is the principle of the nature of moist things.
(Aristotle, *Metaphysics* 1.3 983b18–27 = DK 11A12)

From Aristotle's comments, it is clear that he thought that Thales' claim was based on reasoning from observational evidence.

We may contrast Thales' account of the character of the natural world with the story Hesiod tells (probably in the century before Thales) about the origin of the cosmos:

Tell me these things, Muses, who dwell on Olympus,
From the beginning, and tell me, which of them was born first:
First of all Chaos came into being. Next came
broad-breasted Gaia [Earth], the secure dwelling place forever of all
the immortals who hold the peak of snowy Olympus.
And murky Tartaros [Underworld] in a recess of the broad-rooded
Earth,
and Eros [Love], who is the most beautiful among the immortal
gods, who
loosens the limbs and overpowers the intentions and sensible plans
of all the gods and all humans too.

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From Chaos there came into being Erebus [Darkness] and black

Night.

From Night, Aither [bright upper air] and Hemera [Day] came into being,

which she conceived and bore after uniting in love with Erebus.

Gaia first brought forth starry Uranos [Heaven]

equal to herself, to cover her all about

in order to be a secure dwelling place forever for the blessed gods.

She brought forth long mountains, beautiful shelters of divine

Nymphs who live in wooded mountains,

and also, without delightful love, gave birth to the barren sea,

Pontos, raging with its swelling waves. Then,

bedded by Ouranos, she gave birth to deep-swirling Ocean

and Koios and Kreios and Hyperion and Iapetos

and Theia and Rhea and Themis and Mnemosyne

and Phoebe with a golden wreath and lovely Tethys.

After them, last of all, was born crafty-minded Kronos,

the most terrible of the children, and he hated his mighty father.

(Hesiod, *Theogony* 114–38)

Hesiod requests the help of the Muses for the claims he will make. He then reports on the births of the gods with the Muses' authority as his source. In relying on the Muses, Hesiod does not infer his account of the cosmos from natural evidence. Nor does he think that appeals to evidence are necessary: the divine warrant offered by the Muses is sufficient for his purposes. Hesiod's account of the origins of the universe (his cosmogony) is in fact a story of the origins of the gods (a theogony). Each aspect of the cosmos is identified with the distinct characteristics and personality of a god, who controls that part of the universe. The change from the state of chaos to the presence of Gaia (Earth), Tartaros (the deepest underworld), Eros (desire), Erebus (the darkness under the earth), and Night is not explained in this passage.² Earth, Tartaros, and Eros simply came to be; there is no attempt to explain how this happened or justify why they came to be at exactly this moment rather than another. Once Eros is present, the model of generation is primarily sexual, although we are told that Gaia (Earth) gave birth to Pontos (sea) "without delightful love." These gods who, in some sense, *are* the

2. Hesiod says that Chaos "came into being"; there is no explanation for this coming-to-be.

different parts of the universe, behave like humans in their desires, emotions, and purposes. As in the Egyptian, Sumerian, and Hebrew creation myths, the Hesiodic story makes no clear distinction between a personality and a part of the cosmos: The natural and the supernatural coincide. Since Hesiod feels no compunction about asserting his claims without reasons to support them, he seems to think that the proper response to the story is acceptance. The hearer or reader should not subject it to critical scrutiny followed by rational agreement or disagreement.

While the Presocratics rejected both the kind of account that Hesiod gave and his attitude toward uncritical belief, we must take care not to overstate the case: In the fragments of the Presocratics we shall find gaps in explanation, appeals to the Muses, apparent invocation of divine warrant, breaks in the connection between evidence and assertion. Despite all these apparent shortcomings, these early Greek thinkers took a bold leap in adopting a critical attitude. In the case of the Milesians, for instance, we find each proposing something different as the ultimate foundational reality of the cosmos. Anaximander, who followed Thales, apparently rejected the idea that water is the basic stuff; in its place he posited a single reality that he called the boundless (or the indefinite), something with no specific characteristics, out of which arise the other ingredients of the cosmos. Anaximander's follower Anaximenes, in turn rejects the boundless, apparently arguing that it was just too indefinite to do the job Anaximander required of it. Anaximenes claimed that air was the foundational stuff. Moreover, he seems to have seen that there was a gap in the earlier Milesian theories: Thales and Anaximander provided no mechanism to account for the transformations of their basic stuff. Anaximenes remedies this by proposing the processes of condensation and rarefaction: as air becomes more rarified or compacted, other stuffs are produced. Despite the disagreements among them, even this brief view shows that the Milesians worked within a shared framework of argument and justification.

Having adopted this critical attitude, the early Greek thinkers faced the question of what a human could justifiably claim to know. The Milesians might make claims about the basic stuff of the cosmos, and might give arguments for these claims, but how could they claim to have knowledge about an original or basic state of the universe, which they had never experienced? Hesiod would have an answer to this question: He could say that his information came from the Muses, and he could call on them to authenticate the truth of his claims about the coming-

to-be of the gods. In the same way, we find Homer calling on the Muses when he wants to offer a catalogue of the leaders of the expedition to Troy. Because the Muses are divine they are immortal; since they were present for the gathering of the ships, they are appropriate as witnesses and can provide assurance that the story Homer tells is true:

Tell me now Muses, who have dwellings in Olympus
for you are goddesses and present and know everything,
while we hear only rumor and we know nothing;
Who were the Greek commanders and leaders?
The throngs I could never tell nor name,
Not even if ten tongues, ten mouths belonged to me,
a voice unbroken, and a bronze heart within me.
Unless the Olympian Muses, daughters of aegis-holding
Zeus, put into my mind those who came below Iliion.
(Homer, *Iliad* 2.484-92; tpc)

Although the contexts differ, Homer and Hesiod use the same invocation of the Muses to guarantee their claims: historical for Homer, religious and cosmogonical for Hesiod. Xenophanes of Colophon specifically rejects this justification. "By no means," he says (21B18), "did the gods intimate all things to mortals from the beginning, but in time, by inquiring, they discover better" (tpc). In rejecting divine authority for their claims, the Presocratics invite inquiry into the sources of human knowledge. A tantalizing mention of this problem appears in a fragment from Alcmaeon, who echoes Homer's claims that the gods know all things, but apparently offers a more pessimistic outlook for humans: "Concerning the unseen, the gods have clarity, but it is for men to conjecture from signs . . ." (DK24B1; tpc). We do not have the end of the fragment, but it is clear that Alcmaeon is contrasting the limited epistemic status of humans with the exalted certainty that the gods enjoy.

We find the Presocratics considering what separates sure and certain knowledge from opinion or belief, and the roles of sense perception and thought in acquiring knowledge, and, indeed, worrying about the very possibility of such knowledge. Moreover, as competing theories about the cosmos appear, the problem of theory justification comes to the fore. Sometimes, as with the three Milesians, justification might be a question of which theory appears to fit the evidence best; but there is another aspect to theory justification, and that is the metatheoretical question about what constitutes a genuine theory, regardless of the particular

content. This problem is raised most strikingly by Parmenides of Elea, and his powerful arguments about what can be genuinely thought and said haunt the Greek thinkers who come after him, including Plato and Aristotle.

Although we call these early Greek thinkers "philosophers," they would probably not have called themselves by that name.³ They were active in many fields, and would not have thought that astronomy, physics, practical engineering, mathematics, and what we call philosophy were separate disciplines, and most would not have thought that engaging in study of any of these areas would preclude them from being active in politics. In a society that was still more oral than literary, in which books (as scrolls, not codices) were just beginning to be written and distributed, the Presocratics thought and wrote about an astounding number of things. In the ancient testimonies about the Presocratics, we find reports of writings on physics, ethics, astronomy, epistemology, the gods and human worship of them, mathematics, metaphysics, meteorology, geometry, politics, the mechanism of sense perception, history (including the history of their own field), and even painting and travel. They wrote in poetry and they wrote in prose. They were as interested in the question of how a human being ought to live as in the question of the basic stuffs of the cosmos. Struggling to make philosophical notions clear in a language that did not yet have technical philosophical terms, they used elegant images and awkward analogies, straightforward arguments and intricate paradoxes. Much of their work has not survived, and we know of most of it only through the reports and quotations given by later philosophers and historians.⁴ These later scholars preserved or referred to those parts of Presocratic thought that were most relevant for their own work; therefore most of what has come down to us are fragments of and testimonia about their views on natural philosophy, metaphysics, epistemology, and ethics, and so the bulk of material included in this volume is on those topics.

3. The first use of the term may be in Heraclitus; it is Plato who tries to restrict the name to a certain group of thinkers.

4. In the 1990s, fragments of a papyrus scroll in Strasbourg were pieced together and discovered to contain text from Empedocles of Acragas. The Strasbourg Papyrus has both known and previously unknown lines, and may well be the only direct transmission of a Presocratic text that we know (although scholars disagree about this). Translations of the new material are included in Chapter 8, Empedocles of Acragas.

In the latter part of the fifth century BCE, there was great interest in social, political, and moral questions, and a number of thinkers explored these topics almost exclusively. They were called Sophists, and they were independent and often itinerant teachers of wisdom and practical political skills. Many of them were accomplished and flamboyant rhetoricians. They investigated questions about the nature of moral virtue and the best way for a city to be governed, taking on paying pupils to whom they taught their rhetorical skills and their social and political views. Most of them were contemporaries of Socrates and some of Plato (who despised them). Aristophanes, the great comic poet, represents Socrates himself as a sophist in *Clouds* (423 BCE, revised 418–416). In the play, the character Socrates has the traditional Presocratic interests in cosmological and meteorological subjects (although in Plato's dialogue *Phaedo*, Socrates stresses that he gave up studying these questions). Moreover, at the same time as philosophy was developing, so was medicine. Ancient medical practitioners were also interested in theory, and in the medical literature (collected in what is called the Hippocratic corpus) there are overlaps with questions and problems that the Presocratics explored. All this suggests that absolute distinctions among Sophists, Medical Practitioners, and Philosophers are too extreme.⁵

In studying the Presocratics, the earliest Greek philosophers, we find ourselves at the beginning of a great intellectual adventure. The metaphysical, epistemological, logical, and ethical problems and puzzles that engaged them became part of the philosophical project that Plato and Aristotle inherited and then passed on to other, later thinkers including ourselves. We may find some of their assumptions and views to be strange, even a bit bizarre, and we may find some of their arguments difficult to comprehend. But these early Greek philosophers understood the importance of sustained rational inquiry and the critical evaluation of arguments and evidence. As we join them in this adventure, we, too, become part of that intellectual tradition that goes back to Miletus.

Sources

No Presocratic book has survived intact, and so what we know of the early Greek philosophers is gathered from other works. The Presocratics

5. There were also religious cults developing during the sixth and fifth centuries BCE that explored questions about human souls and personal identity. See Mckirahan for fuller discussions.

were quoted or referred to in many ancient works, ranging from philosophical treatises (e.g., Aristotle and the ancient commentators on Aristotle, or Sextus Empiricus) to works on grammar or entertaining treatises (e.g., Plutarch's "Table-Talk"). Our evidence is of two sorts: direct quotations (often simply called "the fragments") and summaries of Presocratic views, or references to the thinkers and their views (called "testimonia"). One must take care in using the fragments, as the extent of a quotation is often unclear; moreover there can be disagreements about the proper text when more than one source provides a passage. We must also be aware that the sources who quote or refer to our thinkers have their own reasons for doing so: very few are disinterested historians, and so the context may mislead us about the actual view of the philosopher quoted. Because of the fragmentary nature of the evidence, it is important to keep in mind that interpretations are tentative, and based on the best reconstruction of a view that one can offer, using as much evidence as one can. Fuller discussions of these problems may be found in the articles by Mansfeld, Mejer, and Runia, and the book by Osborne found in "Suggestions for Further Reading" at the end of this chapter.

Below is a short list of our most important sources for the Presocratic fragments and testimonia.⁶

Both Plato and Aristotle referred to Presocratic thinkers and occasionally quoted them, but care must be used when dealing with evidence from these sources. Plato and Aristotle used views that they attributed to the earlier philosophers for polemical purposes, and both often gave short summaries of Presocratic positions, which are sometimes inaccurate.

Theophrastus, Eudemos, and Meno were students and associates of Aristotle, and they wrote treatises on the views of earlier thinkers (a project organized by Aristotle). Theophrastus wrote on their theories of perception in his book *On Sensation*, parts of which survive, and on their natural philosophy in a book called *Tenets in Natural Philosophy*. Eudemos concentrated on astronomy, mathematics, and theology, and Meno on medicine. Sadly, except for parts of *On Sensation*, these

6. An excellent introduction to the problems of sources may be found in Mansfeld's article, "Doxography of Ancient Philosophy," *The Stanford Encyclopedia of Philosophy* (Fall 2008 Edition), edited by Edward N. Zalta, which may be found at <http://plato.stanford.edu/archives/fall2008/entries/doxography-ancient/>.

works are lost and survive only in fragments quoted by later scholars; but where they are available, they can provide important evidence for Presocratic thought.

The Roman orator Cicero (first century BCE) quotes from and refers to the early Greek thinkers in his accounts of philosophy, of which he was a serious student.

Clement of Alexandria (second half of the second century CE) was the author of a work called *Miscellanies*, comparing Greek and Christian thought. In the course of this, he often quotes Presocratic philosophers.

Sextus Empiricus, the skeptical philosopher of the second century CE, quotes many Presocratic views on sense perception and knowledge.

Plutarch, writing in the second century CE, quotes from many of our early Greek philosophers in his numerous essays, collected under the title *Moralia*.

The *Placita* (*Opinions*), a work from the second century CE, also gives information about the Presocratics. Though formerly attributed to Plutarch, it was in fact written by someone else. That person, about whom nothing else is known, is conventionally referred to as pseudo-Plutarch. The *Placita* is based on an earlier lost work, as is *Selections on Natural Philosophy* (*Ecllogae Physicae*) by John Stobaeus (fifth century CE). The lost work, by Aëtius, (c.100 CE) was itself based on earlier collections, and probably goes back to Theophrastus.⁷

In the late second or early third century CE, Hippolytus, Bishop of Rome, wrote a book called *Refutation of All Heresies*, in which he argued that Christian heresies can be linked to Greek philosophical thought. In this ambitious work, he gives summaries of Presocratic views and quotes extensively from several of the early Greek philosophers.

Diogenes Laertius (third century CE) produced an entertaining and wide-ranging (but not entirely reliable) work called *Lives of the*

7. The history and reconstruction of Aëtius' work is complex and controversial. For a clear discussion see Runia.

Philosophers, drawing on many sources that are now lost. It contains biographical reports, lists of book titles, and summaries of views. Although it was influential in its time, it must be used with caution, as it contains much hearsay and invention.

The Neoplatonist philosopher Simplicius (sixth century CE) wrote detailed commentaries on Aristotle, and his commentary on Book I of Aristotle's *Physics* (in which Aristotle surveyed the views of his predecessors) is a valuable source for Presocratic scholars. In his commentaries, Simplicius provides quotations from a number of important Presocratics, especially Parmenides, Anaxagoras, and Empedocles (in all three cases, Simplicius is the only source for some passages). In the case of Parmenides, Simplicius tells us that he is quoting more of the material than is strictly necessary for his commentary, because copies of Parmenides' work have become rare and ought to be preserved. Alexander of Aphrodisias (c.200 CE) is another such commentator and source, as is Simplicius' contemporary John Philoponus.

Suggestions for Further Reading

Background and General Treatments of the Presocratics

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2. THE MILESIANS

Thales, Anaximander, and Anaximenes were all from the city of Miletus in Ionia (now the western coast of Turkey) and make up what is referred to as the Milesian "school" of philosophy. Tradition reports that Thales was the teacher of Anaximander, who in turn taught Anaximenes. Aristotle begins his account of the history of philosophy as the search for causes and principles (in Metaphysics I) with these three.

2.1. Thales

Thales appears on lists of the seven sages of Greece, a traditional catalog of wise men. The chronicler Apollodorus suggests that he was born around 625 BCE. We should accept this date only with caution, as Apollodorus usually calculated birthdates by assuming that a man was forty years old at the time of his "acme," or greatest achievement. Thus, Apollodorus arrives at the date by assuming that Thales indeed predicted an eclipse in 585 BCE, and was forty at the time. Plato and Aristotle tell stories about Thales that show that even in ancient times philosophers had a mixed reputation for practicality.

1. (11A9) They say that once when Thales was gazing upwards while doing astronomy, he fell into a well, and that a witty and charming Thracian serving-girl made fun of him for being eager to know the things in the heavens but failing to notice what was just behind him and right by his feet.

(Plato, *Theaetetus* 174a)

2. (11A10) The story goes that when they were reproaching him for his poverty, supposing that philosophy is useless, he learned from his astronomy that the olive crop would be large. Then, while it was still winter, he obtained a little money and made deposits on all the olive presses both in Miletus and in Chios, and since

no one bid against him, he rented them cheaply. When the time came, suddenly many requested the presses all at once, and he rented them out on whatever terms he wished, and so he made a great deal of money. In this way he proved that philosophers can easily be wealthy if they wish, but this is not what they are interested in.

(Aristotle, *Politics* 1.11 1259a9–18)

Thales reportedly studied astronomy (there is evidence for his interest in eclipses, whether or not he had anything to say about the eclipse of 585 BCE), geometry (he was said to have introduced the subject into Greece from Egypt), and engineering (Herodotus reports that he changed the course of the Halys river in order to aid the Lydian army). In his account of the cosmos, Thales reportedly said that the basic stuff was water. This could mean that everything comes from water as the originating source, or that everything really is water in one form or another. Aristotle, the source of the reports, seems unsure about which of these propositions Thales adopted. This shows that even by Aristotle's time, Thales was probably not known by any direct written evidence, but only indirectly. According to the tradition that Aristotle follows, Thales also said that the earth rests or floats on water. Aristotle also reports that Thales thought that soul produces motion and that a magnetic lodestone has soul because it causes iron to move.

3. Thales said that the sun suffers eclipse when the moon comes to be in front of it, the day in which the moon produces the eclipse being marked by its concealment.

(*P.Oxy.* 53.3710, col. 2, 37–40; not in DK)

4. Causes are spoken of in four ways, of which . . . one is matter. . . . Let us take as associates in our task our predecessors who considered the things that are and philosophized about the truth, for it is clear that they too speak of certain principles and causes, and so it will be useful to our present inquiry to survey them: either we will find some other kind of cause or we will be more confident about the ones now being discussed.

(Aristotle, *Metaphysics* 1.3 983a26–b6; not in DK)

⁵(11A12) Of those who first pursued philosophy, the majority believed that the only principles of all things are principles in the form of matter. For that of which all existing things are composed and that from which they originally come to be and that into which they finally perish—the substance persisting but changing in its attributes—this they state is the element and principle of the things that are. . . . For there must be one or more natures from which the rest come to be, while it is preserved. However, they do not all agree about how many or what kinds of such principles there are, but Thales, the founder of this kind of philosophy, stated it to be water. (This is why he declared that the earth rests on water.) He may have gotten this idea from seeing that the nourishment of all things is moist, and that even the hot itself comes to be from this and lives on this (the principle of all things is that from which they come to be)—getting this idea from this consideration and also because the seeds of all things have a moist nature; and water is the principle of the nature of moist things.

(Aristotle, *Metaphysics* 1.3 983b6–27)

6. (11A14) Some say [the earth] rests on water. This is the oldest account that we have inherited, and they say that Thales of Miletus said this. It rests because it floats like wood or some other such thing (for nothing is by nature such as to rest on air, but on water). He says this just as though the same argument did not apply to the water supporting the earth as to the earth itself!

(Aristotle, *On the Heavens* 2.13 294a28–34; tpc)

7. (11A22) Some say the soul is mixed in with the whole universe, and perhaps this is why Thales supposed that all things are full of gods.

(Aristotle, *On the Soul* 1.5 411a7–8; tpc)

8. (11A22) From what is related about him, it seems that Thales too held that the soul is something productive of motion, if indeed he said that the lodestone has soul, because it moves iron.

(Aristotle, *On the Soul* 1.2 405a19–21; tpc)

2.2. Anaximander

Digenes Laertius says that Anaximander was sixty-four years old in 547/6 BCE, and this dating agrees with the ancient reports that say that Anaximander was a pupil or follower of Thales. He was said to have been the first person to construct a map of the world, to have set up a gnomon at Sparta, and to have predicted an earthquake. Anaximander makes the originating stuff of the cosmos something indefinite or boundless (*apeiron* in Greek; later the word can also mean "infinite"). This indefinite stuff is moving, directive of other things, and eternal; thus it qualifies as *divine*. The *apeiron* gives rise to something productive of hot and cold, but Anaximander does not say what this "something productive of hot and cold" is. The hot takes the form of fire, the origin of the sun and the other heavenly bodies; while the cold is a dark mist that can be transformed into air and earth. Both air and earth are originally moist, but become drier because of the fire. In the first changes from the originating *apeiron*, Anaximander postulates substantial opposites (the hot, the cold) that act on one another and that are in turn the generating stuffs for the sensible world. The reciprocal action of the opposites is the subject of B1, the only direct quotation we have from Anaximander (and the extent of the quotation is disputed by scholars). Here he stresses that changes in the world are not capricious, but are ordered; with the mention of justice and retribution he affirms that there are lawlike forces guaranteeing the orderly processes of change between opposites. Anaximander also had theories about the natures of the heavenly bodies and why the earth remains fixed where it is. He made claims about meteorological phenomena, and about the origins of living things, including human beings.

9. (12A9 + 12B1) Of those who declared that the *arkhê*¹ is one, moving and *apeiron*, Anaximander . . . said that the *apeiron* was the *arkhê* and element of things that are, and he was the first to introduce this name for the *arkhê* [that is, he was the first to call the *arkhê* *apeiron*]. (In addition he said that motion is eternal, in which it occurs that the heavens come to be.) He says that the *arkhê* is neither water nor any of the other things called elements, but some other nature which is *apeiron*, out of which come to be all the heavens and the

1. The word *arkhê* is left untranslated here. It means "originating point" or "first principle."

2. THE MILESIANS

worlds in them. The things that are perish into the things from which they come to be, according to necessity, for they pay penalty and retribution to each other for their injustice in accordance with the ordering of time, as he says in rather poetical language.
(Simplicius, *Commentary on Aristotle's Physics* 24.13–21)

10. (12A11) He says that the *arkhê* is neither water nor any of the other things called elements, but some nature which is *apeiron*, out of which come to be all the heavens and the worlds in them. This is eternal and ageless and surrounds all the worlds. . . . In addition he said that motion is eternal, in which it occurs that the heavens come to be.

(Hippolytus, *Refutation of All Heresies* 1.6.1–2)

11. (12A15) This [the infinite, *apeiron*] does not have an *arkhê*, but this seems to be the *arkhê* of the rest, and to contain all things and steer all things, as all declare who do not fashion other causes aside from the infinite [the *apeiron*] . . . and this is the divine. For it is deathless and indestructible, as Anaximander and most of the natural philosophers say.

(Aristotle, *Physics* 3.4 203b10–15)

12. (12A10) He declares that what arose from the eternal and is productive of [or, "capable of giving birth to"] hot and cold was separated off at the coming to be of this *kosmos*, and a kind of sphere of flame from this grew around the dark mist about the earth like bark about a tree. When it was broken off and enclosed in certain circles, the sun, moon, and stars came to be.

(Pseudo-Plutarch, *Miscellanies* 2)

13. (12A21) Anaximander says that the sun is equal to the earth, and the circle where it has its vent and on which it is carried is twenty-seven times <the size> of the earth.

(Aëtius 2.21.1)

14. (12A18) Anaximander says that the stars are borne by the circles and spheres on which each one is mounted.

(Aëtius 2.16.5)

15. (12A11) The earth is aloft and is not supported by anything. It stays at rest because its distance from all things is equal. The earth's shape is curved, round, like a stone column. We walk on one of the surfaces and the other one is set opposite. The stars come to be as a circle of fire separated off from the fire in the *kosmos* and enclosed by dark mist. There are vents, certain tube-like passages at which the stars appear. For this reason, eclipses occur when the vents are blocked. The moon appears sometimes waxing, sometimes waning as the passages are blocked or opened. The circle of the sun is twenty-seven times <that of the earth and> that of the moon <eighteen times> and the sun is highest, and the circles of the fixed stars are lowest. Winds occur when the finest vapors of dark mist are separated off and collect together and then are set in motion. Rain results from the vapor arising from the earth under the influence of the sun. Lightning occurs whenever wind escapes and splits the clouds apart.

(Hippolytus, *Refutation of All Heresies* 1.6.3-7)

16. (12A23) Anaximander says that these [thunder, lightning, thunderbolts, waterpouts, and hurricanes] all result from wind. For whenever it [wind] is enclosed in a thick cloud and forcibly escapes because it is so fine and light, then the bursting [of the cloud] creates the noise and the splitting creates the flash against the blackness of the cloud.

(Aëtius 3.3.1)

17. (12A26) Some, like Anaximander . . . declare that the earth stays at rest because of equality. For it is no more fitting for what is situated at the center and is equally far from the extremes to move up rather than down or sideways. And it is impossible for it to move in opposite directions at the same time. Therefore, it stays at rest of necessity.

(Aristotle, *On the Heavens* 2.13 295b11-16)

18. (12A30) Anaximander says that the first animals were produced in moisture, enclosed in thorny barks. When their age advanced they came out onto the drier part, their bark broke off, and they lived a different mode of life for a short time.

(Aëtius 5.19.4)

19. (12A10) He also declares that in the beginning humans were born from animals of a different kind, since other animals quickly mature on their own, and humans alone require lengthy nursing. For this reason they would not have survived if they had been like this at the beginning.

(Pseudo-Plutarch, *Opinions* 2)

20. (12A30) Anaximander . . . believed that there arose from heated water and earth either fish or animals very like fish. In these, humans grew and were kept inside as embryos up to puberty. Then finally they burst, and men and women came forth already able to nourish themselves.

(Censorinus, *On the Day of Birth* 4.7)

2.3. Anaximenes

Ancient sources say that Anaximenes was a younger associate or pupil of Anaximander. Like Anaximander he agrees with Thales that there is a single originative stuff, but he disagrees with both Thales and Anaximander about what it is. He calls this basic stuff aēr (usually translated "air," although aēr is more like a dense mist than what we think of as air, which is ideally transparent). Aēr is indefinite enough to give rise to the other things in the cosmos, but it is not as vague as Anaximander's apeiron (or indefinite). Anaximander seems to have left it unclear just what it is that comes from the apeiron and then produces the hot and the cold, and Anaximenes could well have argued that the apeiron was simply too indefinite to do the cosmic job Anaximander intended for it. In a major step away from Thales and Anaximander, Anaximenes explicitly includes condensation and rarefaction as the processes that transform aēr and the other stuffs of the cosmos. Like the other Presocratics, Anaximenes gave explanations of all sorts of meteorological and other natural phenomena.

21. (13A5) Anaximenes . . . like Anaximander, declares that the underlying nature is one and unlimited [*apeiron*] but not indeterminate, as Anaximander held, but definite, saying that it is air. It differs in rarity and density according to the substances <it becomes>. Becoming finer, it comes to be fire; being condensed, it comes to be wind, then cloud; and when still further condensed, it becomes

water, then earth, then stones, and the rest come to be from these. He too makes motion eternal and says that change also comes to be through it.

(Theophrastus, quoted by Simplicius, *Commentary on Aristotle's Physics* 24.26–25.1)

22. (13B2) Just as our soul, being air, holds us together and controls us, so do breath and air surround the whole *kosmos*.

(Pseudo-Plutarch, *Opinions* 876AB)

23. (13A10) Anaximenes determined that air is a god and that it comes to be and is without measure, infinite, and always in motion.

(Cicero, *On the Nature of the Gods* 1.10.26)

24. (13A7) Anaximenes . . . declared that the principle is unlimited [apeiron] air, from which come to be things that are coming to be, things that have come to be, and things that will be, and gods and divine things. The rest come to be out of the products of this. The form of air is the following: when it is most even, it is invisible, but it is revealed by the cold and the hot and the wet, and by its motion. It is always moving, for all the things that undergo change would not change if it were not moving. For when it becomes condensed or finer, it appears different. For when it is dissolved into a finer condition it becomes fire, and on the other hand air being condensed becomes winds. Cloud comes from air through felting,² and water comes to be when this happens to a greater degree. When condensed still more it becomes earth, and when it reaches the absolutely densest stage it becomes stones.

(Hippolytus, *Refutation of All Heresies* 1.71–3)

25. (13B1) Or as Anaximenes of old believed, let us leave neither the cold nor the hot in the category of substance, but <hold them to be> common attributes of matter, which come as the results of its changes. For he declares that the contracted state of matter and the condensed state is cold, whereas what is fine and "loose" (calling

2. Translator's note: "Felting" is the production of nonwoven fabric by the application of heat, moisture, and pressure, as felt is produced from wool. The term here is extended to describe any other process in which the product is denser than and so has different properties from the ingredients.

it this way with this very word) is hot. As a result he claimed that it is not said unreasonably that a person releases both hot and cold from his mouth. For the breath becomes cold when compressed and condensed by the lips, and when the mouth is relaxed, the escaping breath becomes warm because of rareness.

(Plutarch, *The Principle of Cold* 7 947F)

26. (13A6) When the air was being felted the earth was the first thing to come into being, and it is very flat. This is why it rides upon the air, as is reasonable.

(Pseudo-Plutarch, *Miscellanea* 3)

27. (13A20) Anaximenes, Anaxagoras, and Democritus say that its flatness is the cause of its staying at rest. For it does not cut the air below but covers it like a lid, as bodies with flatness apparently do; they are difficult for winds to move because of their resistance. They say that the earth does this same thing with respect to the air beneath because of its flatness. And the air, lacking sufficient room to move aside, stays at rest in a mass because of the air beneath.

(Aristotle, *On the Heavens* 2.13 294b13–20)

28. (13A7) Likewise the sun and moon and all the other heavenly bodies, which are fiery, ride upon the air on account of their flatness. The stars came into being from the earth because moisture rises up out of it. When the moisture becomes fine, fire comes to be and the stars are formed of fire rising aloft. There are also earthen bodies in the region of the stars carried around together with them. He says that the stars do not move under the earth as others have supposed, but around it, as a felt cap turns around our head. The sun is hidden not because it is under the earth but because it is covered by the higher parts of the earth and on account of the greater distance it comes to be from us. Because of their distance the stars do not give heat.

(Hippolytus, *Refutation of All Heresies* 1.74–6)

29. (13A17) Anaximenes stated that clouds occur when the air is further thickened. When it is condensed still more, rain is squeezed out. Hail occurs when the falling water freezes, and snow when some wind is caught up in the moisture.

(Aëtius 3.4.1)

30. (13A21) Anaximenes declares that when the earth is being drenched and dried out it bursts, and earthquakes result from these hills breaking off and collapsing. This is why earthquakes occur in droughts and also in heavy rains. For in the droughts, as was said, the earth is broken while being dried out, and when it becomes excessively wet from the waters, it falls apart.
(Aristotle, *Meteorology* 2.7 365b6–12)

Suggestions for Further Reading

The Milesians

All of these entries have further bibliographies; see also the relevant chapters in Barnes and Guthrie. Complete bibliographical information for collections may be found in the bibliography in the Introduction, pp. 10–12.

- Algra, K. "The Beginnings of Cosmology," in Long, pp. 45–65.
 Gagarin, M. "Greek Law and the Presocratics," in Caston and Graham, pp. 19–24.
 Hussey, E. "The Beginnings of Philosophy and Science in Archaic Greece," in Gill and Pellegrin, pp. 3–19.
 Kahn, C. H. 1960, 1994. *Anaximander and the Origins of Greek Cosmology*. New York: Columbia University Press; reprint Indianapolis: Hackett.
 McKirahan, R. "Anaximander's Infinite Worlds," in Preus, pp. 49–65.
 Schofield, M. "The Ionians," in Taylor, pp. 47–87.
 White, S. "Milesian Measures: Space, Time, and Matter," in Curd and Graham, pp. 89–133.
 _____. "Tales and the Stars," in Caston and Graham, pp. 3–18.

3. PYTHAGORAS AND EARLY PYTHAGOREANISM

Pythagoras was born on the island of Samos in the eastern Aegean some time around 570 BCE; according to tradition his father was a gem-cutter or engraver. He reportedly traveled in Egypt and Babylon, leaving Samos around 530 to escape the rule of the tyrant Polycrates. Eventually, Pythagoras settled in Croton, in southern Italy. There he was well-respected and gained political influence. He founded a community for himself and his followers that was philosophical, political, and religious. The exclusivity of the group angered some, and in about 500 there was an uprising in Croton (and elsewhere in Italy) against the Pythagoreans. The Pythagoreans were temporarily driven out of Croton, and many were killed. Pythagoras himself took refuge in Metapontum and died not long afterwards (some say he starved himself to death in a temple). Despite these and other setbacks—some Pythagoreans departed for the Greek mainland—there continued to be groups of Pythagoreans in southern Italy until about 400. Even then Archytas of Tarentum remained. He was a great mathematician and a friend of Plato.

Little is known of the views of Pythagoras himself, except that he had a reputation for great learning—a reputation that would later be mocked by Heraclitus—and that he was most likely the originator of the important and influential Pythagorean doctrine of the transmigration of souls, a view that Xenophanes ridiculed. This difficulty is noted by those in the ancient world who wrote about Pythagoras (see selection number 8 below). Sometime during his life or after his death, Pythagoras' followers split into two groups, which mirrored the two aspects of Pythagorean teaching. These groups were the mathēmatikoi and the akousmatikoi.¹ The akousmatikoi were disciples who venerated Pythagoras' teachings on religion and the proper way to live, but had little interest in the philosophical aspects of

1. The word *akousmatikoi* comes from *akousmata*, "things heard." The word *mathēmatikoi* comes from *mathēmata*, "things studied" or "learned." The later Pythagoreans Philolaus (see Chapter 12) and Archytas (active in the first half of the fourth century) were members of the *mathēmatikoi*. Some scholars think the division belongs to later stages of Pythagoreanism.