

# Book I

## Beginnings

### Chapter 1

184a Since, in all pursuits in which there are sources or causes or elements, it is by way of our acquaintance with these that knowing and understanding come to us (for we regard ourselves as knowing each thing whenever we are acquainted with its first causes and first beginnings, even down to its elements), it is clear that also for the knowledge of nature one must first try to mark out what pertains to its sources. On the other hand, the natural road is from what is more familiar and clearer to us to what is clearer and better known by nature; for it is not the same things that are well known to us and well known simply. For 20 this reason it is necessary to lead ourselves forward in this way: from what is *less* clear by nature but clearer *to us* to what is clearer and better known by nature. But the things that are first evident and clear to us are more-so the ones that are jumbled together, but later the elements and beginnings become known to those who separate them out from these. Thus it is necessary to proceed from what is general to what is particular, for it is the whole that is better known by perceiving, and what is general is a kind of whole since it embraces many 184b things as though they were parts. Something of this same kind happens also with names in relation to their meanings, for a name too signifies some whole indistinctly, such as a circle, but the definition takes it apart into particulars. Children too at first address all men as father and women as mother, but later distinguish each of them.

### Chapter 2

It is necessary that there be either one original being or more than one, and if one, either motionless, as Parmenides and Melissus say, or in motion, as the writers about nature say, some claiming that air is the first source, others that it is water. But if there are 20 more than one, they are either finite or infinite, and if finite but more than

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one, either two or three or four or some other number, or if infinite, either in such a way as Democritus says, one in kind but unlimited in shape, or differing in kind and even opposite. And they make a similar inquiry who inquire how many beings there are, for of those first things out of which beings are constituted, they inquire whether they are one or many, finite or infinite, so they are inquiring whether the original and elementary being is one or many.

185a Now to consider whether being is one and motionless is not to be examining nature. For just as it no longer belongs to the geometer to give an account to someone who rejects his starting points, but either to a different science or to one common to all knowledge, so is it with the one considering origins. For it is not any longer an origin if it is one only and there is therefore only one thing, for the origin is of something or some things. So to consider whether there is thus one thing is like discussing any other thesis whatever of people who argue for the sake of argument (such as the Heraclitean thesis,<sup>o</sup> or if someone should say that being is one man), or like resolving a debater's argument, which is exactly 10 what both arguments are, those, namely, of Melissus and Parmenides. For they take up things that are false, and their accounts are illogically put together. That of Melissus is more crude, and presents no impasse: once one is given one absurd thing<sup>o</sup> the rest follow, and this is in no way difficult. But for us, let it be assumed that the things that are by nature, either all or some of them, are in motion, which is obvious from examples. Nor, at the same time, is it appropriate to resolve all errors, but only as many as someone falsely concludes, demonstrating from first principles, and not those that are not of that kind; for instance, the squaring by means of segments belongs to the geometer to refute, but that of Antiphon<sup>o</sup> does not belong to the geometer. But even though they do not speak about nature, they 20 incidentally speak of things that are impassive in the study of nature. It is perhaps just as well to discuss them a little bit, for the examination is a philosophic one.

The starting point most appropriate of all, since being is meant in more than one way, is in what sense they mean it who say that everything is one. Is it that everything is an independent thing, or a so-much, or an of-this-kind, and in turn, what one thing is everything? Is it, say, one human being or one horse or one soul, or is this rather one of-this-kind, such as white or hot or something else of the

sort? For all these things differ greatly, and each is impossible to claim. For if it were to be *both* an independent thing *and* an of-this-kind and so-much, and these either loosened from one another or not, beings would be many; but if everything is an of-this-kind or a so-much, then whether there is or 30 is not an independent thing, it is absurd, if one may call the impossible absurd. For none of the other senses of being is separate, other than thinghood, since everything is attributed to thinghood as what underlies it. But Melissus says that being is infinite. Therefore being is a so-much, since the infinite is in the genus of how much, while for an independent thing 185b or a quality or a being-acted-upon to be infinite is not possible except incidentally, if at the same time some of them might also be so-much. For the articulation of the infinite makes use of the so-much, but not of thinghood nor of-this-kind. If, then, it is both an independent thing and a so-much, being is two and not one; but if it is an independent thing only, it is not infinite, nor will it have any magnitude, for then it would be a so-much.

Further, since also *one* itself is meant in more than one way, just as is being, one must examine in what way they mean that the whole is one. And what is said to be one is either the continuous or the indivisible or those things of which the articulation of what it is for 10 them to be is one and the same, such as mead and wine. Accordingly, if it is continuous, the one is many, for the continuous is infinitely divisible. (But there is an impasse about the part and the whole, though perhaps it does not connect with the argument but is just by itself: whether the part and the whole are one or more than one, and in what way one or more, and if more, in what way more, even about the parts of what is not continuous. And if each part is one with the whole as indivisible from it, the parts would also be one with one another.) But if it is one as indivisible, nothing would be either so-much or of-this-kind, and being would be neither infinite, as Melissus says, nor finite, as Parmenides does, since a limit 20 may be indivisible but not what is limited. But if all beings are one in meaning, like a robe and a cloak, they turn out to be asserting the Heraclitean account; for being-good and being-bad would be the same thing, and being-good and being-not-good—so that what is good and what is not good would be the same thing, as would a human being and a horse, and their account would not be about the being-one of all things but about the being-nothing of all things.

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Even being of such-and-such a kind and being so-much in size would be the same.

And even the later ancient thinkers were disturbed that the same thing might become both one and many for them. For this reason some abolished "is," such as Lycophron, and 30 others restructured the language so that a human being "has whitened" rather than "is white" and "walks" rather than "is walking," in order not to make the one be many by attaching "is," as though *one* or *being* were meant in only one way. But beings are many either in meaning (as being-pale and being-educated are different, though the same thing is both, and thus the 186a one is many) or by division, as with the whole and its parts. In this respect they were already at an impasse, and they granted that the one is many—as though it were not admissible for the same thing to be both one and many when these are not opposites, since there is what is one potentially or fully at work.

Chapters 3 and 4 are detailed discussions of the errors of Melissus, Parmenides, and Anaxagoras, using the vocabularies of those thinkers. Their content is unnecessary to Aristotle's own argument, which resumes in Chapter 5. Chapters 3 and 4 are omitted here, but are placed in the Appendix.

## Chapter 5

Everyone makes contraries the original beings: those who say that the whole 20 is one and not moved (for even Parmenides makes hot and cold original beings, though he calls them fire and earth), and those who make them rare and dense, and Democritus the full and void, of which he says that the former is as being and the latter as non-being. He also says that things are by means of position, shape, and arrangement, but these are classes to which contraries belong: to position, up and down, before and behind, to shape, pointed and without corners, straight and round. That, then, everyone makes the original beings in some way contraries is clear, and reasonably so. For the original beings must not be dependent on one another nor on anything else, and all things must be dependent on them, 30 but this belongs to the first contraries: since they are

first they are not dependent on anything else, and since they are contraries they are not dependent on one another.

But it is necessary to examine how this follows also from reasoning. But it must be understood first about all beings that none either acts by nature at random or is acted upon by any random thing, nor does anything at all come into being by chance from any chance thing, unless one takes what happens incidentally. For how could white come into being from something educated if the educated were not incidental to something non-white or 188b black? Rather, white comes into being from what is not white, and not from every non-white thing but from the black or what is in-between, and educated from what is not educated, though not from every such thing but from the uneducated, or from something between the two if there is any. Nor is a thing transformed by destruction into the first chance thing, the white, say, into the educated, except when it happens incidentally, but the white is transformed by destruction into the non-white, and not into a random non-white thing but into something black or in-between, and in the same way the educated is transformed by destruction into the not-educated, and not into a random one but into the uneducated, or something between the two if there is any. And this is the case similarly with 10 other things, since also the things that are not simple but composite are in accord with the same account, but this result escapes our notice since there is no name for what is arranged in an opposite way. For necessarily everything concordant comes into being from what is discordant, and the discordant from what is concordant, and the concordant is transformed by destruction into the discordant, and this not any random one but one that is opposite. And it makes no difference whether one speaks of concord or order or composition, for obviously the same account holds. But surely also a house or a statue or anything else whatever comes into being in the same way: the house comes from what is not put together but from these things separated in this way, and the statue or any shaped 20 thing from the shapeless. And each of these things is in some respects a certain order and in others a certain composition. So if this is true, everything that comes into being would come from and everything that is destroyed be destroyed into either its opposite or what is between them. But the in-between things are derived from their opposites, as colors from white and black. So all things that come

into being by nature either are opposites or are derived from opposites.

Up to this point, most of the others have been following along closely together, just as we said before. For all of them say that the elements and the things they call original *30* beings are contraries, and even though they lay it down without argument, they say it nonetheless, as though compelled by the truth itself. But they differ from one another in that some take hold of things that are more primary, others things that are more derivative, some of things that are better known by reason, others things that are better known by sense perception. (For some set down as causes of coming into being the hot and the cold, others the wet and the dry, and others the odd and the even or strife and friendship, and these differ from one another in the way that was said.) So they say things that are in a certain way the same as one another, but also different: different in just the way they seem to be *189a* to most people, but the same to the extent that they are analogous. For they take things that belong to the same series of corresponding things, since some of the contraries contain other ones. In this way what they say is the same and different, as well as better and worse, and some speak of what is better known by reason, others, as was said before, of what is better known by sense perception. (For what is general is known by reason, but what belongs to each thing is known by sense perception, since reason is of the general but sense perception of the particular.) For example, the great and the small belong to reason, but the rare and the dense belong to sense perception. *10* That, then, the starting points must be contraries, is clear.

## Chapter 6

The next thing would be whether the starting points are two or three or more. They cannot be one, because contraries are not one, nor infinite, because what is would not be knowable, in addition to which there is one kind of oppositeness in any one genus, and thinghood is one particular genus, plus the fact that it is possible that things are derived from a finite number of sources, and it is better to trace them to a finite number, as Empedocles does, than to an infinite number. For he thinks he has accounted for everything every bit as much as

Anaxagoras does from infinitely many. Moreover, there are some contraries that are more primary than others, and others that come into being from one another, such as sweet and bitter or white and black, but it is necessary that the starting points always remain what they are.

*20* That, then, they are neither one nor infinite, is clear from these things, and since they are limited in number, not to make them two only has a certain reasonableness. For one would be at an impasse about how density could be of such a nature as to do anything to rarity or it to density. And it is similar with any of the other oppositions whatever; for friendship does not bring strife together or make anything out of it, nor strife out of it, but both act on some other, third thing. And some assume even more things, out of which they construct the nature of things. But on top of these things one might produce this further impasse if someone were not to set down some nature different from the contraries, since *30* of no thing do we see the contraries constitute what it is, but the starting point should not be predicated of any underlying thing, for it would be a source of the source. For the underlying thing is a source, and seems to be prior to that which is predicated of it.

Further, we say that one independent thing is not contrary to another independent thing; how then could an independent thing be derived from what are not independent *189b* things, or how could something that is not an independent thing be prior to an independent thing? Therefore, if one were to regard as being true both the earlier argument and this one, it is necessary, if one is going to preserve them both, to set down some third thing, as those assert who say that the whole is some one nature such as water or fire or something between these. But the in-between seems better, for fire and earth and air and water are already entangled with oppositions. Not unreasonably then do those who make the underlying thing different from these do so, or do those who make it one of them make it air. For air least of them has sensible differences, and water next. But everybody decks out *10* this one thing with contraries, with density and rarity or with more and less. And plainly these are in general exceeding and falling short, as was said before. And this opinion seems to be an ancient one, that the one and exceeding and falling short are the sources of things, but not in the same way, but the older thinkers say that the two act and the one is acted upon, but

some of the later ones say rather the reverse, that the one acts and the two are acted upon.

To say that the elements are three, based on these and other such things, would seem to the one who examines it to have some reason, as we said, but it is no longer reasonable to say they 20 are more than three. As for being acted upon, one thing is sufficient, and if among four things there were two oppositions, there would need to be present, separate from each pair, some other nature between them; and if the oppositions, though they are two, could have come into being from one another, one of them would be superfluous. At the same time, it is impossible that there be a greater number of first oppositions. For thinghood is one particular kind of being, so the starting points could only differ from one another in being more primary or more derivative, but not in kind. For always in one genus there is one opposition, and all oppositions seem to lead back into one. That, then, there is neither one element, nor more than two or three, is clear; but which of these is so, as we said, is a great impasse.

## Chapter 7

30 On this point, let us, making an approach, speak first about all becoming, for it is a natural thing that, after speaking first about what is common, one examines in that way what is peculiar to each thing. For we say one thing comes into being from another or something from something different when we are speaking either of simple things or composite ones. I mean this in this way. For either a human being becomes educated, or 190a the not-educated becomes educated, or the not-educated human being becomes an educated human being. By a simple thing that becomes something, I mean the human being or the not-educated, and by a simple thing that it becomes, the educated; but both what it becomes and the thing that becomes it are composite when we say the not-educated human being becomes an educated human being. Of one sort of these things, it is said not only that this thing comes into being, but also that it does so from that thing, as from the not-educated the educated, but this is not said in every case; for not from a human being did he become 10 educated, but a human being became educated. And of

things that come into being in the way that we say simple things do, one sort becomes something while persisting, but another sort while not persisting; for the human being persists when he becomes educated and is still a human being, but the not-educated or the uneducated persist neither simply nor in composition.

Now that these things have been distinguished, from all coming into being there is this to be grasped, if one looks over it as we recommend: that something must always underlie the coming into being, and even though this is one in number, in form it is not one, and by "in form" I mean the same thing as in articulation. For it is not the same thing to be a human being and to be uneducated. And one thing persists but another does not persist; what is 20 not opposite persists (for the human being persists), but the not-educated or uneducated does not persist, nor what is composed of both, such as the uneducated human being. That something comes from something, rather than something becomes something, is said in the case of what does not persist, as the educated comes from the uneducated, but not from a human being; but even in the case of things that persist it is sometimes said that way. For we say a statue comes from bronze, not that the bronze becomes a statue. But what is from a non-persisting opposite is said in both ways, both from this comes that and this becomes that: for both from the uneducated comes the educated, and the uneducated becomes 30 educated. Hence it is also thus with the composite, for it is said both that from the uneducated human being comes the educated and that the uneducated human being becomes educated.

But becoming is meant in more than one way, and of some things it is meant not that it comes into being but that this thing becomes something else, but to come into being simply is meant only of independent things, while in the other cases it is clear that something must underlie what becomes. (For it belongs to some underlying thing that it becomes so-much or of-this-kind or in relation to something else or somewhere, because only thinghood 190b is not predicated of something else which underlies it, but all the other [ways of being] are predicated of an independent thing.) But that independent things too, as well as whatever else simply is, come into being from some underlying thing, would become clear to those who examine them. For always there is something that underlies, out of which the thing comes into being, as do plants and animals

from seed. And of the things that come into being simply, some come into being by change of shape, as does a statue, some by addition, such as growing things, some by subtraction, as does Hermes out of the stone, some by putting together, such as a house, and some by alteration, as do things that turn into something else on account of their material. All the things that come into being in these 10 ways obviously come from underlying things. So it is clear from what has been said that everything that comes into being is always composite: there is something that comes into being and there is something that becomes this, and this latter in two senses, either what underlies or what is opposite. I mean that the uneducated is opposite, and the human being underlies, and what is shapeless or formless or disordered is an opposite, but bronze or stone or gold an underlying thing.

It is clear then that if there are causes and sources of the things that are by nature, 20 from which first things they are and have come to be not incidentally but what each is said to be in virtue of its thinghood, then everything comes to be out of something underlying and form. For the educated human being is composed in some way out of human being and educated, since you could take it apart into the articulations of those things. It is clear then that what comes into being would come from these things. But while the underlying thing is one in number, it is two in kind (since the human being or the gold or in general the material is manifold, for it is primarily a *this*, and while it is not incidental that the thing that comes into being comes from it, still the deprivation or opposition is incidental to it). But the form is one, such as the order or the education or any of the other things that are predicated in this way. 30 Hence there is a way in which one must say that the starting points are two, and another in which they are three; and there is a way in which they are contraries, as if one were to speak of the educated and uneducated, or the hot and cold, or the concordant and discordant, but another in which they are not, since it is impossible for contraries to be acted upon by one another. But this also is resolved by the underlying thing's being something different, for this is not a contrary. So the starting points are in a certain way not more than the contraries, but two in number in this way of speaking, but neither are they altogether two on account 191a of the being different from them of the underlying thing, but three. For

being a human being is different from being uneducated, and being shapeless from being bronze.

How many are the starting points of the things involved in natural coming into being, and in what way they are so many, has been said, and it is clear that something must underlie the contraries and the contraries must be two. But in another way this is not necessary, for it would be sufficient if one of the contraries were to bring about the change by its absence and presence. And the underlying nature is knowable through analogy. For 10 as bronze is to a statue or wood to a bed or as the formless is before taking on its form, in relation to any of the other things that have form, so is this nature, in relation to an independent thing or a *this* or a being. This then is one starting point (though it is not one thing, nor is it at all in the same way as a *this*), and one starting point is the articulation that belongs to it, and further there is what is contrary to this, its deprivation. That these are somehow two and somehow more, was said above. It was said first that only the contraries were starting points, but later that something must also underlie them and that they must be three; but from what is being said now, it is clear what the difference between the contraries is, how the 20 starting points stand toward one another, and what the underlying thing is. But whether the thinghood of the thing is the form or what underlies it, is not yet clear. But that the starting points are three, and in what way three, and what their character is, is clear. So how many and what the starting points are have been brought into view by these means.

## Chapter 8

After these things, let us explain that only in this way is the impasse to which the ancients came gotten past. For those who first inquired in a philosophic way into the truth and the nature of things got lost, as though they had been pushed aside into some other road by inexperience, and they say that none of the beings either comes into being or is destroyed, since it is necessary that what comes into being come either out of what is or 30 out of what is not, and out of both of these it cannot come; for a being would not come into being (since it already is), and from what is not, nothing could come into being, since *something* must underlie it. And building up the

result successively in this way, they say that there are not even many things, but only being itself.

So they took hold of this opinion through what has been said. But we say that for something to come into being out of what is or what is not, or for what is not or what is to do something or be acted upon or become anything whatever to which one might point, is *191b* in one way no different than for a doctor to do something or be acted upon or be or become something out of being a doctor; so since this is meant in two ways, clearly so too is "from what is" or "what is acts or is acted upon." Now the doctor builds a house not as a doctor but as a housebuilder, and turns pale not as a doctor but as swarthy; but he heals or becomes a failure at healing as a doctor. But since we say most properly that a doctor does or suffers something or becomes something from a doctor when as a doctor he suffers or does or becomes these things, it is clear that also "this comes into being from what is not" *10* means what is not insofar as it is not. They left out this very thing, not having distinguished it, and on account of this mistake they made so great an additional mistake as to believe that nothing comes into being or is anything else, but rather to abolish all becoming. Now we and they say that nothing comes into being simply from what is not, but surely in some way a thing comes into being from what is not, for example incidentally. (For from its deprivation, which in virtue of itself is something that is not, and which does not continue to be present, something comes into being; but this is wondered at, and it seems impossible that something thus comes from what is not.) But likewise, neither does a thing come into being from what *is*, nor does what is come into being, except incidentally. But in this way *20* what is does come into being, in the same way as if animal were to come from animal or a certain animal from a certain animal, for example, if a dog were to come into being from a dog or a horse from a horse. For not only would the dog come into being from a certain animal, but also from animal, though not as animal, since this is still present. But if something is going to become an animal *not* incidentally, it will not be from an animal, and if something is going to become a being in this way, it will not be from a being. Nor will it be from what is not, for it was said that for us "from what is not" means insofar as it is not. Moreover, we do not abolish everything's either being or not being.

This then is one way to go, but another is that it is possible to

mean these things in *30* respect to potency as well as to their being-at-work, but this distinction has been made in other places with more precision. So (as we said), the impassables are dissolved on account of which they were compelled to abolish some of the things mentioned; for on account of this they formerly detoured so much from the road to coming into being and passing away, and change in general. For this nature having been perceived, their entire mistake would have dissolved.

## Chapter 9

There are some others<sup>o</sup> who have touched on it, but not sufficiently. For, *192a* first of all, they allow something to come into being simply out of what is not, on which point Parmenides speaks rightly; second, it seems to them that if something is one in number, it is also only one in potency. But this is very different. For we say that material and deprivation are different things, and of these the one is a non-being incidentally, namely the material, while the deprivation is so in its own right, and the one, the material, is almost, and in a certain respect is, an independent thing, which the other is not at all. But they make the non-being the great and the small alike, either both together or each separately. *10* So this triad and that one are of completely different characters. For they advanced as far as this, that there must be some underlying nature, but they make this one; for even if someone makes it a dyad, calling it great and small, nonetheless he makes them the same, for he overlooks the other nature. For the nature that persists is a co-cause with the form of the things that come into being, like a mother, while the other portion of the opposition might often be slandered as not being at all by one who fixes his thinking sternly upon it as upon a criminal. But since there is something divine and good and sovereign, we say that there is something opposite to it, and something else which inherently yearns for and *20* stretches out toward it by its own nature. For them, it follows that the contrary yearns for its own destruction. However, it is not possible either for the form to long for itself, since it is not defective, or for its contrary to long for it (since contraries are destructive of one another), but it is the material that does this, as does



the female for the male or the ugly for the beautiful, except that in its own right it is neither ugly nor female, except incidentally.

There is a sense in which the material passes away and comes into being, and there is a sense in which it does not. As that in which a thing is, the material does in its own right suffer destruction (for that which is destroyed is in it, namely the deprivation), but as what is by way of potency, it does not in its own right suffer destruction, but is itself necessarily indestructible 30 and ungenerable. For if it were to come into being, there would have to be something underlying it, present all along, out of which it first came to be; but this is the nature itself of which we are speaking, so it would be before it came to be. (For by material I mean what first underlies each thing, out of which something comes into being, which is present all along, but not incidentally.) And if it were destroyed, it would arrive at this condition last, and so, before being destroyed [in its own right], it would have been destroyed [as a deprivation].

About the starting point in the sense of form, whether it is one or many and what it 192b or they is or are, it is the work of first philosophy<sup>o</sup> to mark out with precision, so let it be set aside until that occasion. But we will speak of the forms of natural and destructible things in the elucidations that follow.

That, then, there are starting points, and what they are, and how many in number, let it have been marked out in this way for us, but starting over from another starting place, let us speak in a different way.

### Commentary on Book I

The pre-Socratic philosophers speculated about nature, and they began at the beginning, with the ultimate beings that originate and govern all things. Aristotle begins the *Physics* with the reflection that, while the highest causes are the things that come first simply, a knowledge of them does not come first for us. Early modern philosophers, from the time of Descartes, as well as the most ancient Greek thinkers, attempted to secure all knowledge by reasoning only from the ultimate sources of things. Aristotle understands philosophy as inquiry in quest of those sources, which cannot help starting from where we find ourselves, with a general sense of how

things are and an array of better and worse opinions.

The first book of each of Aristotle's inquiries reviews the opinions of previous thinkers. A prominent opinion of a respected thinker will contain either some valuable kernel of truth or some interesting error, and in either case it will point the inquiry in a direction. In Book I of the *Physics*, the most interesting error is the teaching of Parmenides that "all is one," since in denying manyness and, consequently, all motion and change, that teaching abolishes nature itself. Aristotle compares it to the claim of Antiphon, that, when reciting linear polygons of increasing numbers of sides are successively inscribed in a circle, one of them must eventually equal the area of the circle. Unlike the mistake of Hippocrates of Chios, who did find the areas of some curvilinear segments, and thought wrongly that he had found that of the circle, Antiphon's error is not within geometry at all but prior to it and blocking the way to it. Parmenides, seeking the permanent being behind the appearances of change, went so far that he left no way to reason back to nature. In its extremism, the Parmenidean thesis merges with its opposite, the claim of Heraclitus that "everything is in flux and nothing stays what it is," since both opinions collapse all distinctions. The refutation of Parmenides is primarily in the *Metaphysics*, where Aristotle shows that being is meant in more than one way, and even *one* must be understood in more than one sense. Here, at the end of Chapter 2, Aristotle points out that it is no contradiction to say that the same thing both is and is not, and is both one and many, in senses in which those attributes are not opposites, and thus he sufficiently secures the possibility of nature as a topic of inquiry.

Two of the most difficult and technical chapters in all Aristotle's works follow, with detailed refutations of various opinions of Parmenides, Melissus, and Anaxagoras. Melissus was a defender of Parmenides, but he was a shallow thinker. The "one absurd thing" (185a, 12) from which he reasons is the claim that whatever is everlasting must be infinite in size. Anaxagoras is chosen as asserting the opposite of the Parmenidean claim, by making the ultimate beings infinite in number. Aristotle's own argument resumes in Chapter 5, steering a middle course between these errors. It takes the form of a general analysis of change. Any change presupposes opposites, since no change is ever a random replacement of one condition by another; only the not-white can become white, and only