

Aristotle The Mechanist

Aristotle's natural philosophy is said to be in opposition to that of the Atomists¹. Despite this, there are plenty of textual and philosophical reasons to suppose that Aristotle's account of features of the world is, in fact, very close to the mechanism² of the Atomists.

For example, Aristotle's Meteorologica IV contains his account of physical occurrences like boiling, scalding, and so forth. These rely heavily on motion (i.e. mechanism), and I will defend in this paper that there are only a few subtle differences between an Atomistic view of change and the Aristotelian one. There is a slight difficulty in that the Atomistic account does not give any specific examples of the type of coming to be we are generally concerned with; however, Atomists explain the origin of the world, and the general principle behind it. From this we can determine their general viewpoint on matters of coming to be and perishing. Primary differences between Aristotle and the Atomists lie in the issues of the void and of underlying substrates. Aristotle does not want to admit a void for various reasons; we will see these reasons and the consequences of void for mechanism, but this does not change the nature of mechanism that greatly. This will allow us to see not only that change in the macroscopic world is mechanistic, but that the "microchanges"³ of the substrate are also mechanistic. We shall also see the few, (but important) differences between the Aristotelian substrate (the pairs of contraries) and the atoms of the Atomists. I will also investigate three possible objections to this account to the notion of Aristotle as a mechanist. These issues taken together support my notion that Aristotle is, in fact, a

¹ In the Physics, and elsewhere, Aristotle himself sets his natural philosophy apart.

² Mechanism, as used here, is the philosophical position that events in the world can at least in part be explained by interactions of the things that there are. It is often used to refer to Newton's account (cf. the Random House Dictionary of the English Language), but is obviously not used this way herein.

³ That is, the changes in the underlying substrates that make changes in the world of sense experience possible.

mechanist.

First, our focus will be on some excerpts from Meteorologica IV. In each, Aristotle uses the language of motion to explain some sort of change in the realm of ordinary experience; that is, change of in the realm of macroscopic bodies⁴. In the first excerpt, Aristotle says:

“That is why everything that decays gets drier, until it ends as earth or dung: for as its own heat leaves it its own natural moisture evaporates, and there is nothing to suck moisture into it (this being the function of its own heat, which attracts and draws moisture in).”⁵ [emphasis added]

We can see in this case that the Aristotelian account of decay involves several clearly mechanistic terms, by virtue of dealing with motion (i.e.: leaves, suck, attracts, draws).

To describe roasting and boiling Aristotle again uses the language of motion:

“For what is cooked in a pan is roasted, being acted upon the moisture which contains it, by drying up and absorbing it into itself: what is boiled, on the other hand, produces the opposite effect, its moisture being drawn out of it by the heat of the moisture surrounding it.”⁶

Describing the drying of laundry, he says:

“For even things which are dried by cooling, like wet clothes, and in which the water has a separate existence, are dried by their internal heat which, when driven out by the surrounding

⁴ As opposed to changes in the substrate.

⁵ Meteorologica IV, p. 295 as translated by H.D.P. Lee

⁶ p. 305, *ibid*

cold, evaporates the moisture if the amount of it is small.”⁷

Again, there is a clear use of a word implying motion.

Let us now contrast these statements about certain events with those of the Presocratic Atomists. Diogenes Lærtius records the following viewpoint of the Atomist Leucippus:

“Leucippus holds that the whole is infinite... part of it is full and part void... Hence arise innumerable worlds, and are resolved again into these elements. The worlds come into being as follows: many bodies of all sorts move ‘by abscission from the infinite’ into a great void; they come together there and produce a single whirl ... So the earth came into being...”⁸

Like Aristotle, the Atomistic view espouses that in particular (here, the earth) came to be through motion. While this motion is not of the Aristotelian contraries, (as we shall see), but instead of the atoms, it is clear that a similarity exists here. Let us examine another fragment of Atomistic natural philosophy to see if this account can be further supported. Aristotle refers to Democritus in On Democritus and reports:

“As they [sc. the atoms] move they collide and become entangled in such a way as to cling in close contact to one another ...”⁹

Thus we see that the Atomists accounted for the origins of the things of the realm of sense experience as being things that were mere combinations of the atoms.

To conclusively see that Aristotle wants a mechanism at the macroscopic level to explain the changes in the world, two useful passages are found in On Generation and

⁷ p. 317, *ibid*

⁸ p.417, Presocratic Philosophers, as handed out by Professor Eric Lewis, McGill University course 107-453B, Winter Term, 1997.

⁹ p.425, *ibid*

Corruption, chapter 10.

“... for the locomotion will produce the generation perpetually by bringing near and then removing the generation perpetually by bringing near and then removing the generating body.”

and

“... and since we hold that locomotion is the cause of coming to be, ...”¹⁰

Another key point in this explanation of Aristotle as a mechanist is the issue of the substrate. There has been some debate over this point; in this section of the paper I will defend the notion that the substrate (through changes) is in fact vitally important to understanding the mechanism in Aristotle’s natural philosophy and metaphysics. Furthermore, we will see that this substrate itself possesses some of the characteristics of the parts of a machine. Aristotle introduces his substrate, the basic contraries, in *Physics* I, chapter 5.

“Clearly, then, all in some way agree that opposites are the principles. And that is plausible. For the principles must come neither from one another nor from anything else, and everything else must come from them. Primary opposites fulfill these conditions: because they are primary they do not come from anything else, and because they are opposite they do not come from one another. But we must also see what emerges from logical considerations.”¹¹

This explains the role of the contraries, in other words, that they will account for the features of the world. Examining this, Aristotle wants an explanation of the world in which becoming and perishing are possible. This is like the Atomist account. Since the Atomist’s substrate and the Aristotelian substrate are posited to allow for change, they are, in fact,

¹⁰ p. 54, *Aristotle’s De Generatione et Corruptione*, Translated by C.J.F. Williams, Oxford, Clarendon Press, 1982

¹¹ p.10 of *Physics* by Aristotle, as translated by W. Charlton, Clarendon Press, Oxford

similar as far as this is concerned. But is this account of the substrate dependent on mechanistic notions?

In the case of the Atomists, they want to have it that the features of the world arise from the interactions between the fundamental things (substrates). These fundamental things are like parts in a machine. It is not immediately clear that the contraries are like the least parts in a machine. There are several ways in which something could be thought of as being like a least part in a machine. Least parts of a machine would be parts that are not composed of any of the other parts of the machine, would be possibly parts to lots of machines (for instance, a gear can be a part in many machines), and the parts should be able to interact with each other in some way or other. Let's see in turn how the contraries and the atoms fit these characteristics.

Aristotle makes it clear in the last quotation that the basic contraries are definitely not formed out of anything else. He takes them to be his basic substrate for that very reason. The atoms of the Atomists are similar. Since nothing exists for the Atomists save atoms and the void, it seems plausible that the atoms are not composed out of anything. (The only other thing that the atoms could be composed out of would be the void, and it appears that having the atoms composed out of void would be nonsensical).

We can also see that the contraries and the atoms both are like a common part to many machines (like gears are a part of many machines), because, as has already been made clear, they are what everything in the world is composed out of. (That is, the things in the world are like the various machines.)

Finally, let us see whether they are capable of interactions with each other. For the atoms, this is clear:

“So he [Democritus] is already enabled from them, as from elements, to create by aggregation bulks that are perceptible to

sight and the other senses.”¹²

But does Aristotle mean that the contraries themselves move in some fashion? It appears so, as we see in his account of drying:

“... what happens when the moisture is removed and consumed by the action of the thing's own heat as it leaves it.”¹³ [emphasis added]

The hot and the moist (two contraries) are clearly moving here, just like the parts of a machine would be expected to when in operation.

Now that we see that Aristotle uses mechanistic terminology like the Atomists, let us turn to the reasons for and consequences of this interpretation. The first one is to account for properties of things which are placed together. For when boiled milk is placed in a mug, and the milk gets a bit colder, and the mug a bit hotter, why does this occur?

The Aristotelian philosophy requires motion of the contraries to explain this occurrence. In other words, it requires mechanism at both levels of explanation. Some of the hot of the boiled milk becomes the hot of the mug, and some of the cold of the mug becomes the cold of the milk. If Aristotle wants to claim that this common sense observation that things brought together (for example, of liquids in a container, as we have seen above) tend to share their properties, he must account for the way that the properties are shared. One possible explanation is that a substrate of some sort remains throughout the change, and certain properties of that substrate change through motion. Since we see that Aristotle definitely allows the contraries to change location and become ‘of something else’ it must be that they move, in some way or other. How they move is not actually very clear.

¹² p.414, Presocratic Philosophers, as handed out by Professor Eric Lewis, McGill University course 107-453B, Winter Term, 1997.

¹³ p. 319, Meteorologica IV as translated by H.D.P. Lee.

We must now turn our attention to the issue of the void. This is one of the main difficulties for some in accepting a mechanistic Aristotle. Since some of the Presocratic philosophers had held that there was no motion without the void, and the Atomists themselves wanted void to account for the motion of sense experience, the void is intimately linked to the idea of motion. Since Aristotle does not want to admit the void, as we shall see, it is instructive to look at his accounts of motion, and see if they are compatible with the mechanistic type accounts of the Atomists.

Let us first look at an Atomistic type description on how the void and the atoms are supposed to relate to one another:

“... we may point out that each of the indivisibles (sic) has to be said to be incapable both of being affected (for it is not possible to be affected except by means of the vacuum) ... ”¹⁴

This quotation from Aristotle’s On Generation and Corruption tells us how the Atomists required void for the motion and powers of the atoms. Of course, Aristotle rejects this account, and develops an account of motion which shares many of the same features of the Atomistic one. Aristotle rejects the void as being unnecessary, as what is, is divisible everywhere:

“Since bodies are divisible at any point, it is absurd to posit the existence of passages; for where they are divisible, they can be separated.”¹⁵

This is saying that the void is unnecessary for motion, for things are able to move by passing through other things which have ‘separated/divided’ (perhaps temporarily). We also see a similar account elsewhere in On Generation and Corruption:

¹⁴ p. 29, Aristotle’s De Generatione et Corruptione, Translated by C.J.F. Williams, Oxford, Clarendon Press, 1982

¹⁵ p. 31, *ibid*

“This then, at any rate, is clear: there is a sense in which the things which cause motion will touch the things they move and a sense in which they will not. ... whereas that of ‘mutual contact’ is applicable to things capable of being moving and being moved in which there is acting and being affected”¹⁶

We see here that Aristotle definitely allows for motion without the existence of void, and further, we also see that this motion is necessary to insure “acting and being affected”, or in other words, change and the features of the world. Once again, we see Aristotle using mechanistic language.

Having seen the primary textual evidence to support the notion of Aristotle as a mechanist, I will now deal with some objections. First, I will deal with the issue of metaphor. It is possible that Aristotle would want his statements about motions of bodies when they mix, interact and so forth to be taken metaphorically. But to me, this is untenable for several reasons. Most importantly, Aristotle uses the same language in three different works: in the Physics, in On Generation and Corruption, and in book four of the Meteorology. It seems unlikely that he used metaphorical language when introducing the subject, say, and then as he got more specific with regards to details, filled in the gaps. Unlikely, because we see mechanistic language in the specific work on changes in the world and the like (Meteorology IV), right from the beginning.

It is also unlikely that this language used is metaphorical, for Aristotle tells us when a metaphor is being used on at least one occasion:

“The final cause is not active (so health is not active, except metaphorically).”¹⁷

Here, Aristotle points out where a metaphor is being used; no such indication is given when

¹⁶ p. 22, *ibid*

¹⁷ p. 26, *ibid*

he describes the motions and mechanism of things, either at the level of sense experience, or at the level of the contraries.

One other possible objection to Aristotle being a mechanist would be that his account of things so far discussed only involves the sub-lunary world. This is true; there are different laws of reality governing the heavens for Aristotle. However, this doesn't appear to destroy the account of him as a mechanist for the following reason. If the divine element, æther, does not interact with things in the sub-lunary world, it cannot affect or be affected by them, and as such, the mechanistic sub-lunary world is effectively isolated from the heavens around it. And so, the account of things is still mechanistic, because it is as if there are two separate realities. The only difference, from the Atomists, therefore, is that they deny this dual nature to reality. Since Aristotle refuses to discuss what happens in the heavens¹⁸ (an assumption based on accounts in the Physics), it is of little consequence to speculate any how.

Another objection to this view of Aristotle as a mechanist might be that mechanism referred to those who took Newton's explanations of the universe seriously, and that to call Aristotle a mechanist would be severely anachronistic. This isn't a problem, for in this paper I am simply defending the notion that motion and by extension, mechanism, are like are as part and parcel of Aristotelian natural philosophy as they are of the Atomist account. (See footnote 2 on page 1)

Having seen how Aristotle is a mechanist in much the same way as the Presocratic Atomists are, we can appreciate that the perceived variation in ancient natural philosophy wasn't as great as was previously thought. From this it is easy to understand why he discusses his predecessors, that is he wants to draw out the subtle differences between his account, and that of the others. A mechanistic account of things that are, together with a mechanism of their underlying substrates, is not one of these differences.

¹⁸ See *Physics*, Book I, Chapter 2 for Aristotle's account of what lies beyond 'nature' and how natural philosophy need not discuss it.