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MILETUS AND ELEA

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1.1 Miletus

1.1.1 Thales

Thales of Miletus lived in the late seventh century BCE and early sixth century BCE. Apollodorus of Athens claimed that Thales was born in about 625 BCE. According to Herodotus, he predicted a solar eclipse that occurred on 28 May, 585 BCE. Diogenes Laertius tells us that he died at the fifty-eighth Olympiad (548–545 BCE) at the age of 78. His family history is reported as going back to the Phoenicians. Thales is cited as the only early Greek philosopher among the seven sages.

Thales is the subject of numerous anecdotes, which function historically to commend or malign philosophers. Thales is credited with devising a brilliant way to cross a river. Rather than cross the river, have the river cross you. The story goes that an army needed to cross a river, but the river was too strong to cross. So, he found a pronounced curve in the river, advanced into the bulge, and once the army advanced into the bulge, he rerouted a portion of the river behind them. With the river split, they could cross to the other side. Though many particulars of this story are dubitable, the engineering is not improbable. There are some stories about him that have become stereotypes of philosophers. When he was asked why he had little money, but was supposed to be wise, he invested in olives and made great profits. This story was meant to show that philosophy teaches practical skills, but philosophers are not preoccupied with employing them. Along similar lines, Aristotle tells us that Thales was criticized for seeming to be

This Is Ancient Philosophy: An Introduction, First Edition. Kirk Fitzpatrick.
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wise but being poor. As the story goes, Thales studied the heavens and predicted a bumper crop in olives the next year. He put deposits on the olive presses. In modern economics, he bought all the futures contracts for olive presses. He subsequently made a large profit. This anecdote was to show that though philosophers seem practically useless for studying the heavens, they are not. The philosophers do not go after money, but wisdom instead.

In another anecdote, when Thales was walking along, looking to the heavens and examining the stars, he fell into a well. This story portrays philosophers as practically useless stargazers.[1] Plato returns to the negative conception of the philosophers in the *Republic*, when he tells us that the majority of people (*hoi polloi*) call the philosophers "useless stargazers."[2] In everyday life, the philosopher is not worried about the peculiarities of what is proximate; instead, the philosopher wonders about what is universal. Thales does not know his neighbor, but he is keenly interested in humankind. Thales of Miletus was credited as the first to develop natural philosophy. He did not take payment from his associates or students.

Thales brought geometry and mathematics to Greece. Proclus mentions that Thales learned mathematics from knowledge handed down from the Phoenicians, whereas the Greeks learned geometry from the Egyptians. Thales traveled to Egypt and learned other science, both general and empirical. He theorized about math and geometry in the abstract, but he also applied his theories to empirical observations. In the abstract, he was the first Greek to identify the diameter of a circle. He divided the year into 365 days. He showed that an isosceles triangle has two equal angles. In Egypt, he measured the height of the pyramids by their shadows. By establishing the relation between an upright stick and its shadow, he calculated the height of the pyramids.

We have conflicting reports of Thales' writings. One work that he possibly authored was called the *Nautical Star Guide*. Alternatively, he is said to have written only two major treatises: *On the Solstice* and *On the Equinox*. Some sources tell us that he wrote nothing, and to date we cannot verify that Thales wrote any works. The works that are spuriously attributed to Thales are indicative of an interest that he had in the sky. Thales claims that

[1] Plato's *Theaetetus*, 174a. Plato's works are available online at MIT Classics: http://classics.mit.edu/Browse/browse-Plato.html. His works are also at Project Guttenberg: https://www.gutenberg.org/ebooks/search/?query=plato&submit_search=Go%21, and at The Perseus Project: http://www.perseus.tufts.edu/hopper/searchresults?q=plato.

[2] *Republic*, 489c.

the stars are composed of the earth and fire. This claim makes the unknown (the stars) like the known (earth and fire). The move is essential to reasoning that extrapolates known things and extends them to unknown things. We saw this move in measuring the pyramids; the known is the ratio of height to shadow as determined by a stick of known height in relation to a shadow of known length. This information is then applied to the unknown, the height of the pyramid. He is credited with predicting a solar eclipse, but it is more likely that Thales explained a solar eclipse. He argued that the moon passes in front of the sun to causes an eclipse. Here we have a natural explanation of a solar eclipse.

There is a singular innovation that Thales made to establish his place as an early Greek philosopher. He tried to find a principle of all things and a theory of all things in matter. This move is indicative of many early Greek philosophers, but it is important to note that it is not true of all of them. Since he was reputedly the first to develop a theory of all things in a material substratum, he is hailed as the first Greek philosopher. In the following passage, Aristotle offers a general account of the early Greek philosophers who found a material substratum that persists through change. All things come from this substratum and return to it.[3] Aristotle notes that this is a revolutionary innovation. The early Greek philosophers claimed that the substratum underlies and is the principle of everything. There is a wide variety of stuff, such as plants, animals, wood, mud, etc. These thinkers, Aristotle tells us, attempt to account for the variety of stuff by identifying a more basic stuff. One might, for example, identify mud as a combination of the earth and water. One might, for example, claim that there are four types of basic stuff: air, earth, fire, and water. In this way, a philosopher could explain the enormous variety of stuff by means of an account of more basic stuff. These philosophers attempted to find the most basic stuff. If this process ends in multiple basic material stuffs, the theory is a form of material pluralism. If the process ends in one basic stuff, which underlies all the variety of stuff, the theory is a form of material monism. We see both material pluralist and material monist theories among the early Greek philosophers. The theories claim that the basic stuff, whether singular or plural, functions as a persistent substratum. The substratum is "changing in its attributes," but the underlying substratum persists through change. In this way, the basic stuff neither comes to be nor perishes; instead it is always

[3] Aristotle, *Metaphysics* 983b6–13, A12, I. Aristotle's works are available online: http://classics.mit.edu/Browse/browse-Aristotle.html.

preserved. Modern science, it is worth noting, continues this search for the basic stuff(s). To date, we continue this ancient search, though we have not yet found it or them.

Aristotle develops an account of four causes: material, efficient, formal, and final. By talking about the substance water as a material principle, Aristotle places it in his theory as a material cause. We will get to Aristotle's account of the four causes in Section 5.2.3. At this point, it is important to avoid anachronism, as tempting as it might be, to frame Thales' account in Aristotle's subsequent theory. Aristotle hones in on Thales' particular theory, by noting that some early Greek philosophers are pluralists and some are monists in their accounts of the basic stuff. He identifies Thales as a monist.[4] Thales, Aristotle tells us, says that the only basic stuff is water and that earth floats on water. We can say with confidence that Thales holds these claims, but we are left to conjecture concerning Thales' reasons for holding them.

Multiple sources tell us that Thales offers a materialist account of natural phenomena. He offered an explanation for the flooding of the Nile. Thales claimed that the flooding of the Nile was caused by the Etesian winds and explained earthquakes by claiming that the earth floats on water. As a ship bobs in the waves, the earth quakes in the bobbing. This also explains, he thinks, that water is dispersed throughout the rivers of the earth. These reports credit Thales with an innovation worthy of repute. A physical explanation of the flooding revolutionizes the explanatory model. It ignores the mythological model of explanation, which cited Poseidon as the cause of flooding. Thales offers a physical explanation, which cites natural phenomena as the cause. Other sources report that Thales explanatory model expands from water to the whole of the world and the heavens. First, there is water. The condensation and compaction of water forms the earth. From water and the condensation of the earth come wind, earthquakes, and the movement of the stars. Thales was the first to explain the heavens and the earth through an eternal element that underlies all changes. There are many things in need of explanation here. If we accept the first claim, water is the only thing. What changes the water and makes it condense? How can you condense water enough to get earth? Both of these concerns point to motion. The concerns condense into the question: What causes the changes in water? We need some explanation of motion in the account.

[4] Aristotle, *Metaphysics*, 983b19–21.

Thales imports motion elsewhere. He argues that the soul is a source of motion, in the way that magnets move objects. Aristotle argues that Thales infers the power of motion in the soul from the ability of a magnet to move iron. If we follow the model so far, water is condensed into earth. Now we are told that two forms of the earth (condensed water) can move each other (loadstone and iron). Put this together. The soul is the animating force. It is an attraction–repulsion relation between two objects. Both objects are forms of variously condensed water. If this is true, then the soul is everywhere, since water is everywhere, and the soul is just a form of water. As we saw, water is immortal, so it is God. Thales' position is expansive. He starts with one thing – water – and from it, he explains the earth, the wind, earthquakes, the flooding of the Nile, the motion of the stars, and the entire cycle of nature. It is difficult to confidently say much about Thales' beliefs and reasons for his beliefs. Testimonia does give us confidence in holding that he was reputed as holding certain beliefs and that he had some justification for holding the beliefs. If Thales offered a naturalistic account of natural phenomena, then he deserves to be credited as the first Greek philosopher. If Thales did not offer a natural account of physical phenomena, then he is not worthy of repute as the first Greek philosopher. Philosophers disagree about whether he was the first philosopher or not.

Aristotle offers a controversial interpretation of Thales' claims about water. According to Aristotle, Thales held that water is a source or governing principle. In Greek the term is *arche*. This is a central concept in Aristotle's philosophy. The term "arche" can have multiple meanings: (1) a base element from which other elements come, (2) a base element that makes up the world, and (3) the governing principle used to explain the world. We do not have any evidence that Thales actually employed the concept of *arche* in this way. While these concepts play a big part in Thales successors and in Aristotle's philosophy, Aristotle's application of the term "*arche*" and its various meanings to Thales is now believed to be anachronistic. Interpreters today are skeptical of Aristotle's interpretation, and they offer an alternative view of the meaning and function of water for Thales. We can recall that Homer and Hesiod placed Oceanos surrounding the earth and that Oceanos was the begetter of gods. Oceanos was said to be in motion and it generated the rivers and freshwater wells. We also saw that Oceanos functioned in a mythological and not philosophical explanatory model. When we see Thales' account in the historical context of Homer and Hesiod, we see that his account is reminiscent of the earlier mythological accounts. This is now taken to be the more likely meaning and function of "water" in Thales' claims. The early Greek philosophers

hailed Thales as their founder. Aristophanes has a character jokingly say, "The man is a Thales!"[5] The joke only works if Thales is believed to be philosophically wise.

1.1.2 Anaximander

Our best sources tell us that Anaximander was the son of Praxiades of Miletus. Anaximander was 64 years old during the second year of the fifty-eighth Olympiad (547/6 BCE). This would make Anaximander about 15 years younger than Thales. Anaximander was an associate and student of Thales. Though the early Greek authors did not tend to title their works, a common practice was to give them a title after the fact. *On Nature* was the most popular title of works by these early Greek authors, and Anaximander was the first to write such a work.

Anaximander was also the first Greek cartographer to write a schematic map on a wall. The map had Europe and Asia in equal size with the ocean flowing around it. Anaximander was also reputed to be the first person to bring the gnomon to Greece. He placed one in Sparta. This gnomon marked solstices and equinoxes and the hours of the day. Anaximander offers a cosmogony, a history of the origins of the *Kosmos*. This testimonia comes to us at some remove. Simplicius reports that Theophrastus reports that Anaximander's view on the origin of the *Kosmos* names the source of all things as *apeiron*. It is not an element, such as air, earth, fire, and water. The term "*apeiron*" comprises two parts. The "*a*" is an alpha-privative, and it means "not." The term "*peiron*" is derived from a root term used to form the verb "*perao*," meaning "to travers or to pass through," or "*peras*," meaning an end, limit, or boundary. When we combine the parts, we see that *apeiron* means "boundless or unlimited," or "cannot be traversed or passed through." The *apeiron* is eternal, always moving, and it surrounds the *Kosmos*.

At first glance, we might interpret the translation of *apeiron* as having only spatial reference. It is conceived as being so vast that it is infinite. There is a difference between what is boundless and what is infinite. If there is nothing beyond the boundless, then we cannot go beyond it. Even there we should be cautious to interpret the term as "infinite," except in certain of Aristotle's uses and other later authors. Spatially we can say that there is nothing outside of or beyond *apeiron*. While the term can have a spatial

[5] Aristophanes, *Birds*, 1.1009. Aristophanes' plays are available here: http://classics.mit.edu/Browse/browse-Aristophanes.html.

reference, it can also have a conceptual reference. The *apeiron* is generative of all the elements in the *Kosmos*, and some of these elements have opposite features: hot and cold, and dry and wet. There is a cycle that begins with the *apeiron* and the process of separating. The separation generates all things, the *Kosmos*. Over time the elements combine to reform *apeiron*. Some interpreters mention a natural regulation to the length of the cycles. The cycles are repeated endlessly. This shows that the *apeiron* is boundless also in its capacity to generate elements because when the elements are compared to each other they have opposite features and *apeiron* generates all elements of the *Kosmos*.

Anaximander had a detailed account of the *Kosmos* in its current generation. Plutarch and Hippolytus give us the following information about Anaximander's account of the *Kosmos*. The heavenly bodies are fire separated from the sun, and they are in air.[6] There are tubes or holes for breath like spokes in a wheel, through which we see the stars, the moon, and the sun. The sun is 27 times larger than the earth. The moon is 18 times larger than the earth. The sun is the farthest from the earth, and the stars are the closest. The earth is suspended in air, equidistant from everything. It is round, concave, and cylindrical. The depth of the earth is one-third of its width. Anaximander describes a hocky-puck earth equidistant from the heavenly bodies with specific proportions in relation to the sun and moon, or the apertures of the elements in the spoked wheel. The spokes in the wheel give him access to explanations of heavenly phenomena. He explains solar and lunar eclipses through the breathing holes and the waxing and waning of the moon. He invokes the winds to explain numerous natural phenomena such as thunder, lightning, and hurricanes. His explanation is that when the clouds surround the wind, the clouds are less dense than the wind. There is then a violent interchange, which causes a tearing and produces various phenomena. The wind is the prominent and consistent factor in Anaximander's explanation of natural phenomena.

Anaximander describes the stages in this current earth cycle in very general terms. The *apeiron* separates into the elements; then after a cycle governed by cosmic justice, these elements combine to be *apeiron* again. Also, he tells us that the earth is in the process of drying out. It is going from wetter to dryer, as the moisture dries from the heat of the sun. The vapor from the drying water produces winds. The process of the world drying up

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[6] See Hippolytus Refutation 1.6.3–7 as found in Daniel W. Graham's *The Texts of Early Greek Philosophy* (Cambridge: Cambridge University Press, 2012), vol. 1, 57.

helps him explain the origins of human beings. Human offspring are not able to care for themselves when young. It is a wonder that the first humans survived. To explain the survival of humans, he claims that they come from nonhuman animals. He suggests that humans originally came from fish or smaller animals. The humans matured to puberty in these aquatic animals, whatever they were, and then burst forth from the aquatic animals.

Anaximander offers a revolutionary account of the *Kosmos*. He uses his model of the *Kosmos* to explain heavenly phenomena, such as eclipses and the phases of the moon. He charts the seasons and equinoxes by means of the gnomon. He offers a thoroughgoing physical account, where the gods of the mythic age have no place. The gods have become superfluous. Rather than explaining lightning and thunder by means of Zeus, we get an explanation in terms of wind, rarity and density, and friction. Rather than explaining the behavior of water through Poseidon, he invokes wind and pressure. His account employs phenomena that we can demonstrate at a smaller scale and then amplify the implications of the phenomena to apply to large-scale Kosmic phenomena. His explanation of the place of the earth in the *Kosmos* is especially interesting. Aristotle tells us that Anaximander places the earth in the middle of the *Kosmos*. The earth is held in stasis, held in by contrary forces. In this way, the earth and the heavens are placed by necessity. Interpreters notice that this explanation employs what Leibniz will subsequently call the Principle of Sufficient Reason.[7] Aristotle describes Anaximander as having what is now called sufficient reason to place the earth anywhere except at the center, since he has no reason to place it higher, lower, left, or right. Unless there is some sufficient reason to place the earth elsewhere, there can be no explanatory justification for placing it elsewhere.

Anaximander's account is revolutionary not just in his consistent use of physical elements interacting with physical elements to generate phenomena, but in his conceptual and explanatory form of justification. Unlike Thales, we know that Anaximander committed his thoughts to writing. His work, *On Nature*, was groundbreaking and seminal. Many subsequent authors wrote books titled *On Nature* or had their works known by this commonly used title. He wrote in prose and not poetry, which marks a clear stylistic break from the poets Homer and Hesiod. The papyrus informs subsequent interpreters in a way that gives us insight into his thoughts in a way that we lack concerning Thales. The particulars of Anaximander's account

[7] See Richard D. McKirahan's *Philosophy Before Socrates* (Indianapolis: Hackett Publishing Company, 1994), 40.

show ingenuity and creativity in their explanations of natural phenomena. Even more remarkable are his theoretical commitments underlying his explanations. He clearly sees the problem of accounting for the elements, earth, air, fire, and water in terms of each other or in terms of any one of these elements. His invocation of *apeiron* as an underlying substance is theoretically brilliant. True, he does need, but does not provide, an explanation of how *apeiron* can generate elements with opposite features. He does, however, see that to account for the opposite features of the common elements, he needs a genesis from a different sort of stuff. He does not tell us what *apeiron* is, but he does make it function in his explanations in a novel way. Finally, his invocation of what would later be called the Principle of Sufficient Reason shows that he is concerned as much with the structure of his explanations as he is with their content. In light of this, there are reasons to hold that Anaximander is the first Greek philosopher.

1.1.3 Anaximenes

Anaximenes' biography is obscure and there is not much that we can say with certainty. It might be true that Anaximenes of Miletus was the son of Eurystratus and that he died in the sixty-third Olympiad (528/5 BCE). Plato never mentions him by name and Aristotle is the first to name him. We can say with more confidence that he was from Miletus, that he was a student of Anaximander, and that he was the last in our record of the Milesian philosophical school of thought.

Anaximenes holds that air (*aer*) is the *arche* of the *Kosmos*. He posits air as the first element and the source of the other elements. The term "*aer*" is used by his predecessors. Among them, we should focus on Anaximander's use of the term, which leads contemporary translators to render the term *aer* as "dark mist." This is distinguished from the higher regions in the skies that are called ether or more precisely *aither*. Anaximenes is referring to *aer* or air, insofar as it has no perceptible qualities. In some form, it is the stuff that we take for granted. Until it becomes tainted, we take it as given. Suppose that one fish asked another fish, "How's the water?"[8] Until the water is tainted and somehow off, the fish takes the water for granted. *Aer* functions in a similar way; it is imperceptible and as yet unknown. Anaximenes calls *aer* boundless and this echoes a concept from

[8] You might know this term by its modern use. "Ether" is a gas used as an anesthetic or solvent (aka laughing gas).

Anaximander. For Anaximander, *apeiron* has the capacity to separate and become all things. Anaximenes argues that the indeterminate *apeiron* is determinate. He determines the indeterminate in *aer*. The element *aer* is that sort of stuff, that stuff that you do not notice until it is not there, or until it becomes different or unfit. He refers to the substratum of nature singular and *apeiron*. He specifies *apeiron* to be *aer*, which can rarify or condense. In rarified form *aer* becomes fire. When condensed it becomes water, earth, and rock. Anaximenes holds that motion is an eternal force in the *Kosmos*. Everything that exists comes from *aer* and motion.

It is difficult to conceive that air is the basic element and that it is generative of the others. Yet, this is what Anaximenes attempts to show. Anaximenes offers the following to explain how the diversity of the world comes to be from *aer*. Air changes as its density and rarity change. We think of density and rarity as quantitative concepts that apply to how much of a given substance occupies a certain volume. Let us say that we have a container with a volume of 1 and we have *x* amount of an element in that container. If we can have more of an element in the same volume, then we have a denser element. Interpreters are quick to point out that these are sophisticated ways of thinking about rarity and density, and that we cannot have confidence in thinking that this is the concept Anaximenes employs. The rarest form of air is fire; as the fire becomes denser, it becomes wind, denser and it becomes cloud, denser and it becomes water, denser and it becomes the earth, and even denser it becomes stones. This gives us a list of seven elements that we can place from most rare to most dense: fire, air, wind, cloud, water, earth, and stones. All other things come from the seven elements. We should not think that we can explain air in terms of fire or stone. Air is not a denser form of fire and air is not a less dense form of stone. We can explain fire and stone in terms of air and not vice versa. If we could explain any of the elements by means of any other element, then no element is *arche* more than any other.

Anaximenes has more to say about air. He takes hot and cold as accidental and not essential features of matter. The following sentences show why he thinks the features are accidental. He explains hot and cold in terms of rarity and density. As justification for the connection, he offers an experiment that each of us can do at home. He claims that when you exhale with open lips the air is hot, and when you exhale with pursed lips the air is cold. This empirical evidence is meant to justify his claim that air can be both hot and cold. Anaximenes has air function in a way that is different from the other elements. Air alone, plus motion, rarity, and density, explains hot and cold. Air alone functions to explain the accidental features of the other

elements. No other element functions in this way. We can now better understand how air functions as *arche*.

1.1.4 Xenophanes

Xenophanes of Colophon was a philosopher and minstrel. He tells us that he was born in Colophon in Ionia about 570 BCE. Xenophanes was part of the philosophical movement in Miletus. In about 546 BCE, he left Ionia and traveled widely. He spent most of his time in Sicily and southern Italy, where there were Greek colonies. He lived to be over 90 years old and died around 478 BCE.

Xenophanes does not offer a cosmogony, an account of the genesis of the *Kosmos,* and the diversity of genesis within the *Kosmos*. He does, however, discuss the *Kosmos*, the heavens, and the principal elements. So, he continues the discussion of principal stuff that is familiar among the Milesian philosophers. In addition, he is traditionally credited, going back to Plato and Aristotle, as the founder of the Eleatic school of thought in southern Italy. He was reputed to have been an associate and teacher of Parmenides, the most famous of the Eleatic philosophers. Recently, interpreters have become skeptical of the claim that Xenophanes was the teacher of Parmenides. Nevertheless, we can see that Parmenides reiterates some of Xenophanes' ideas and so we can say that his ideas had some influence on Parmenides. Xenophanes was a pivotal figure, forming a bridge between the end of the philosophical movement in Miletus and the beginning of the philosophical movement in Elea.

Xenophanes does not accept the traditional mythological Greek gods as real; instead he explains them away by substituting natural phenomena. He does not think that a rainbow is the goddess Iris, but he explains it as cloud and light. Xenophanes tells us in a fragment that certain elements are primary, but we get conflicting evidence on this point. One fragment says that he posited the earth as the only *arche*. Other, more numerous sources tell us that he takes the earth and water to be *arche*. The evidence does not allow us to determine whether there is one or two principal elements for Xenophanes. Possibly the earth dissolves into water, but more likely the earth and water are in a cyclical relationship with each other. He does tell us a bit more about the earth. The earth stretches from our feet downward without end. So, there is more to the earth than what we see. The air extends above us to the heavens. We can say with confidence that he does not take air as a principal element. He tells us that water, the ocean, makes wind. It also makes clouds and rain. He tells us that the sun

warms the earth and we can suppose it warms the water too. He describes a process where water generates clouds through what we would now call evaporation. The clouds carry water through the sky. The rainwater falls back to the earth supplying the water for rivers. We now call this process the water cycle.

Xenophanes holds not only that water cycles from sea to cloud to rivers to sea, but testimonia tells us that he thinks the world goes through a process from wet to dry and back to wet again. He offers empirical evidence for the cyclical process. He argues that sea shells are found in the mountains. Impressions of seaweed, coral, and sea animals are found scattered about. These remnants are far from and above the sea. He infers that water and earth, wet and dry, undergo cyclical periods of dominance. Humankind will come to an end when the earth dissipates into the water. Xenophanes makes a remarkable claim about fossils and he takes that physical evidence into account when supplying his explanation of the phenomena. This is an important feature of science, namely that the explanation for physical phenomena must be grounded in physical evidence. His account shows that he continues with the themes of the Milesian philosophers. Though he does not give us a cosmogony, he does give us novel twists in his account of the *Kosmos*.

He is a focal figure of early Greek philosophy because of his comments on epistemology, ethics, and theology. We start with his epistemological skepticism. He argues that we do not *know* the plain truth about the gods or coming to be and perishing. All that we think we know actually is *opinion*. This is a puzzling passage since it seems to refute itself. If the plain truth cannot be known, then Xenophanes cannot tell us the plain truth. This response to the passage is too easy and it misses the point. Xenophanes is contrasting the plain truth or knowledge with opinion. We offer opinions; although these opinions can be true, they do not constitute knowledge. So, it can be the case that what Xenophanes is saying is true, but we just cannot claim that it is known. Though he offers a healthy skepticism through his division of knowledge and opinion, he does not offer a nihilistic skepticism. He argues that there are better and worse opinions. By investigating, using reason and observation, we can come to better opinions. Many people claim that the gods have revealed all things to them. He rejects this. It is not the gods that give justification to opinions, but instead humans must seek out true opinions for themselves. Through a process of seeking the truth, we can suppose, as Xenophanes sees it, that humans can gain better and better opinions. So, there is some hope of gaining true beliefs. He urges us to believe his claims as if they were true. Still, though we can have true

opinions and we can be justified in believing the opinion as if it were known, we cannot have knowledge.

Xenophanes is committed to natural explanations of the *Kosmos* and he is skeptical of claims of knowledge. So, it is not surprising that he is relentless in his attack on the traditional Greek beliefs about the gods. One line of critique focuses on epistemological concerns about our knowledge of the gods. Humans think that gods are born, wear clothes, speak, and have bodies like humans. Gods end up being very much like humans. He offers more specific indications of humans anthropomorphizing gods. In Africa, the gods are black and snub-nosed. In Thrace, they have blue eyes and red hair. That is remarkable indeed. Xenophanes is incredulous about the widespread opinion that gods look just like the humans that worship them. The method that humans employ when envisioning the gods has other unwanted implications. If humans do this, what would other animals do? Xenophanes opines that if cows had hands, they would draw the gods in their own image. Cows worship cow-morphic gods. Horses worship what we can call *hippomorphic* gods. He concludes that the other animals would follow in the same manner. This species-centered *morpho* of the gods generates incredible results. So, no sooner should we believe that the gods look like us than we should believe that the gods look like horses, lions, or any other such things. Xenophanes is not done with his critique of traditional beliefs about the gods. There are not only epistemological reasons to reject the traditional beliefs about the gods; there are ethical concerns too. Homer and Hesiod attribute many morally vicious and disgraceful acts by the gods. Adultery and deception are just the start of the list. Xenophanes has ethical commitments that apply not only to human beings but also to the gods. There is one standard for both and this standard cannot credibly be inferred from the traditional Greek theological beliefs. We do not know much about Xenophanes' ethical theory, but it is safe to say that it forbids theft, adultery, and some forms of deception. When faced with a choice between his reasoned opinions on ethics and the behavior of the gods as depicted in Homer and Hesiod, Xenophanes sides with his reasoned opinions.

Despite his rejection of traditional Greek theology and his refusal to have the gods function in his physical account of the *Kosmos*, Xenophanes has beliefs about one God. He holds that there is one God and that God is unlike man in body and thought. God sees and hears everything, according to Xenophanes. To be consistent, Xenophanes needs to hold that God sees, thinks, and hears in a way very different from humans. While he does not tell us anything about how God sees or hears, he does tell us something about God's thinking. God thinks and moves all things; he causes

earthquakes or anything else, simply by his mind. God is not a superhuman. God's thought is not that of a superhuman. God is not an anthropomorphic extreme. God's thought is not different in degree, but it is different in kind from human thought. Xenophanes also insists that God does not move. God does not move or change location. God is not fixed in some particular location and bounded in one place. This is not why Xenophanes claims that God does not change location. God does not change location because God is everywhere always.

1.2 Elea

1.2.1 Parmenides

Parmenides was from the city of Elea, which was a Greek colony in southern Italy (aka Magna Graecia). Plato gives us the best information on the dates of his life.[9] He was born c. 515 BCE and died in about 450 BCE. Inspired and influenced by Xenophanes, Parmenides is credited as the founder and most influential member of the Eleatics, a pre-Socratic school of philosophy.

Parmenides' most influential contribution comes in a lengthy fragment of text, 154 lines long. The text is written in poetic verse, in dactylic hexameter to be more specific. The pattern is based on long and short syllables, where the length of the syllable is determined by the length of the vowel. A short vowel takes about half as long to pronounce as a long vowel. A dactyl is a long syllable followed by two short syllables. A "hexameter" is six metron. Take the pattern long-short-short and repeat it five times. The sixth metron is two long syllables, a spondee. This is the same rhythmic (metric) verse that we see in Homer's and Hesiod's poems. It is also the rhythmic verse that Xenophanes sometimes uses and that Empedocles uses in all his works.

Parmenides' poem has three main sections: (1) the Proem or prologue, (2) the Way of Truth, and (3) the Way of Mortal Opinion. The Proem begins in grand poetic style with three mares carrying Parmenides. The chariot makes its way, with an axle that screeches like a pipe. The daughters of the Sun guide him. They lead him out of the night to the Gates of Night and Day. Justice is the key to unlock the gates. Justice requires strategic words and persuasion. The daughters of the Sun guide Parmenides beyond the gates of day and night. This is not the end of the Proem, but it is a good

[9] *Parmenides* 127.a7–c5.

place to sort things out. The first lines describe a trip led by mares to a deity. The deity is the goddess that we meet at the end of the passage. It is a common device in ancient Greek poetry to invoke the muses or some other deity at the beginning of a poem. The hope is that the deity will inspire the poet in crafting the poem. It also functions to put the poet in a position of privileged access to information, since the deity can tell the poet things that we cannot know. Parmenides has invoked this common poetic device, but he makes novel use of it.

The Proem continues, and Parmenides argues that there are only three ways of thinking or inquiry. These are paths into which one can inquire. One path inquires into what-is. This path holds that what-is is and that it must be. This path is *knowable* and it is the way of *truth*. The second path inquires into what-is-not. It holds that what-is-not is not and what-is-not must not be. This is an *unknowable* path. The third path inquires into both what-is and what-is-not. It holds that what-is and what-is-not are the same and not the same. This is the backward-turning path of mortal *opinion*. There is no truth in this path. Parmenides identifies three paths: the true, the unknowable, and the false.

As we saw, Parmenides claims that what-is *is*. There are at least three possible interpretations of "is." The term comes from the verb to be (*enai*). It is the third-person, singular, present, indicative, active form, translated into English as he, she, or it, is. There are three main uses of the verb "to be": (1) the *veridical* use, meaning "is true;" (2) the *existential* use meaning "exists;" and (3) the *predicative* use that attaches a predicate *y* to the subject *x*, in the form *x* is *y*. The veridical use takes a proposition as its object. One person could say, "this chariot is junk." Another person could respond by saying "it is." "It is" means that the proposition "the chariot is junk" is true. The existential use claims that an object exists. After putting the final pieces of the chariot together Milo exclaims, "There it is!" Milo means that the chariot exists. The predicative use attaches a predicate to a subject, "the chariot is wood." Here the predicate "wood" is applied to the subject "chariot." It is not clear how these three possible interpretations apply to Parmenides' claims. Interpreters disagree about which of the three interpretations apply to which of Parmenides' claims. Possibly, Parmenides applies only one of the three interpretations to all of his claims. It seems more likely that he employs more than one meaning of "is" in his claims.

Parmenides tells us that the second path holds that "what-is-not is not and what-is-not must not be." He says that this path is unknowable and unsayable. We can dismiss the second path as unknowable, but this is a curious dismissal. How can we know that something is unknowable? Can

one think about a circle-square? You might suggest a "squircle" is the object of your thought, but that is neither a circle nor a square. There is no object to conceive of that is a circle-square. This is a possible interpretation. Can we utter anything about a circle-square? We can name it, but we are naming nothing. We can make the sounds of the utterance but the utterance has no meaning. We cannot think about or talk about nothing. So, Parmenides rejects the second path.

The third path holds that what-is and what-is-not are both the same and not the same. This is the opinion of mortals. Parmenides tells us that the breast leads mortal. The body leads the mind for mortals. They use their senses to try to find the truth, but they are deaf, blind, and confused by the senses. Since humans hold that what-is and what-is-not are both the same and not the same, humans find contradictions and oppositions in all things. Objects of the senses were not here in the past and then they are here in the present. When the objects of sense are here, they are both here and not there. So "not then" and "not there" are supposed to be objects of thought, inquiry, understanding, knowledge, and truth. The backward-turning mortals chase being and not being as if they are the same, since they are both supposed to be objects of thought. Yet humans also think that being and not being are different, since the one is and the other is not. This path is led by an unseeing eye. We can see why Parmenides calls mortals "two-headed" and "backward-turning." The senses often give us deceptive or false information and reason often disagrees. A straight stick in water looks bent, but it is not. A mirage in the desert looks like water, but it is not. Also, relational terms are challenging, since a person can be taller than x and shorter than y. Is the person tall? Yes and no. We are to avoid our habitual use of the senses to gain truth. If the path of what-is is conjoined with the path of what-is-not, then a contradiction results. What-is is and what-is-not is. We might suppose that the path is both knowable and unknowable, both true and false. Instead, Parmenides says there is no truth in this path of mortal opinion.

Parmenides rejects the unknowable path of what-is-not and the false path of what-is and what-is-not. Parmenides turns to the only path remaining, what-is is and it must be. He applies a series of predicates to what-is; ungenerated, imperishable, a whole of one kind, unperturbed, and complete. He offers a series of arguments in support of the predicates. To show that what-is is not generated and imperishable, Parmenides engages in rebuttals that he might face. A contrarian might claim that what-is came into existence at some time. Parmenides replies with a question, from what did it come? Since what is not cannot be spoken of or conceived, we cannot

have what is not as the originator of what is. This is our first statement of the *Parmenidean Constraint*: Nothing comes from nothing, or something cannot come from nothing. Since the constraint is true, there must be something that has always been. If a contrarian claims that what-is came about at some time, then Parmenides invokes what we now call the *Principle of Sufficient Reason*. There is no reason for what is to have come to be at some earlier time, some later time, or any time. There is no reason for it to come to be at any particular time. Since there is no reason for it to come to be at any particular time or all the time, what is must be imperishable. So, he holds that what-is is timeless. We need to be careful here, since the term "timeless" has more than one meaning. "Timeless" can mean outside of time or through all time. We can determine which meaning Parmenides references, since he does not think that time applies to what-is. Consider the timeless truths of mathematics and geometry, a Euclidean triangle has 180° as the sum of its interior angles and the proposition $1 + 1 = 2$ did not come to be or come to be true at some time. The proposition exists, or is true, without any reference to time. So, Parmenides holds that time is not a predicate of what-is.

Parmenides argues that what-is is a whole of one kind. He tells us that what-is is alike throughout, continuous, holds together as one, and is not divisible. So, we cannot say that it is more here than there. Parmenides applies predicates to what-is to show that it does not admit of internal distinctions of any sort. Here we encounter an analogous ambiguity as we noticed with the term "timeless." Rather than saying that what-is is everywhere, we should say place does not apply to it. Parmenides tells us that what-is is unperturbed and motionless. We already saw that place or location does not apply to what-is; it follows that there can be no motion. After all, motion is movement through space. We might be inclined to understand "motionless" as meaning "being in one location." Instead, I suggest that we think of it as we did with time and place. Thereby, we understand Parmenides to mean that motion does not apply to what-is. Parmenides tells us that what-is is complete and lacks nothing. What-is cannot become more complete or gain some predicate that it needs. These predicates indicate the timeless and unchanging nature of what-is.

1.2.2 Zeno

Zeno was from Elea, born about 490–485 BCE, and flourished in the mid-fifth-century BCE. He was an associate and advocate of Parmenides. We have one fragment from Zeno. It focuses on plurality, the dichotomy

between one and many. The first part of the fragment states that "If there are many things, it is necessary that they are just as many as they are, and neither more nor less than that."[10] The fragment continues by holding that there are only so many of the things that are. It concludes that the-things-that-are are limited. So far we have half of the dichotomy. The second part argues that if there are two things, then there are other things between the two things. Then again, it continues, there are others between them and so on for an infinite regress. He concludes that things are unlimited. One branch of the argument aims to show that pluralists must hold that things are limited and the other shows they must hold that things are unlimited.

Zeno challenges pluralists by holding that they must be able to tell how many things there are. This is a reasonable challenge to the pluralist. It is as if to quip, "You say there are many things, how many are there?" Should the pluralist respond with, "a lot," we would be unsatisfied. It is tempting to consider a context for Zeno's claim and take up some sort of thing. Possibly he is thinking of numerical things, or maybe it is physical things he references. Limiting his challenge to one context or another is a mistake. Zeno is making a claim about any sort of thing, the pluralist must say how many there are. Zeno's claim might be true of some sorts of things, but his challenge requires that the claim be true of all things and all sorts of things. An exception to Zeno's claim must show that there is more than one thing, but there are not an infinite number of them. So, if there is one context that shows Zeno's claim is not true, then his claim is simply false. There are reasonable responses available to the pluralist. They could claim that there are an infinite number of things. This might seem overkill, since Zeno only called for an account of how ever many things that there are – even if there are only two things – and now the pluralist has responded by going to infinity.

Alternatively, he takes up from Parmenides and examines the move from one thing to many things. Focus on the move from one thing to two things. His teacher distinguished thing instead of nothing and instead of many things. The many things were a mixture of things and nothings; this was nonsense. But if they are as many as they are, then they are neither more nor less than that. So, if they are as many as they are, they will be limited. "If there are many things, the-things-that-are are unlimited; for there are always others between the-things-that-are, and again others between those. And thus

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[10] See G.S. Kirk, J.E. Raven, and M. Schofield, *The Presocratic Philosophers*, 2nd ed. (Cambridge: Cambridge University Press, 1999), 266.

the-things-that-are are unlimited."[11] It is difficult to understand why Zeno holds that when we accept that there is more than one thing, we must accept that there are an unlimited number of things. Consider the most basic division into thing A and thing B. If there are two things, then they must differ. They differ because A has at least one feature, a quantity or quality, that B lacks. Consider quantity, for instance the number one and the number two. They differ in many ways, since one is half of two, and two is twice one. Zeno argues that the division of one into two establishes an infinite regress resulting in an unlimited number of things. Suppose that there are many things, start with two. The two things must differ from each other.

Zeno had four arguments about motion.[12] The first argument is known as "The Dichotomy," and Aristotle calls the second "Achilles." The dichotomy argues that if there is motion, then to move from any point to any other point one must cover half of the distance. Then again one must cover half the next half distance, and so on. The half distances are infinite and one cannot get through what is infinite. So, there is no motion. We can see that the argument is called the dichotomy because it splits the distance, again and again, into two parts. The Achilles argument makes the same point but in a slightly different way. Suppose that Achilles races a tortoise, but the tortoise gets a head start. To catch the tortoise, Achilles must get to the point from which the tortoise started the race. From that point, he must get to the point where the tortoise was when Achilles got to the point where the tortoise started the race. This process goes on infinitely. Achilles never catches the tortoise. So again, there is no motion. Zeno employs the infinite divisibility of space to show that there is no terminating minimus for half the distance. There is always a half of a half of a half and so on ad infinitum.

The Arrow argument holds that time is composed of a series of instants called "now." At each moment of now, the arrow occupies a space that is just as much as the arrow or that is equal to the arrow. At each moment "now" the arrow is motionless. So, the arrow is both moving and not moving. This is false, so there is no motion. Zeno urges us to consider our idea of motion and time. If motion is like a movie running at a certain number of frames per second, then the composition of "now" moments will generate a paradox. If we think that motion is not a series of "now" moments, then we

[11] See G.S. Kirk, J.E. Raven, and M. Schofield, *The Presocratic Philosophers*, 2nd ed. (Cambridge: Cambridge University Press, 1999), 266.

[12] Aristotle, *Physics*, 6.9239b9–11.

need to offer an account of it. Aristotle rejects this argument by rejecting the idea that time is composed of "now" moments.

We have two more arguments. In the paradox of place, Zeno asks us to consider the place of place. Here Zeno asks us to consider the existence of what we call "place." We do say that each and every thing is in a place. Place is something, so place must be in a place. If place is in a place, then that place is a place too, and so on. This is an infinite regress. Ancient sources reject this argument, by rejecting the assumption that everything that exists has a place. Such things as numbers do not have a place. Thus, we avoid the infinite regress. Alternatively, we might accept that all physical things have a place, but their place is just where they are. So, although place has a place, it is the same place in each case.

The final argument that we will consider is called The Millet Seed. Zeno argues that when you drop a single millet seed or some subpart of the seed, it does not make a sound. When you drop a bushel, it does make a sound. So, millet seeds make a sound and do not make a sound. This argument points to the limitations of the senses, but it also indicates the limitations of any form of measure. Suppose you get an amplifier so that you can hear the millet seed hit the ground, you might think that the problem is solved. Not so fast, there will still be some sub-portion that does not make a sound. We can amplify the import of Zeno's argument. Suppose we consider the argument as directed not toward sound, but toward weight. Take the millet seed or some subportion of the seed that does not register as weighing anything. Then take a bushel of seed on the scale. The bushel will have weight. You might think that you just need a better scale, but at some point the scale will not register weight and then as more seeds are added, it will measure weight.

It is tempting to think that it is easy to answer Zeno's arguments. There are ancient sources that offer accounts of certain arguments and then point to fallacies in Zeno's position. In some cases, the critiques are correct. Also, armed with our contemporary understanding of math, physics, and logic, it might seem easy to solve Zeno's arguments. Of course, Achilles will overtake the tortoise. Of course, the arrow will hit the mark. We do Zeno's arguments a disservice by interpreting them in this way. Zeno is claiming that our understanding, coupled with our perceptions, leads to illusions of time, space, motion, and place. We have the impression of motion and time, but we lack an account. So, motion and time, he argues, are illusions. We can see that they are illusory, by considering the account we can offer for the illusions. The account we offer generates paradoxes and contradictions. If there really is such a thing as motion and time, Zeno is arguing that we cannot offer a coherent account of them.

1.2.3 Empedocles

Empedocles lived from about 495 BCE to 435 BCE. This makes him younger than Parmenides and a contemporary of Zeno and Melissus. He lived in Acragas, a Greek city in the south of Sicily. He was wealthy and involved in politics. Some people knew him as a religious leader, a physician, and even a magician. His dress was extravagant, with bronze shoes, a purple robe, and a gold crown. Some cities hailed him as a god.

He wrote numerous works, two of which were *On Nature* and *Purifications*. We should remember that often works were not titled by the author but by others. We have a large collection of his works in numerous fragments and testimonia. He composed tragedies, historical texts, religious poems, medical texts, and philosophical writings. Empedocles has connections with Pythagorean philosophy. His philosophical writing form is heroic dactylic hexameter. In keeping with the form, his style employs figurative and symbolic references. *On Nature* focuses on cosmogony and physical science. *Purifications* focuses on religious principles.

Empedocles is a pluralist, since he holds that what-is is more than one thing. He holds that there are four basic elements, or more specifically roots (*rizda*). This term refers to the roots of a living thing. He does not call them four "elements"; instead he calls them "roots" and imbues them with life. He refers to them in poetic style, naming Zeus (fire), Hera (air), Aidoneus or Hades (earth), and Nestis (water). The four roots in his physics are irreducible and indestructible. His cosmology places the four roots into an eternal cyclical process governed by the principles of "love" and "strife." Here again we see poetic language in his use of terms: "love" refers to attraction, mixing, and combining the roots and "strife" refers to the separation of the roots so that each is just what it is isolated from the others. Empedocles says that the genesis of mortals is double. He tells a story with two parts: one of increasing love and the other of increasing strife. In this way, the roots eternally become one, then many, and then one again. At stage one, there is love that is dominant, as the roots mix and combine. At stage two, there is maximal love, as the roots are mixed together. At stage three, the roots then separate. At stage four, there is maximal strife and all the roots are separated. Then comes love again and the process continues. This process of love and strife is governed by necessity. Empedocles accepts the ontological status of time, since he applies time references to the process. He refers to past, present, and future.

At every stage in the mixing of the roots, the Kosmos is a sphere. The sphere is a plenum; there is no void. The roots are in motion by

exchanging places. The combining and separating roots mix in the form of a vortex. He draws an analogy between the vortex motion that occurs from the circular motion of liquids and air. Employing this argument by analogy is a useful strategy in science and more broadly. He argues that just as the larger and heavier things move to the middle of the vortex in water and air so too do such roots move to the middle of the Kosmos. The heaviest root is the earth and it is at rest at the center of the Kosmos. Surrounding the earth are concentric rings of water, then air, and finally fire. Empedocles offers an explanation for the phenomena of the heavens that we observe. By relying on observations that we can make in water and air, Empedocles argues that we can account for phenomena that we cannot currently observe.

According to Empedocles, we are in the stage of increasing strife, in maximal strife, or in decreasing strife. One thing is for sure, we are not in maximal love. If we were in maximal love, then there would be one living thing. The more strife, the more variety, separation, and dissimilarity physical things, and living things, have with each other. We live in a world of strife and many things. Eventually, all the roots will become one again. Empedocles enlivens the interaction between love and strife, by interweaving a zoogony. At stage one, when love comes to dominate, the roots attract. Empedocles invites us to consider all sorts of combinations. Today we are accustomed to distinguishing mixtures from compounds. You can mix oil and water, but they remain oil and water. Compounds involve a chemical reaction and the initial components cannot be separated. Bread dough is a compound of flour, yeast, and water. Though you can remove the water from the dough, you cannot separate the yeast from the flour. Empedocles is not thinking of mixtures and compounds in our contemporary terms. He invites us to think about all sorts of combinations. Empedocles describes a series of generations. In the first stage of generation, all the parts of plants and animals were split apart. In the second generation, the parts come together in the most imaginary ways. In the third generation come plants and animals. In the fourth generation comes reproduction among the plants and animals, such as we know them today. Empedocles invites us to employ our imaginations in this process. As love dominates the Kosmos there comes to be a bunch of parts of plants and animals. Then they combine to form animals. During this stage, we can imagine two humans joined back-to-back or ox-headed humans. We can imagine centaurs, gorgons, and all other manners of creatures. This is the age of mythical beasts. They did not reproduce in our time. In the final stage, the love is so dominant that the living things attract each other so strongly that they reproduce. Today we are in the zoological age.

Empedocles offers a novel and detailed account of perception. He argues that objects emit a stream of particles or effluences. The various effluences streaming from an object travel from the object to the perceiver. The particles in the stream are of various sizes. Some are the right size to flow into the eye, others to the nose, and so on. In this way, he explains how the eye perceives visual information, as opposed to other information such as scent. The visual information is the correct size to penetrate the eye, but not the right size to penetrate the nose. We see with the eyes and perceive scent with the nose, because the particles in the effluences are the correct size to penetrate that certain organ of perception. His account of perception is remarkable, since it is the first account of perception and is entirely grounded in his physicalist commitments.

We have focused, so far, on Empedocles' account of nature but he also had important religious commitments. We can see these two features of his philosophy in the two titles of his works. *On Nature* clearly focuses on the material world. *Purifications*, in contrast, focuses on religious matters. A purification in ancient Greece was meant to remove moral pollution from the person and the community. There were various purifications and the necessary steps to follow to remove the pollution were various. Empedocles holds that there are beings called *daimones*. They are composed of the earth, air, fire, and water. They live a very long time and are reincarnated many times. The *daimones* became morally polluted because they killed. This feature of his religious views explains why he prohibits killing and why he prohibits eating meat. Interpreters disagree about whether the two texts are consistent. Recent scholarship is mixed but tends to favor interpreting the texts as consistent. For our purposes, we should note the material nature of the *daimones* and recognize Empedocles' consistent dedication to a materialist account of the cosmos.