

# Aristotle's Cosmological Argument: *Metaphysics* Λ as 21<sup>st</sup> Century Cosmology

by David Wood

“When someone attains more strictly compelling proofs, we must be grateful to the discoverers, but for the present we must state things as they appear.”

~Aristotle, *On the Heavens*

In science classes around the world, Aristotle has been accused of forcing his science to conform to his philosophy. It would be more accurate to say that his philosophy was constrained by his observations of the natural world. In other words, as with all natural philosophers, Aristotle found himself in dialogue with the cosmos, forming theories based on his scientific investigations and then pushing these theories to their explanatory limits. However, while it is commendable for a philosopher to have a healthy respect for experience (as when one rejects Zeno's paradox on the ground that Achilles really does overtake the tortoise, or as when the notorious Dr. Johnson, faced with Berkeley's ingenious proofs that the material world is an illusion, kicked a stone and said, “I refute him thus”), our interpretations of phenomena are sometimes wrong. For the natural philosopher, such errors can be devastating, for his explanations are based on his data.

In *Metaphysics* Λ, Aristotle shows us the breadth of his cosmology, taking us from substance to God in ten short chapters. It is a coherent picture of the cosmos, yet the observations on which it was based were grossly inadequate. Nevertheless, Aristotle's science wasn't completely wrong, and many of his philosophical principles, when extracted from faulty scientific opinions, are just as reasonable today as they were in the fourth century BC. Indeed, as if by a moderate touch of historical irony, the famous conclusion of book Λ—that an unmoved mover is necessary to account for *kinēsis*—may have even been hindered by the science of Aristotle's day. To see this, let us (1) explore Aristotle's case for the first mover in the light of his overall cosmology, (2) separate out everything based on his outmoded science, and (3) see what remains of Λ, and how this fares when modern science reigns supreme.

## *I. Cosmology and the Cosmic Patriot[1]*

“The subject of our inquiry is substance; for the principles and the causes we are seeking are those of substance” (1069<sup>a</sup>18-19). Far from rushing into theological speculations, Aristotle begins by taking a hard look at nature. For it is the natural world that he wishes to understand, and it is only this task—explaining what we *observe*—that could ever justify appeals to an unseen entity. Turning thus to the furniture of the world, he notices individual substances, such as this rock, that tree, Theophrastus, and Polaris, as well as their various qualities, quantities, motions, etc. However, since he is searching for the causes of things, he finds substance to be most important concept, because, of the various categories, only substance can exist apart. If we are to understand the cosmos, we must above all understand substance, for to explain substance is also to explain everything that inheres in it. “And therefore all things have the same causes, because, without substances, modifications and movements do not exist” (1071<sup>a</sup>1-2).

In Λ 2 Aristotle discusses the “principles and causes” of substance, and he begins by noting the obvious fact that “Sensible substance is changeable” (1069<sup>b</sup>3). Of the two kinds of sensible substance—the eternal and the perishable—both undergo change. Perishable substances, such as this rock, that tree, and Theophrastus, are susceptible to all four kinds of change, namely, (1) generation and destruction, (2) increase and diminution, (3) alteration, and (4) motion. Eternal substances, such as Polaris, are only capable of motion. Thus, common to all sensible substance is motion, and Aristotle understandably focuses his discussion on this characteristic.

It is at this point that Aristotle's allegiance to the cosmos is most clearly seen. Avoiding the mistakes of his predecessors, he works out a solution that acknowledges the reality of both substance and motion, while avoiding the "empty words and poetical metaphor" of Plato's Forms. Heraclitus had rightly acknowledged the pervasiveness of change in the world; the Megarians were equally correct in noting that there is something odd in the idea that "being" could come from "non-being." But to depart from nature in formulating our explanations can only be a sign of "weakness of intellect."

That non-white objects may become white, and that Polaris moves from here to there may be taken as given.[2] Since being cannot come from non-being (except in the sense given below), and yet there *is* change, there must be something that persists through the change. This is the *matter* of the substance, and change takes place when the matter takes on a form that it previously lacked. "The causes and the principles, then, are three, two being the pair of contraries of which one is definition and form and the other is privation, and the third being the matter" (1069<sup>b</sup>33-34).

Even this doctrine presents a problem, however, for it seems that, in a given change, what 'is' (i.e. a certain definition or form) comes into being *ex nihilo*. Aristotle removes the difficulty by drawing a distinction between potency and act:

The matter, then, which changes must be capable of both states. And since that which 'is' has two senses, we must say that everything changes from that which is potentially to that which is actually, e.g. from potentially white to actually white, and similarly in the case of increase and diminution. Therefore not only can a thing come to be, incidentally, out of that which is not, but also all things come to be out of that which is, but is potentially, and is not actually. (1069<sup>b</sup>14-20)

Thus, in place of the difficult notion of change as a procession from non-being to being, Aristotle presents change as a transition between being potentially and being actually. The question that naturally arises at this point is how the matter, which is capable of both states, is changed from *potentially* X to *actually* X. But Aristotle leaves little out of his account: "For everything that changes is something and is changed by something and into something. That by which it is changed is the immediate mover; that which is changed, the matter; that into which it is changed, the form" (1069<sup>b</sup>36-1070<sup>a</sup>2). The immediate mover, or motive cause, is necessary because whatever is moved must either be moved by something else or be self-moved. Since the idea of a self-mover contains a contradiction,[3] motion requires that an external mover bring about the transition from potency to act.

Further, as Aristotle notes in  $\Theta$  8, this motive cause must already be in actuality: "For from the potentially existing the actually existing is always produced by an actually existing thing . . . there is always a first mover, and the mover already exists actually" (1049<sup>b</sup>24-25).[4] A potency cannot actualize itself, so it must be actualized by something in act. Hence, actuality is prior to potency, as one who plays the harp is prior to the student of music. Aristotle's account of the principles and causes of substance, then, runs something like this:

- (1) There are two types of sensible substance: eternal and perishable.
- (2) Both types of sensible substance are capable of being moved.
- (3) Motion is the "fulfillment of what exists potentially" (201<sup>a</sup>10).
- (4) This fulfillment takes place via something actual (i.e. a motive cause).
- (5) The motive cause confers form or definition on the matter, which is capable of both states (i.e. form and privation).
- (6) Since the other categories depend on substance for their being, the causes of substance—matter, form, privation, and motive cause—are the causes of all things.

This seems to be a coherent explanation of substance. Aristotle saves the cosmos from Heraclitean flux and Megarian illusions, and he does it without recourse to eternal Forms, which could never explain change anyway. Nevertheless, there are a few loose ends that need tying up, and questions that need answers.

To begin, we must discern whether Aristotle is justified in claiming that the motion of the stars and planets is eternal, for if such motion had a beginning, then we may need to inquire into the origin of motion itself. Aristotle's case for the necessity of perpetual motion is found in  $\Lambda$  6, where he presents a series of arguments in rapid succession:

But it is impossible that movement should either have come into being or cease to be (for it must always have existed), or that time should. For there could not be a before and an after if time did not exist. Movement also is continuous, then, in the sense in which time is; for time is either the same thing as movement or an attribute of movement. And there is no continuous movement except movement in place, and of this only that which is circular is continuous. (1071<sup>b</sup>6-11)

Everything that is moved is moved by another. If motion were to have a beginning, it would need to have a mover to start the motion, which is impossible. Aristotle bases a similar argument on the necessary eternality of time, which, since it is simply the measure of motion, is really an attribute of it. For time to have a beginning, it would need a *temporally* prior cause, and this is absurd, for there can be no before or after when there is no time. Thus, motion and time are eternal.

Motion, however, like the rest of the non-substantial categories, cannot exist apart from moving substances. "For substances are the first of existing things, and if they are all destructible, all things are destructible" (1071<sup>b</sup>5-6). When this is combined with Aristotle's argument for the eternality of motion and time, *modus tollens* does its proper work:

- (1) If all substances are destructible, then motion and time are also destructible.
- (2) Motion and time are not destructible.
- (3) Therefore, not all substances are destructible.

So there must be eternal substances. When we scrutinize the candidates for eternally moving substances, only the heavenly bodies qualify, for their motion is circular, and only circular motion is perfect and continuous.[5]

Yet we've already seen that Aristotle's theory of motion demands that everything that moves must be moved by something else. If the sensible heavenly substances are in eternal motion, they must also be moved by something else. We cannot, however, proceed to infinity like this. For if the mover of the heavenly bodies is also in motion, this will require a further mover, and so on, *ad infinitum*.

There is, then, something which is always moved with an unceasing motion, which is motion in a circle; and this is plain not in theory only but in fact. Therefore the first heaven must be eternal. There is therefore also something which moves it. And since that which is moved and moves is intermediate, there is something which moves without being moved, being eternal . . . (1072<sup>a</sup>20-25)

This is no small conclusion, for Aristotle has taken his study of nature beyond the realm of physics and into "another science." Since the purpose of God in the discussion is to account for substance and motion, Aristotle's theology must be squarely based on the physical conclusions of  $\Lambda$ . Further, if he is to avoid vagueness and to show that he has a coherent concept, he must describe the nature of the unmoved mover. Finally, unless Aristotle can adequately explain how this unmovable substance causes motion in other beings, his doctrine will fall victim to the same criticisms leveled against Plato's Forms.

Fully aware of the task before him, Aristotle returns to his notion of act and potency and finds that the unmoved mover "must be actuality" (1071<sup>b</sup>23). Having the capability of moving things is different from actually moving them, but we have already seen that motion is eternal and necessary. "But if there is something which is capable of moving things or acting on them, but is not actually doing so, there will not necessarily be movement; for that which has a potency need not exercise it" (1071<sup>b</sup>12-14). Additionally, as Aristotle has maintained, potency cannot actualize itself; change is wrought by something that is already in

act, but the unmoved mover does not change. Therefore, the eternal and necessary motion of the heavens requires an eternal and necessary mover that is pure act.[6]

Matter always involves potentiality, and it is perhaps for this reason that Aristotle argues that an unmoved mover “must be without matter” (1071<sup>a</sup>21). That the unmoved mover is incorporeal fits nicely with the idea that its essence is actuality, or pure form. It is also “without parts and indivisible” (1073<sup>a</sup>6), as well as unextended. Indivisibility would seem to follow if it is unextended, but Aristotle’s argument for the latter is problematic.[7] We could, however, be charitable and grant that a substance without matter must be unextended (and hence indivisible).

Aristotle also concludes, based on the incorporeality of the unmoved mover, that it must be one in number: “But all things that are many in number have matter . . . But the primary essence has not matter; for it is complete reality. So the unmovable first mover is one both in definition and in number” (1074<sup>a</sup>34-37).[8]

Aristotle supports this claim at the end of *Λ* 10 by arguing that the oneness of things in the world—soul and body, etc.—is to be attributed to the oneness of the world’s first cause. The universe is obviously “of the nature of a whole,” which we would not see if there were a multitude of first causes.[9]

The orderly nature of the universe also gives Aristotle evidence to conclude that the first cause is supremely good:[10]

We must consider also in which of two ways the nature of the universe contains the good and the highest good, whether as something separate and by itself, or as the order of the parts. Probably in both ways, as an army does; for its good is found both in its order and in its leader, and more in the latter; for he does not depend on the order but it depends on him. And all things are ordered together somehow, but not all alike—both fishes and fowls and plants; and the world is not such that one thing has nothing to do with another, but they are connected. For all are ordered together to one end . . . (1075<sup>a</sup>12-19)

Just as we would attribute a good army to a good general, so also we must attribute the order and perfection of the heavens to the goodness of God.[11] “[I]n all things the good is in the highest degree a principle” (1075<sup>a</sup>37), but the ultimate good is found in God, which, as Aristotle has already argued, is the source of cosmic unity. Moreover, given Aristotle’s doctrine of act and potency, we find that those who hold beauty and goodness to be effects rather than characteristics of the first mover are in error:

Those who suppose, as the Pythagoreans and Speusippus do, that supreme beauty and goodness are not present in the beginning, because the beginnings both of plants and of animals are causes, but beauty and completeness are in the effects of these, are wrong in their opinion. For the seed comes from other individuals which are prior and complete, and the first thing is not the seed but the complete being. (1072<sup>b</sup>30-36)

The elements of Aristotle’s theology we have covered thus far have been based, to some extent, on his physics. Two final elements—the method by which God moves the heavens and the divine activity—are more difficult to accept in a discussion about physical causes. The purpose of introducing the unmoved mover into the conversation was to account for eternal motion, yet Aristotle’s methodology constrains him to find his principles by abstracting them from the natural world. We know that the motion of the stars must have a cause, and that, if we are to avoid an infinite regress, this cause must be unmoved. What do we find in nature that is analogous to this sort of causation? *Desire*.

“And the object of desire and the object of thought move in this way; they move without being moved” (1072<sup>a</sup>26-27). This mode of causation, of course, requires two things. First, the prime mover must be an object of desire. That is, something must really long for it. Second, the outer sphere of the cosmos must be an object which desires the prime mover. It is difficult to fathom how the unmoved mover, as an unchanging, unextended, separate thing, could be an object of desire for something in the universe. But it is even more difficult to think of the cosmos as being capable of desire. Since God is ultimate good, we might grant that such a God could be an object of desire. Yet to suggest that the outermost sphere of the universe

in some way desires God, and that this desire causes eternal, circular motion seems almost as worthy of reproach as Plato's theory of Forms.

Nevertheless, Aristotle has stayed his course. His theory of motion demanded an unmoved mover, and he went to nature to understand how such causation could take place. Living things desire and think of what is good: "The primary objects of desire and of thought are the same. For the apparent good is the object of appetite, and the real good is the primary object of rational wish" (1072<sup>a</sup>27-28). And the cosmos, as an ordered, organic unity in eternal motion, is a living thing.

Aristotle is no less perplexing when he discusses the activity of the unmoved mover. In contrast to the static world of Platonic Forms, Aristotle's first cause must be active, for "if there is something which is capable of moving things or acting on them, but is not actually doing so, there will not necessarily be movement" (1071<sup>b</sup>12-13). But movement is eternal and necessary, so the first mover is eternally active. Two lines of reason help Aristotle converge on the particular activity of the deity. First, its activity must be thoroughly immaterial in nature, one completely independent of body. This rules out most types of activity, including forms of thought that rely on sense perception (since this depends on body). Rational thought, however, is both immaterial and independent of any body. Hence, if we are to develop our theology based on our observation of nature, rational thought seems to be the only candidate for the divine activity.

Second, if the unmoved mover is supremely good, its activity must be supremely good, for the unmoved mover, as pure act, simply *is* its activity. And since "the first in any class is always best, or analogous to the best" (1072<sup>a</sup>36), God's activity must be best of all. But what is the best of all activities? Drawing on his ethical reflections, Aristotle concludes that it is contemplation. Rational thought, or thinking for its own sake, is the most blessed and pleasurable activity for man, "the most divine of things observed by us" (1074<sup>b</sup>16). Because our theology is to be based on what we find in nature, rational thought again seems to be the obvious choice for divine act.

Thought must have an object, however, and some thoughts aren't worth thinking. If the first mover is to be the best of all things, its thought must reflect this. It cannot think of anything outside itself, because thought seeks what is best, and nothing can be better than God. Thus, the divine thought must be thought about God. But God, for Aristotle, is simply the unalterable activity of thinking, so the divine act must be thinking about thinking:

For both thinking and the act of thought will belong even to one who thinks of the worst thing in the world, so that if this ought to be avoided (and it ought, for there are even some things which it is better not to see than to see), the act of thinking cannot be the best of things. Therefore it must be of itself that the divine thought thinks (since it is the most excellent of things), and its thinking is a thinking on thinking. (1074<sup>b</sup>30-34)[12]

This activity, far from being an extravagant and curious addition to Aristotle's theology, turns out to be crucial for his cosmology. For it solves an apparent contradiction between two of his earlier conclusions, namely, that God is both unchanging and eternally active. Activity implies some sort of change in God, but if the divine act is the eternal contemplation of a changeless being, there will be no change in God. In addition, the rationality of the first mover helps account for the order of the cosmos. For it is not simply motion that we observe, but rational motion. The living sphere of the stars moves in this rational manner because it imitates the rational activity of God.[13] Thus, Aristotle's account explains not only the eternal motion of the heavens, but also the order we see in the cosmos.

As we have already outlined the first half of  $\Lambda$ , we may summarize chapters 6-10 as follows:

- (1) The natural philosopher must account for substance and motion.
- (2) Motion is eternal, for (a) a beginning of motion would require a moving cause, which is impossible, and (b) a beginning of time would require a cause before time, which is impossible.
- (3) Since motion is motion of substances, there are eternal substances.
- (4) These eternal substances are the heavenly bodies, which rotate in circular motion.

- (5) Everything moved is moved by another.
- (6) Since the heavenly bodies move, they must be moved by something else.
- (7) This cannot proceed to infinity, so there must be a first mover.
- (8) This mover is (a) unmoved (otherwise it would require a mover), (b) eternal (or it would be preceded by the eternal substances), (c) purely actual (since potentiality wouldn't give necessary motion), (d) changeless (for motion never ceases), (e) imperishable (since it is changeless), (f) incorporeal (because matter implies potentiality), (g) unextended (because it is incorporeal), (h) indivisible (since it is unextended), (i) one in number (since things can only be differentiated due to their matter), (j) good (for it is the source of goodness in the heavens).
- (9) The unmoved mover moves everything else by being an intentional object.
- (10) Since thought about changeable substances would imply change in the unmoved mover, the divine contemplation is "thinking about thinking."
- (11) "We say therefore that God is a living being, eternal, most good, so that life and duration continuous and eternal belong to God; for this *is* God" (1072<sup>b</sup>27-29).

All things considered, this is a remarkable explanation when we ponder the tremendous task faced by Aristotle. Though a few items are difficult to accept (in any age), it is important to note that Aristotle's cosmology is internally coherent and therefore "a possible account of the matter" (1072<sup>a</sup>18). All that remains is to see whether it lines up with the evidence acquired through two thousand years of scientific investigation (an undertaking to which Aristotle would give wholehearted assent).

## ***II. The Cosmic Patriot in the Copernican Revolution***

Aristotle's cosmology satisfied much of the world for a good portion of human history. Were it not for the fact that all men by nature desire to know, his cosmology might have been intact today. But alas, philosophers and scientists strive after knowledge infinite, though most of the knowledge gleaned has no practical value. Take Newton, for instance. Sir Isaac didn't solve many of the world's problems by discovering the equation for gravity or by formulating his laws of motion. Nonetheless, he was one of a long chain of figures bent on making poor Aristotle look foolish. Apples don't fall from trees because of some desire in the apples' earthy parts for a place at the center of the universe. Instead, apples fall to the ground for the same reason planets orbit the sun—gravity.

True, gravitational attraction bears an uncanny resemblance to the desire of one thing for another, but it doesn't require anything like a prime mover (unless we call the force itself the prime mover, but this would be *too* generous[14]). Aristotle's claim that everything that moves must be moved by another is tenable then, but, as Newton showed, attraction is reciprocal.[15] Thus, even if we call the universe an organic whole, everything is moving everything else. There is no *first* mover.

This, of course, solves the twin difficulties of how divine contemplation could be a "thinking on thinking" and how the unmoved mover, as an object of desire, could move the cosmos. If there's no first cause, we don't need to understand its activity, and talk of its beauty and goodness now seems empty. Neither does there seem to be anything changeless or purely actual anywhere in the observable universe, which should make us wonder when Heraclitus will return to haunt us. Since there is no first mover, there's no reason to wonder how an unmoved object could move other things. We may therefore take desire out of the heavenly spheres and place it where it belongs—in the sphere of living things, where Aristotle found it in the first place.

But it gets worse for Aristotle. Not only is there no first mover to rotate the stellar sphere by being its object of desire, but there isn't even a fixed outer sphere of stars. Hubble, upon finding that the light from distant galaxies is a little more red than it should be, realized that the universe is expanding. The outer sphere, which supposedly held the stars and marked the extent of the cosmos, has thus turned out to be mere fiction. The universe has no fixed limit, and so there is nothing to desire the unmoved mover.

Nor have the stars turned out to be eternal substances, a fact that wipes out one of Aristotle's two kinds of sensible substance. While we can easily understand why an ancient philosopher would see the stars as part

of a rational cosmos, we moderns learned long ago that stars are nothing more than fiery balls of hydrogen. To be sure, these balls of hot gas last much longer than plants or animals, but this makes them no less perishable. They follow the laws of nature, not the motion of an animate sphere, and we certainly wouldn't say that they are alive in any meaningful sense of the word.

There isn't much of Aristotle's cosmology left, but what there is has also been destroyed. The humble Copernicus found that it's much easier to make a calendar work if the only thing traveling around the earth is the moon. And even that isn't really circular, as Kepler, in spite of his loyalty to Aristotle's perfect circular motion, was forced to admit. The orbits of the planets, like that of the moon, are elliptical (an argument for perfect elliptical motion is still forthcoming), and the earth itself has just such an orbit.

Even some of the most logically compelling arguments of Aristotle are now known to be unsound. For instance, once Hubble had proclaimed that the universe is expanding, it took only moments for others to argue that, if the universe is expanding, it must have been smaller in the past. It follows that the universe can be traced back to a point of infinite density. From this singularity came everything that exists. Substance, then—all substance—did have a beginning, as did motion, some eighteen billion years ago. There is nothing eternal.

Hence, far from finding ourselves in Aristotle's cozy little universe, organized like a household with each member serving its purpose, we find that we are hurtling through space, and a very large space at that. The earth is a mere speck in our runt of a galaxy, and it would be difficult to even imagine how the entire universe, though all its parts are related, could be unified for any purpose at all. Shakespeare was correct:

Life's but a walking shadow, a poor player  
That struts and frets his hour upon the stage,  
And then is heard no more; it is a tale  
Told by an idiot, full of sound and fury,  
Signifying nothing.[16]

Thus, while Aristotle remained faithful to the cosmos for most of his philosophic career, the cosmos has been most unfaithful in return. Both time and motion had a beginning at the Big Bang, and nature's laws took over shortly thereafter. Of Aristotle's three types of substance—perishable, eternally moving, and unmoved—only the one that was directly before his eyes can be said to exist. His world picture was flawed in almost every way, not to mention a burden and a hindrance to scientific researchers such as Galileo and Descartes. *Metaphysics* Λ, then, would seem to be nothing more than an interesting relic in the halls of ancient science and philosophy, completely irrelevant apart from its place in history. After an eternity of contemplation, the unmoved mover can finally sleep the eternal sleep.

### *III. The Cosmic Patriot in the Age of Superstrings*

To sleep, perchance to dream. It is an interesting feature of modernity that her children are selective in their skepticism. That is, when an Aristotelian comes along with an argument for an unmoved mover, the modern scoffs and says, "It's a pity the old boy didn't have a telescope." Yet when a scientist states as a brute fact that the universe came from nothing, by nothing, the modern nods in assent and says, "Thank heaven we finally understand it all." [17]

Aristotle's cosmology was wrong, for it was based, to a large extent, on insufficient data. Yet some of his observations were quite basic and sufficient in themselves, so the philosophical principles extracted from these must give us pause. Indeed, there is much in *Metaphysics* Λ that is salvageable, even compelling. Aristotle may have even given us enough to make an argument for a first cause of the universe. But let us see what remains after his encounter with modern science.

First, Aristotle's belief that the natural philosopher must explain substance remains fundamental to the discussion, for one who takes the natural world for granted will never understand it. Two of the most obvious facts about our world is that there are particular substances and that they undergo change. Any coherent cosmology must, at minimum, account for these facts.

Second, the distinction between the two types of being—being in act and being in potency—remains a reasonable aid to our understanding how there can be real things even when there is change. That the causes of substance are form, privation, and matter is also a realistic explanation. While Aristotle’s concept of matter differs slightly from the modern scientific idea of matter (i.e. matter = the elements found on the Periodic Table), this presents no problems for the Aristotelian.

Third, the notion that whatever moves (or changes) is moved (or changed) by another still holds, whether causation occurs through direct contact or through forces active between objects. Though a theoretical physicist would likely add a string of theoretical qualifications, no one doubts that we live in a cosmos governed by causal relations. Change (the “incomplete actualization of the potential”), then, requires the activity of an external mover.

Fourth, empty mathematical abstractions aside, an infinite regress of movers is impossible. Since a potential mover can only move another if its potentiality is actualized by something prior to its actualization, to go on forever like this would yield a great deal of potentiality but nothing actual. Hence, explanations must come to an end at some point, and this point we call a first cause.[18]

Along with these four principles of Aristotelian philosophy, we need something from modern science to replace the outmoded science of the *Metaphysics*. The only facts that need be drawn from the science of our day are (1) that the universe originated in a tremendous explosion of energy and (2) that this was also the origin of space, time, energy, and matter. Consider the following descriptions of the Big Bang:

Space and time were created in that event and so was all the matter in the universe. It is not meaningful to ask what happened before the Big Bang; it is like asking what is north of the North Pole. Similarly it is not sensible to ask where the Big Bang took place. The point-universe was not an object isolated in space; it was the entire universe, and so the only answer can be that the Big Bang happened everywhere.[19]

The most startling feature of the scientific theory is the suggestion that space itself was created in the big bang, and not merely matter. . . . The first instant of the big bang, where space was infinitely shrunken, represents a boundary or edge in time at which space ceases to exist. . . . Space is inextricably linked to time, and as space stretches and shrinks, so does time. Just as the big bang represents the creation of space, so it represents the creation of time. Neither space nor time can be extended back through the initial singularity. Crudely speaking, time itself began at the big bang.[20]

The first passage calls the singularity a “point-universe,” and says that it “was the entire universe.” This is remarkably close to saying that the singularity was the universe in potency, and that the Big Bang was the actualization of this potency. But what was it that actualized this potency? Surely something must have done it. As Aristotle points out, potentiality isn’t enough, for things could be *capable* of existing without ever actually existing:

Yet there is a difficulty; for it is thought that everything that acts is able to act, but that not everything that is able to act acts, so that the potency is prior. But if this is so, nothing that is need be; for it is possible for all things to be capable of existing but not yet to exist. (1071<sup>b</sup>23-26)

One could take this a step further by adding Aristotle’s claim that a potentiality isn’t a potentiality for any and every thing. Rather, different things have different potentialities, and we can judge from what is actualized what there was in potency:

One might raise the question from what sort of non-being generation proceeds; for ‘non-being’ has three senses. If, then, one form of non-being exists potentially, still it is not by virtue of a potentiality for any and every thing, but different things come from different things; nor is it satisfactory to say that ‘all things were together’; for they differ in their

matter, since otherwise why did an infinity of things come to be, and not one thing? For 'reason' is one, so that if matter also were one, that must have come to be in actuality which the matter was in potency. (1069<sup>b</sup>27-33)[21]

In other words, the singularity wasn't potentially everything. It was our universe in potency. All of the elements that now make up our cosmos were once in potency in that primal singularity. But where did the singularity come from? One could argue that the singularity itself must have been created, but this isn't necessary for our argument. For we can assume whatever we choose about the singularity—e.g. that it was created, that it was always there, that it was timeless, etc. The important point is that it was a potential universe that *became* an actual universe. It couldn't have actualized itself, for then it would be both mover and the recipient of motion. Therefore, it must have been actualized by something external to it.

Yet, until the singularity was actualized, there was no space, time, or matter. Accordingly, this first mover must be unextended, timeless, and immaterial. Both Ockham and Aristotle would agree that this cause must be one, for one is enough to account for the actualization of the potentiality, and only one cosmos, with universal laws, resulted from the change.

Although this account retains some of Aristotle's principles while remaining consistent with his loyalty to observation, it isn't without difficulties. Aristotle's God (as well as the God of classical theism) is unchangeable. But actualizing what was originally only potential would seem to be a change. Also, this God, at least at the moment of creation, apparently played an active role in the world. This has a dramatic impact on Aristotle's theology. A God which creates the universe can't be a God engaged in perpetual self-contemplation. Here we must recall Aristotle's preference for extracting his principles from what he observed in the natural world. The only principle in nature that could explain an act of direct creation is *choice*. Based on this argument, we would conclude that God must have a will.

An additional difficulty with this explanation comes from Aristotle himself. How can there be 'before' and 'after' when there was no time? Interestingly, Aristotle's principles offer a more satisfying solution to this problem than we find in other versions of the cosmological argument. On Aristotle's view, we don't need to talk about what happened before the Big Bang. Rather, we simply need the actualization of a potentiality at the moment of the Big Bang. Hence, instead of saying that there was a cause (God's act) and then an effect (the Big Bang), Aristotle's concept of causation allows us to posit the cause as simultaneous with the effect. This is still difficult to grasp, but we need only make the claim that God was active in the actualization of the potential universe, and that we can't speak about what happened before that actualization, for that act was the very beginning of time.

To outline our argument for a first cause based on contemporary science and Aristotelian principles:

- (1) The universe had a beginning at the Big Bang.
- (2) This was the origin of matter, space, and time.
- (3) The universe must have gone from being in potency to being in actuality.
- (4) Potency cannot actualize itself.
- (5) Therefore, there must have been a first mover.
- (6) The first mover must be incorporeal, timeless, one.
- (7) It must also have a will.

The alternative to this account is that the singularity actualized itself, which leads to all sorts of difficulties. It would mean that potentialities can self-actualize and that the same thing can be both mover and moved. Also, if the singularity was capable of actualizing itself, what caused it to actualize *that* capability? Here we are on the verge of an infinite regress. Further, this view would suggest that there should never have been a singularity, for if the singularity had always been capable of actualizing itself, it should never have been potential. It would have been pure act, which it couldn't be if it was ever a singularity.

### *Assessment*

The greatest problem of the Aristotelian system was that it worked. It worked so well that people refused to abandon it when faced with alternate systems. Their stubborn allegiance to a cosmology that had served them so well aroused the anger of some who were less sympathetic. With all the passion of soldiers storming an ogre's castle, the moderns attacked the stronghold of Aristotle. Yet perhaps they should have considered that there was a reason the ogre was so strong. Some of his principles were completely reasonable.

We are often too hasty in dismissing arguments. A problem in a cumulative case, even a number of problems, doesn't mean that each and every conclusion is wrong, or that the case, as a whole, is feeble. Although *Metaphysics* Λ is filled with the cutting-edge science of the fourth-century BC, not all of its science is wrong. Neither are all of its principles inextricably linked to outdated science. As we have seen, Λ can be used to make the same case Aristotle made more than two thousand years ago: "And since that which is moved and moves is intermediate, there is something which moves without being moved, being eternal, substance, and actuality (1072<sup>a</sup>24-25).

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**Notes:**

[1] G.K. Chesterton used the term "cosmic patriot" to describe a person with a proper balance of optimism and pessimism; such a person sees the problems in the world and tries to fix them, but remains loyal to the cosmos nonetheless. Aristotle is a philosophical version of the cosmic patriot. He sees the difficulties inherent in developing a coherent account of nature, yet he remains faithful to the cosmos in seeking his principles from within, not without.

[2] Cf. 185<sup>a</sup>13-14: "We physicists, on the other hand, must take for granted that the things that exist by nature are, either all or some of them, in motion—which is indeed made plain by induction." Consider also 254<sup>a</sup>35-<sup>b</sup>1: "We have sufficient ground for rejecting all these theories in the single fact that we see some things that are sometimes in motion and sometimes at rest."

[3] Self-movement would require the same thing, in the same sense, to be both mover and that which is moved. But this would mean that the thing is in both potency and act at the same time, and this is impossible. For Aristotle's full refutation of the idea of a self-mover, see *Physics* VIII:5.

[4] Cf. 257<sup>b</sup>6-10: "Moreover, we have established the fact that it is the movable that is moved; and this is potentially, not actually, in motion, but the potential is in process to actuality, and motion is an incomplete actuality of the movable. The mover on the other hand is already in activity: e.g. it is that which is hot that produces heat: in fact, that which produces the form is always something that possesses it."

[5] Aristotle had explained in 261<sup>a</sup>27-<sup>b</sup>3 that "no other than locomotion can be continuous," since every other motion is between opposites, and "for the changing thing the contraries will be states of rest." Changes other than the circular motion of the heavenly bodies, then, will involve periods of rest; thus, substances capable of generation/corruption, increase/diminution, alteration, and rectilinear motion cannot be substances in eternal motion.

[6] One may wonder how something can be both active *and* utterly unchanging. The answer is found in the nature of God's activity (see below).

[7] "It has been shown also that this substance cannot have any magnitude, but is without parts and indivisible (for it produces movement through infinite time, but nothing finite has infinite power; and, while every magnitude is either infinite or finite, it cannot, for the above reason, have finite magnitude, and it cannot have infinite magnitude because there is no infinite magnitude at all" (1073<sup>a</sup>5-11). The difficulty

lies (I think) in attributing infinite power to the unmoved mover. If Aristotle were treating it as a proximate rather than a remote efficient cause, we could attribute infinite power to the first cause, since it would be moving the universe eternally by its own might. But the God of the *Metaphysics* moves things indirectly, through no effort of its own.

[8] Oddly enough, this argument occurs in  $\Lambda$  8, where Aristotle argues for a plurality of unmoved movers. I have omitted the arguments from the rest of this chapter because they seem to be secondary both to  $\Lambda$  as a whole and to Aristotle's cosmology in general.

[9] The idea of multiple first movers also offends Aristotle's sense of economy. Why posit many causes if one cause can account for motion?

[10] Politis notes that "this is not moral goodness, but rather the goodness of things in so far as they are rational and intelligible, i.e. in so far as they are subject to explanation. For the ultimate cause of change is the ultimate and most basic explanatory principle, and this is why it is supremely good" (Vasilis Politis, *Aristotle and the Metaphysics* [London: Routledge, 2004] p. 279).

[11] Not in the sense of the design argument, however. For Aristotle, God does not produce order by forging anything (as with Plato's Demiurge). Rather, the order of the stars is eternal, and it is based on their eternal desire for God's goodness.

[12] Aristotle argues in *De Anima* that "in the case of objects which involve no matter, what thinks and what is thought are identical; for speculative knowledge and its object are identical" (430<sup>a</sup>3-4).

[13] The rational activity of the heavenly spheres is different from that of God because they are material in nature. Note, however, that such imitation sounds incredibly Platonic. For more on this, see Politis, pp. 286-288.

[14] Even if we allowed a force to qualify as a being (which wouldn't be entirely different from calling an unextended, immaterial actuality a "being"), gravity isn't the only force governing the universe: the strong and weak nuclear forces and the electromagnetic force also play a role. Avid Aristotelians still searching for an unmoved mover may need to wait for a general theory of everything.

[15] Aristotle rejects reciprocal causation among the parts of a whole in his discussion of self-movers (*Physics* VIII:5). His third argument against this sort of movement is that, since motion is eternal, "there should be some movent that is either unmoved or moved by itself" (257<sup>b</sup>23-24).

[16] *Macbeth*, Act V, Scene V.

[17] Guthrie laments that Aristotle "has sometimes been treated not altogether fairly by critics whose minds work *logikōs*, trying to satisfy arguments at the expense of the phenomena" (W.K.C. Guthrie, *A History of Greek Philosophy Volume VI—Aristotle: An Encounter* [Cambridge: Cambridge University Press, 1981], p. 267).

[18] I'm referring here to a *temporal* regress, which isn't what Aristotle had in mind, but which is easier to defend given a beginning of the universe.

[19] J. R. Gott, J. E. Gunn, D. N. Schramm, B. M. Tinsley, "Will the Universe Expand Forever?" in *Scientific American* (March, 1976), p. 65.

[20] Paul Davies, *God and the New Physics* (New York: Touchstone, 1983), p. 18.

[21] Aristotle identifies the three senses of 'non-being' in  $N$  2: "But since 'non-being' taken in its various cases has as many senses as there are categories, and besides this the false is said not to be, and so is the potential, it is from this that generation proceeds, man from that which is not man but potentially man, and

white from that which is not white but potentially white, and this whether it is some one thing that is generated or many" (1089<sup>a</sup>26-31).