

### Ancient Atomists: Leucippus and Democritus

With these philosophers, we finally have a coherent and ingenious response to Parmenides' challenge to knowledge of sense-perception. The upshot of the atomist position leads to an incredible *advance* in our understanding of the physical world and the constituents of knowledge. What more, by eliminating final causation from their physical theories, the ancient atomists break from the mystic tradition carried over into philosophy, and they establish the study of ethics as a separate sub-field of philosophy independent from religion. This makes them far closer to our understanding of ethics than anything we have seen previously.

Little is known of Leucippus, and we have only one sentence of his work *The Great World System* that has come down to us. Even in antiquity, he appears to be a shadowy figure. Leucippus was eclipsed by his pupil, Democritus, and most of what we will be doing will focus on Democritus. Democritus was a very prolific writer. Over 70 works are attributed to him. He is a contemporary of Socrates, and was in Athens when Socrates is active.

Democritus is said to have constructed a systematic and comprehensive theory of nature and of the origin of things that was difficult even for the ancients to distinguish from Leucippus. It is Aristotle who grasped the significance of the atomist work.

If we examine some of the testimonia and fragments of Democritus' work, we will be in a position to understand both his physics and, hopefully, his ethics. Let's turn to fragment 67A6, or fragment 3.

Leucippus and his associate Democritus declare the full and the empty [void] to be the elements, calling the former 'what is' and the other 'what is not'. Of these the one, 'what is' is full and solid, the other, 'what is not', is empty [void] and rare. (This is why they say that what is is no more than what is not, because the void is no less than body is.) These are the material causes of existing things. . . . They declare that the differences <among these> are the causes of the rest. Moreover, they say that the differences are three: shape, arrangement, and position. For they say that what is differs only in 'rhythm', 'touching' and 'turning' - and of these 'rhythm' is shape, 'touching' is arrangement, and 'turning' is position. For *A* differs from *N* in shape, *AN* from *NA* in arrangement, and *Z* from *N* in position. Concerning the origin and manner of motion in existing things, these men, too, like the rest, lazily neglect to give an account. (Aristotle. *Metaphysics* 985b4-20)

The oneness and immobility of being seemed to the Eleatics to follow directly from their denial of any sort of being to what is not. For Being is all alike, and consequently, the separation of any part of being from another part, would at the same time, involve a gap and the existence of gaps in being. That would imply the existence of non-being, which, for Parmenides, this is impossible. The motion of any part of being is ruled out for the same reason, it cannot enter where being already is, it must enter where nothing is, and this involves once more the existence of what is not.

The atomists meet this line of reasoning by denying the principle on which the arguments against plurality and motion rest: the principle that being is identical with the full.

atom (literally, the indivisible)      void (literally, the empty)

This is illustrated clearly in the next fragment.

Leucippus . . . did not follow the same path as Parmenides and Xenophanes concerning things that are, but seemingly the opposite one. For while they made the universe one, immovable, and ungenerated and limited, and did not even permit the investigation of what is not, he posited the atoms as unlimited and ever moving elements, and an unlimited multitude of shapes among them on the grounds that they are no more like this than like that, since he observed that come to be and change are unceasing in things that are. Further, he posited that what is is no more than what is not, and both are equally causes of what comes to be. For supposing the substance of the atoms to be compact and full, he said it is 'being' and that it moves in the void, which he called 'not-being' and which he declares is no less than what is. His associate, Democritus of Abdera, likewise posited the full and the void as principles, of which he calls the former 'being' and the later 'not-being'. For positing atoms as matter for the things that are they generate the rest by means of their differences. These are three: rhythm, turning, and touching, i.e., shape, position, and arrangement. For like is by nature moved by like, and things of the same kind move towards one another, and each of the shapes produces a different composition when arranged in a different compound. Thus, since the principles are unlimited, they reasonably promised to account for all attributes and substances - how and through what causes anything comes to be. This is why they say that only those who make the elements unlimited on the grounds that they are no more like this than like that. For they themselves assign this as a cause of the unlimitedness. (Simplicius. *Commentary on Aristotle's Physics*. 28.4-26. 68A38)

Clearly, the testimony of Aristotle and Simplicius reflect that the fundamental nature of visible objects is atoms and the void. The arrangement, shape, and position of the individual atoms comprise the compound out of which the visible object is made. There is the hint that differences in visible objects can be understood in terms of these three differences. But, how do the atomists account for change or for generation and corruption?

After making the shapes, Democritus and Leucippus make alterations and coming to be out of them: coming to be and destruction by means of separation and combination, alteration by means of arrangement and position. Since they held that the truth is in the appearance, and appearances are opposite and unlimited, they made the shape unlimited, so that by reason of changes of the composite, the same thing seems opposite to difference people, and it shifts position when a small amount is mixed in, and it appears completely different when one thing shifts position. For tragedy and comedy come to be out of the same letters. (Aristotle. *On Generation and Corruption*. 315b6-15. 67A97)

I would suggest, as another source for understanding the nature of visible compounds, the fragment of Aristotle's work *On Democritus*, that was preserved by Simplicius. This fragment is rather extended in length, and the latter half of it directly bears on the subject at hand. The one

item that I would like to draw your attention to, at this moment, is the notion that each of the atoms has a different shape. The account provided about how atoms form compounds is there. Democritus was believed to have held that why substances or compounds stay together is because some atoms are rough, others hooked, others concave, others convex. On account of these differences in shape, atoms cling together and stay together until something stronger necessity comes along from the environment and shakes them and scatters them apart. By accounting for the formation of compounds by virtue of the individual shapes of atoms, Democritus is able to reject any explanation that would invoke a *force* or other such non-tangible, non-material cause for the creation and destruction of any visible object. This makes him a thorough materialist. This is very unique in the ancient world, and makes Democritus far closer to our understanding of things than any other of the ancient philosophers.

How do the atomists account for living things? Aristotle, in *De Anima*, provides a long, discontinuous account of Democritus on the soul.

In our inquiry about the soul we shall have to raise problems for which we must find a solution, and in our progress for which we must take with us for comparison the theories expounded by our predecessors, in order that we may adopt those which are well stated, and be on our guard against any which are unsatisfactory. (Aristotle. *De Anima*. 404a1-25)

This passage makes for an excellent point of departure for examining this discontinuous passage, in that notice: Aristotle does not say that all of the previous theories concerning the soul or living principles are wrong. What he does say is that those portions of those previous theories that are well stated, i.e., true, should be adopted, while those which are unsatisfactory, i.e., false, should be rejected (or that we should be on our guard against these.) This point is subtle, but worth mentioning now. Later in this semester, we will be examining Aristotle's theories in their own right. But for now, it is important for us to notice that the reason that Aristotle wants to preserve these earlier views, is not simply to have something to argue against, but that we learn from those who proceeded us, so that we do not make the same mistakes as they did.

When Aristotle gets around to presenting Democritus' view of the soul, he says: Democritus has explained with great precision why each of these two things is so; for he identifies the soul and the mind. This, he says, consists of primary and indivisible bodies, and its power of producing movement is due to the smallness of its parts, and its shape; for he calls the spherical the most easily moved of all shapes and this characteristic is shared by mind and fire. (Aristotle. *De Anima* 405a8-14)

Further down in the text, Aristotle presents Democritus' account of how the soul moves the body.

Some say that the soul moves its body exactly as it is moved itself. Such is the view of Democritus, arguing in the vein of Philippus the cosmic dramatist, for he tells us that Daedalus made his wooden Aphrodite move by pouring in quicksilver. Democritus speaks in a similar strain; for he says that the spherical atoms, as they move because it is their nature never to remain still, draw the whole body with them and so move it.

(Aristotle. *De Anima* 406b15-23)

Before passing to the next passage, let's examine some of the implications of this passage. The soul, so Democritus held, consists of the smallest spherical atoms which are always in motion. These small, spherical atoms are most easily moved, and this is also a characteristic of fiery atoms. The reference to the statues of Daedalus suggests an analogy between the wooden statue, and the quicksilver poured into it, and the body and the soul. Since the quicksilver accounts for the motion of the statue, the soul and its motion accounts for the movement of the body. The body, then, appears to be a container for the soul. In fact, one of the surviving fragments of Democritus refers to the body as the tent of the soul. So, the motions of the soul, being within the body, account for the motions of the body. Aristotle is very critical of this notion and in this next passage, criticizes Democritus.

In effect, as we have said, this theory in one respect repeats the view of those who suppose the soul to be a body of fine particles, and in another, just as when Democritus states that the body is moved by the soul, it has an absurdity of its own. For if the soul exists in every part of the sentient body then there must be two bodies in the same place, if the soul is a body. And those who say that the soul is a number (Pythagoreans) must believe that there are many points in one point, or else that every body has a soul, unless the number engendered in the body is different and distinct from the points already present in the body. And it follows that the living creature is moved by the number, just as we have already said that Democritus account for its movement; for what difference does it make whether we call them small spheres or large units, or generally moving units? For in either case we can only account for the movement of the living creature by the movement of these particles. (Aristotle. *De Anima* 409a23-409b11)

It would appear that the main problem that Aristotle has either with the Pythagorean account or the Atomist account is the notion that there could be two bodies occupying the same space. But, this makes us wonder to what extent did Aristotle understand Democritus' position. If the soul is composed of the smallest particles, and those particles move about within the body within the space between the body's atoms (being larger, and the void between them greater), then it is possible for one body to exist in the same space as another body. The reference to quicksilver is an important one, because it was known in antiquity that quicksilver could be absorbed within another body, gold, for example. Under the right conditions, the quicksilver could be removed from the gold without destroying either. The real point I think that needs to be made in this connection is that Aristotle rejects the underlying atomism because he cannot conceive of a body being anything but a uniform substance. But to fully lay out this notion would take us far afield from a presentation of Democritus' views. Needless to say, what we are seeing here is the way in which the intellectual conception of one philosopher impedes the understanding of another. This is not to say that Aristotle did not take Democritus seriously. Far from that. Good evidence that Aristotle did take Democritus seriously is that he wrote two treatises on him. Unfortunately most of that work was lost in antiquity. What we have seen so far is that Democritus' physicalist account of motion is consistent with his account of compounds.

What remains for us to understand is how Democritus, being an Atomist, accounts for

ethics. What I mean is, it would appear, from the reports we have of the atomist's physical views, they reject or do away with final cause. But the notion of final cause appears to be central to any ancient notion of ethics. If we conceive of happiness as that towards which all of our actions aim, then the notion of final cause is inherent to our understanding of happiness. So, if Democritus is to remain consistent, what kind of ethics could he propose? My suggestion is that Democritus' ethics can be understood as proposing a state of being as the best condition of the soul and body, rather than some final cause towards which all things aim. This condition might be understood as serving an analogous purpose as final cause, but in many respects, this will be a different kind of notion than that of final cause.