

20 LEUCIPPUS

Leucippus is a shadowy figure: his dates are not recorded, and even his birthplace is uncertain. He was the first to develop the theory of atomism, which was elaborated in far greater detail by his pupil and successor, Democritus of Abdera. Democritus overshadowed his master in the later tradition. The Greek historians of philosophy rarely distinguish between the views of the two men: they often refer, conjunctively, to 'Leucippus and Democritus'. We are rarely in a position to separate the contributions of Democritus from those of Leucippus.

The atomist philosophy, then, will be presented more fully in the next chapter under the name of Democritus. Here it is enough to cite one of the few doxographical passages which speak specifically of Leucippus, and to transcribe the one short fragment which is all that survives of Leucippus' writings.

Leucippus of Elea or of Miletus (both places are mentioned in connection with him) shared Parmenides' philosophy but did not take the same path as Parmenides and Xenophanes about the things that exist but rather, as it seems, the opposite one. For whereas they made the universe one and motionless and ungenerated and limited, and did not allow anyone even to inquire into what does not exist, he posited infinite and eternally moving elements, the atoms, and an infinite quantity of shapes among them (because there is no more reason for them to be thus than thus) supposing that generation and change are unfailing among the things that exist. Again, he held that being no more exists than non-being, and both are equally causes of the things that come into being. For supposing that the substance of the atoms is solid and full, he said that it was

being and that it was carried about in the void, which he called non-being and which he says exists no less than being.

(Simplicius, *Commentary on the Physics* 28.4-15)

Leucippus: everything happens in accordance with necessity, and necessity is the same as fate.

Leucippus: he says in *On Mind*:

No thing happens in vain, but everything for a reason and by necessity. [67 B 2]

(Stobaeus, *Anthology* I iv 7c)

21 DEMOCRITUS

Democritus was born in Abdera in the north of Greece. He was the most prolific, and ultimately the most influential, of the Presocratic philosophers: his atomic theory may be regarded from a certain point of view as the culmination of early Greek thought. Although Plato fails, remarkably, to mention his name, he was highly regarded by Aristotle, and his fundamental ideas were taken up and developed by Epicurus in the fourth century BC. None of Democritus' writings has survived intact, and there are, moreover, very few fragments bearing on what we now think of as the central and most important part of his thought. Much of Epicurus' work, however, was preserved, so that by way of Epicureanism Democritus has had a lasting effect on western science and philosophy.

Little is known of his life. He is said to have travelled to Egypt, to Persia, and to the Red Sea. He is supposed to have learned from Leucippus and from Anaxagoras and from Philolaus. In a fragment of uncertain authenticity he allegedly writes:

I came to Athens and no-one knew me.

(Diogenes Laertius, *Lives of the Philosophers* IX 36
= 68 B 116)

He himself offered a little chronological information:

As to his dates, he was, as he himself says in *The Little World-ordering*, a young man when Anaxagoras was old, being forty years younger than him. And he says that *The Little World-ordering* was composed 730 years after the capture of Troy. So he was born, according to Apollodorus in his *Chronicles*, in the

eightieth Olympiad [460–457 BC]—or, according to Thrasyllus in his work entitled *Prolegomena to the Reading of the Books of Democritus*, in the third year of the seventy-seventh Olympiad [470/469 BC], being, he says, one year older than Socrates. So he will have been a contemporary of Archelaus, the pupil of Anaxagoras, and of Oenopides (whom he mentions). He also mentions, in connection with their beliefs about the one, Parmenides and Zeno as being particularly celebrated in his time—and also Protagoras of Abdera, who is agreed to have been a contemporary of Socrates.

(*ibid* IX 41)

Some idea of Democritus' productivity, and of the breadth of his professional interests, may be gained from the list of his books which Diogenes Laertius preserves:

His books were catalogued and arranged in tetralogies by Thrasyllus in the same way as he arranged Plato's works. His ethical works are these:

Pythagoras, On the Disposition of the Wise Man, On the Things in Hades, Tritogeneia (so called because from her come three things which conserve all human affairs), *On Manliness* or *On Virtue, The Horn of Amaltheia, On Contentment, Ethical Commentaries*. (Well-being is lost.)

These are his ethical works; his works on natural science are:

The Great World-ordering (which Theophrastus says was written by Leucippus), *The Little World-ordering, Cosmography, On the Planets, On Nature* (one book), *On the Nature of Man* or *On Flesh* (two books), *On Mind, On the Senses* (some put these together under the title *On the Soul*), *On Flavours, On Colours, On Different Shapes, On Changing Shape, Buttresses* (which supports the previous works), *On Images* or *On Providence, On Logic* or *The Rule* (three books).

These are about nature. (Not integrated into the catalogue are the following:

Heavenly Causes, Atmospheric Causes, Terrestrial Causes, Causes Concerned with Fire and Things in Fire, Causes Concerned with

Sounds, Causes Concerned with Seeds and Plants and Fruits, Causes Concerned with Animals (three books), *Miscellaneous Causes, On Magnets*. These are the non-integrated works.)

The mathematical works are these:

On Different Angles or On Contact of Circles and Spheres, On Geometry, Geometry, Numbers, On Irrational Lines and Solids (two books), *Planispheres, On the Great Year or Astronomy* (a calendar), *Contest of the Waterclock, Description of the Heavens, Geography, Description of the Poles, Description of Rays of Light*.

These are the mathematical works; the literary works are the following:

On Rhythms and Harmony, On Poetry, On the Beauty of Verses, On Euphonious and Harsh-sounding Letters, On Homer or Correct Language and Glosses, On Song, On Verbs, Names.

Such are his literary works; his technical works are these:

Prognosis, On Diet or Dietetics, Medical Judgement, Causes Concerning Appropriate and Inappropriate Occasions, On Farming or Farming, On Painting, Tactics and Fighting in Armour.

Such are these. Some order separately the following works from the *Commentaries*:

On the Sacred Writings in Babylon, On Those in Meroe, Circumnavigation of the Ocean, On History, Chaldaean Account, Phrygian Account, On Fever and Coughing Sickesses, Legal Causes, Artefacts or Problems.

The other books which some ascribe to him are either compilations of his works or else agreed to be by others.

(Diogenes Laertius, *Lives of the Philosophers* IX 45-49)

The remainder of this chapter is divided into four sections. First comes a selection of texts, none of them fragments of Democritus, which describe the atomic theory. Secondly come the texts which record Democritus' views on knowledge and scepticism. There follows a short section on Democritus' scientific and literary studies. Finally, the longest section is given to the ethical fragments. The relative lengths of the four sections are determined by the amount of available material: they do not reflect the importance which Democritus - or we - might ascribe to the different aspects of his thought.

I Atomism

For Democritus' most celebrated doctrine, his atomism, we are obliged to rely on second-hand reports.

If the same atoms endure, being impassive, it is clear that [the Democriteans] too will say that the worlds are altered rather than destroyed - just as Empedocles and Heraclitus seem to think. An extract from Aristotle's work *On Democritus* will show what the view of these men was:

Democritus thinks that the nature of eternal things consists in small substances, infinite in quantity, and for them he posits a place, distinct from them and infinite in extent. He calls place by the names 'void', 'nothing' and 'infinite'; and each of the substances he calls 'thing', 'solid' and 'being'. He thinks that the substances are so small that they escape our senses, and that they possess all sorts of forms and all sorts of shapes and differences in magnitude. From them, as from elements, he was able to generate and compound visible and perceptible bodies. The atoms struggle and are carried about in the void because of their dissimilarities and the other differences mentioned, and as they are carried about they collide and are bound together in a binding which makes them touch and be contiguous with one another but which does not genuinely produce any other single nature whatever from them; for it is utterly silly to think that two or more things could ever become one. He explains how the substances remain together in terms of the ways in which the bodies entangle with and grasp hold of one another; for some of them are uneven, some hooked, some concave, some convex, and others have innumerable other differences. So he thinks that they hold on to one another and remain together up to the time when some stronger force reaches them from their environment and shakes them and scatters them apart. He speaks of generation and of its contrary, dissolution, not only in connection with animals but

also in connection with plants and worlds – and in general with all perceptible bodies. [Aristotle, fragment 208]
(Simplicius, *Commentary on On the Heavens* 294.30–295.22)

The excerpt from Aristotle's lost essay on Democritus can be supplemented from his extant Metaphysics:

Leucippus and his colleague Democritus say that the full and the void are elements, calling the one 'being' and the other 'non-being'; and of these the full and solid is being, the void non-being (that is why they say that being no more exists than non-being – because void no more exists than body), and these are the material causes of the things that exist. And just as those who make the underlying substance single generate other things by its properties, making the rare and the dense origins of the properties, so these men say that the differences [among the atoms] are the causes of the other things. They say that the differences are three in number – shape, order, and position. For they say that beings differ only by 'rhythm', 'contact' and 'mode' – where rhythm is shape, contact is order and mode is position. The letter A differs from N in shape; AN differs from NA in order; and N differs from Z in position. As for motion (whence and how existing things acquire it), they too, like the others, negligently omitted to inquire into it.

(Aristotle, *Metaphysics* 985b4–20)

Aristotle's final remark is echoed by Simplicius:

Democritus too, when he says that a whirl of every kind of forms was separated off from the whole [B 167] but does not say how and by what cause, seems to generate it spontaneously and by chance.

(Simplicius, *Commentary on the Physics* 327.23–26)

The same commentary contains a brief doxographical section which adds a little to what we learn from Aristotle.

In the same way [Leucippus'] associate Democritus of Abdera posited the full and the void as first principles, one of which

he called being and the other non-being; for he posits the atoms as matter for the things that exist and generates everything else by their differences. These are three: rhythm, contact, mode – which is to say, shape and position and order. For by nature like is moved by like and things of the same kind are carried towards one another, and each of the shapes when arranged in a different compound produces a different condition. Thus since the principles are infinite, they reasonably undertook to account for all properties and substances and for how and by what cause they come into being. That is why they say that only those who make the elements infinite produce a reasonable account of things. And they say that the quantity of shapes in the atoms is infinite because there is no more reason for them to be thus than thus. They themselves give this as the explanation of the infinitude.

(*ibid* 28.15–27)

Democritus' idea that 'like is moved by like' is illustrated in the following passage:

There is an ancient opinion which, as I have already said, has long been current among the natural scientists to the effect that like recognizes like. Democritus is thought to have produced confirmation of this opinion and Plato to have touched on it in his *Timaeus*. Democritus bases his argument on both animate and inanimate things. For animals, he says, congregate with animals of the same kind – doves with doves, cranes with cranes, and so with the other irrational animals. Similarly in the case of inanimate things, as we can see from seeds that are being riddled and from pebbles on the sea-shore. For in the one case the whirling of the sieve separately arranges lentils with lentils, barley with barley, wheat with wheat; and in the other case, by the motion of the waves, oval pebbles are forced into the same place as oval pebbles, and round pebbles as round pebbles, as though the similarity in things contained some sort of force for collecting things together. [B 164] That is Democritus' view.

(Sextus Empiricus, *Against the Mathematicians* VII 116–118)

The texts so far cited do not explain why Democritus thought that the world consisted of atoms and void. The following Aristotelian passage does not purport to represent Democritus' actual arguments, but it is generally supposed to be an adaptation of Democritean material.

Democritus seems to have been persuaded by appropriate and scientific arguments. What I mean will be clear as we proceed.

There is a difficulty if one supposes that there is a body or magnitude which is divisible everywhere and that this division is possible. For what will there be that escapes the division? If it is divisible everywhere, and the division is possible, then it might be so divided at one and the same time even if the divisions were not all made at the same time; and if this were to happen no impossibility would result. So if it is by nature everywhere divisible, then if it is divided – whether at successive mid-points or by any other method – nothing impossible will have come about. (After all, if it were divided a thousand times into a thousand parts, nothing impossible would result, even though no-one would actually so divide it.)

Now since the body is everywhere divisible, suppose it to have been divided. What will be left? A magnitude? That is not possible; for then there will be something that has not been divided, but we supposed it divisible everywhere. But if there is to be no body or magnitude left and yet the division is to take place, it will either consist of points and its components will have no magnitude, or else they will be nothing at all so that it would come to be, and be composed, from nothing and the whole body would be nothing but an appearance.

Similarly, if it is made of points it will not be a quantity. For when the points were in contact and were a single magnitude and were together, they did not make the whole at all larger. For if it is divided into two or more parts the whole is no smaller or larger than it was before, so that even if all the points are put together they will not make any magnitude.

If some sawdust, as it were, is created when the body is being divided, and in this way some body escapes from the magnitude, the same argument applies: how is *this* body divisible?

Perhaps it is not a body but a separable form or property which escapes, and the magnitude consists of points or contacts with such and such a property? But it is absurd to think that a magnitude consists of what are not magnitudes.

Again, where will these points be, and are they motionless or moving?

And a single contact always involves two things, so that there is something apart from the contact and the division and the point.

If one posits that any body of whatever size is everywhere divisible, all these things follow.

Again, if I divide a log or anything else and then put it together, it is again a unit of the same size. This is so at whatever point I cut the log. So it has potentially been divided everywhere. Then what is there apart from the division? Even if it has properties, how is the body dissolved into these and how does it come into being from them? And how are they separated? So if it is impossible for magnitudes to consist of contacts or points, necessarily there are indivisible bodies and magnitudes.

(Aristotle, *On Generation and Corruption* 316a13–b16)

II Knowledge

Democritus' atomism was the framework within which he tried to understand the nature of the world. At the same time it was a theory which appeared to have strongly sceptical implications. It is best to approach this topic by setting down the passages in which Plutarch records and criticizes two objections made against Democritus by Epicurus' pupil Colotes.

[Colotes] first accuses [Democritus] of saying that each object is no more such-and-such than so-and-so, and thereby throwing life into confusion. But Democritus is so far from thinking that each subject is no more such-and-such than so-and-so that