ON GENERATION AND CORRUPTION

Aristotle

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Book I

1

OUR next task is to study coming-to-be and passing-away. We are to distinguish the causes, and to state the definitions, of these processes considered in general-as changes predicable uniformly of all the things that come-to-be and pass-away by nature. Further, we are to study growth and ‘alteration’. We must inquire what each of them is; and whether ‘alteration’ is to be identified with coming-to-be, or whether to these different names there correspond two separate processes with distinct natures.

On this question, indeed, the early philosophers are divided. Some of them assert that the so-called ‘unqualified coming-to-be’ is ‘alteration’, while others maintain that ‘alteration’ and coming-to-be are distinct. For those who say that the universe is one something (i.e. those who generate all things out of one thing) are bound to assert that coming-to-be is ‘alteration’, and that whatever ‘comes-to-be’ in the proper sense of the term is ‘being altered’: but those who make the matter of things more than one must distinguish coming-to-be from ‘alteration’. To this latter class belong Empedocles, Anaxagoras, and Leucippus. And yet Anaxagoras himself failed to understand his own utterance. He says, at all events, that coming-to-be and passing-away are the same as ‘being altered’:’ yet, in common with other thinkers, he affirms that the elements are many. Thus Empedocles holds that the corporeal elements are four, while all the elements-including those which initiate movement-are six in number; whereas Anaxagoras agrees with Leucippus and Democritus that the elements are infinite.

(Anaxagoras posits as elements the ‘homoeomeries’, viz. bone, flesh, marrow, and everything else which is such that part and whole are the same in name and nature; while Democritus and Leucippus say that there are indivisible bodies, infinite both in number and in the varieties of their shapes, of which everything else is composed-the compounds differing one from another according to the shapes, ‘positions’, and ‘groupings’ of their constituents.) For the views of the school of Anaxagoras seem diametrically opposed to those of the followers of Empedocles. Empedocles says that Fire, Water, Air, and Earth are four elements, and are thus ‘simple’ rather than flesh, bone, and bodies which, like these, are ‘homoeomeries’. But the followers of Anaxagoras regard the ‘homoeomeries’ as ‘simple’ and elements, whilst they affirm that Earth, Fire, Water, and Air are composite; for each of these is (according to them) a ‘common seminary’ of all the ‘homoeomeries’.

Those, then, who construct all things out of a single element, must maintain that coming-tobe and passing-away are ‘alteration’.

For they must affirm that the underlying something always remains identical and one;

and change of such a substratum is what we call ‘altering’ Those, on the other hand, who make the ultimate kinds of things more than one, must maintain that ‘alteration’ is distinct from coming-to-be: for coming-to-be and passingaway result from the consilience and the dissolution of the many kinds. That is why Empedocles too uses language to this effect, when he says ‘There is no coming-to-be of anything, but only a mingling and a divorce of what has been mingled’. Thus it is clear (i) that to describe coming-to-be and passing-away in these terms is in accordance with their fundamental assumption, and (ii) that they do in fact so describe them: nevertheless, they too must recognize ‘alteration’ as a fact distinct from coming to-be, though it is impossible for them to do so consistently with what they say.

That we are right in this criticism is easy to perceive. For ‘alteration’ is a fact of observation. While the substance of the thing remains unchanged, we see it ‘altering’ just as we see in it the changes of magnitude called ‘growth’ and ‘diminution’. Nevertheless, the statements of those who posit more ‘original reals’ than one make ‘alteration’ impossible. For ‘alteration, as we assert, takes place in respect to certain qualities: and these qualities (I mean, e.g. hot-cold, white-black, dry-moist, soft-hard, and so forth) are, all of them, differences characterizing the ‘elements’. The actual words of Empedocles may be quoted in illustration-

The sun everywhere bright to see, and hot, The rain everywhere dark and cold;

and he distinctively characterizes his remaining elements in a similar manner. Since, therefore, it is not possible for Fire to become Water, or Water to become Earth, neither will it be possible for anything white to become black, or anything soft to become hard; and the same argument applies to all the other qualities. Yet this is what ‘alteration’ essentially is.

It follows, as an obvious corollary, that a single matter must always be assumed as underlying the contrary ‘poles’ of any change whether change of place, or growth and diminution, or ‘alteration’; further, that the being of this matter and the being of ‘alteration’ stand and fall together. For if the change is ‘alteration’, then the substratum is a single element; i.e. all things which admit of change into one another have a single matter. And, conversely, if the substratum of the changing things is one, there is ‘alteration’.

Empedocles, indeed, seems to contradict his own statements as well as the observed facts. For he denies that any one of his elements comes-to-be out of any other, insisting on the contrary that they are the things out of which everything else comes-to-be; and yet (having brought the entirety of existing things, except Strife, together into one) he maintains, simultaneously with this denial, that each thing once more comes-to-be out of the One. Hence it was clearly out of a One that this came-to-be Water, and that Fire, various portions of it being separated off by certain characteristic differences or qualities-as indeed he calls the sun ‘white and hot’, and the earth ‘heavy and hard’. If, therefore, these characteristic differences be taken away (for they can be taken away, since they came-to-be), it will clearly be inevitable for Earth to come to-be out of Water and Water out of Earth, and for each of the other elements to undergo a similar transformation-not only then, but also now-if, and because, they change their qualities. And, to judge by what he says, the qualities are such that they can be ‘attached’ to things and can again be ‘separated’ from them, especially since Strife and Love are still fighting with one another for the mastery. It was owing to this same conflict that the elements were generated from a One at the former period. I say ‘generated’, for presumably Fire, Earth, and Water had no distinctive existence at all while merged in one.

There is another obscurity in the theory Empedocles. Are we to regard the One as his

‘original real’? Or is it the Many-i.e. Fire and Earth, and the bodies co-ordinate with these? For the One is an ‘element’ in so far as it underlies the process as matter-as that out of which Earth and Fire come-to-be through a change of qualities due to ‘the motion’. On the other hand, in so far as the One results from composition (by a consilience of the Many), whereas they result from disintegration the Many are more ‘elementary’ than the One, and prior to it in their nature.

2

We have therefore to discuss the whole subject of ‘unqualified’ coming-to-be and passingaway; we have to inquire whether these changes do or do not occur and, if they occur, to explain the precise conditions of their occurrence. We must also discuss the remaining forms of change, viz. growth and ‘alteration’. For though, no doubt, Plato investigated the conditions under which things come-to-be and pass-away, he confined his inquiry to these changes; and he discussed not all coming-to-be, but only that of the elements. He asked no questions as to how flesh or bones, or any of the other similar compound things, come-to-be; nor again did he examine the conditions under which ‘alteration’ or growth are attributable to things.

A similar criticism applies to all our predecessors with the single exception of Democritus. Not one of them penetrated below the surface or made a thorough examination of a single one of the problems. Democritus, however, does seem not only to have thought carefully about all the problems, but also to be distinguished from the outset by his method. For, as we are saying, none of the other philosophers made any definite statement about growth, except such as any amateur might have made. They said that things grow ‘by the accession of like to like’, but they did not proceed to explain the manner of this accession. Nor did they give any account of ‘combination’: and they neglected almost every single one of the remaining problems, offering no explanation, e.g. of ‘action’ or ‘passion’ how in physical actions one thing acts and the other undergoes action. Democritus and Leucippus, however, postulate the ‘figures’, and make ‘alteration’ and coming-to-be result from them.

They explain coming-to-be and passing-away by their ‘dissociation’ and ‘association’, but ‘alteration’ by their ‘grouping’ and ‘Position’.

And since they thought that the ‘truth lay in the appearance, and the appearances are conflicting and infinitely many, they made the ‘figures’ infinite in number. Hence-owing to the changes of the compound-the same thing seems different and conflicting to different people: it is ‘transposed’ by a small additional ingredient, and appears utterly other by the ‘transposition’ of a single constituent. For Tragedy and Comedy are both composed of the same letters.

Since almost all our predecessors think (i) that coming-to-be is distinct from ‘alteration’, and (ii) that, whereas things ‘alter’ by change of their qualities, it is by ‘association’ and ‘dissociation’ that they come-to-be and pass-away, we must concentrate our attention on these theses. For they lead to many perplexing and well-grounded dilemmas. If, on the one hand, coming-to-be is ‘association’, many impossible consequences result: and yet there are other arguments, not easy to unravel, which force the conclusion upon us that coming-to-be cannot possibly be anything else. If, on the other hand, coming-to-be is not ‘association’, either there is no such thing as coming-to-be at all or it is ‘alteration’: or else we must endeavour to unravel this dilemma too-and a stubborn one we shall find it. The fundamental question, in dealing with all these difficulties, is this: ‘Do things come-to-be and “alter” and grow, and undergo the contrary changes, because the primary “reals” are indivisible magnitudes? Or is no magnitude indivisible?’ For the answer we give to this

question makes the greatest difference. And again, if the primary ‘reals’ are indivisible magnitudes, are these bodies, as Democritus and Leucippus maintain? Or are they planes, as is asserted in the Timaeus? To resolve bodies into planes and no further-this, as we have also remarked elsewhere, in itself a paradox. Hence there is more to be said for the view that there are indivisible bodies. Yet even these involve much of paradox. Still, as we have said, it is possible to construct ‘alteration’ and coming-to-be with them, if one ‘transposes’ the same by ‘turning’ and ‘intercontact’, and by ‘the varieties of the figures’, as Democritus does. (His denial of the reality of colour is a corollary from this position: for, according to him, things get coloured by ‘turning’ of the ‘figures’.) But the possibility of such a construction no longer exists for those who divide bodies into planes.

For nothing except solids results from putting planes together: they do not even attempt to generate any quality from them.

Lack of experience diminishes our power of taking a comprehensive view of the admitted facts. Hence those who dwell in intimate association with nature and its phenomena grow more and more able to formulate, as the foundations of their theories, principles such as to admit of a wide and coherent development: while those whom devotion to abstract discussions has rendered unobservant of the facts are too ready to dogmatize on the basis of a few observations. The rival treatments of the subject now before us will serve to illustrate how great is the difference between a ‘scientific’ and a ‘dialectical’ method of inquiry. For, whereas the Platonists argue that there must be atomic magnitudes ‘because otherwise “The Triangle” will be more than one’, Democritus would appear to have been convinced by arguments appropriate to the subject, i.e. drawn from the science of nature. Our meaning will become clear as we proceed. For to suppose that a body (i.e. a magnitude) is divisible through and through, and that this division is possible, involves a difficulty. What will there be in the body which escapes the division? If it is divisible through and through, and if this division is possible, then it might be, at one and the same moment, divided through and through, even though the dividings had not been effected simultaneously: and the actual occurrence of this result would involve no impossibility. Hence the same principle will apply whenever a body is by nature divisible through and through, whether by bisection, or generally by any method whatever: nothing impossible will have resulted if it has actually been divided-not even if it has been divided into innumerable parts, themselves divided innumerable times. Nothing impossible will have resulted, though perhaps nobody in fact could so divide it.

Since, therefore, the be dy is divisible through and through, let it have been divided. What, then, will remain? A magnitude? No: that is impossible, since then there will be something not divided, whereas ex hypothesis the body was divisible through and through. But if it be admitted that neither a body nor a magnitude will remain, and yet division is to take place, the constituents of the body will either be points (i.e. without magnitude) or absolutely nothing. If its constituents are nothings, then it might both come-to-be out of nothings and exist as a composite of nothings: and thus presumably the whole body will be nothing but an appearance. But if it consists of points, a similar absurdity will result: it will not possess any magnitude. For when the points were in contact and coincided to form a single magnitude, they did not make the whole any bigger (since, when the body was divided into two or more parts, the whole was not a bit smaller or bigger than it was before the division): hence, even if all the points be put together, they will not make any magnitude.

But suppose that, as the body is being divided, a minute section-a piece of sawdust, as it were-is extracted, and that in this sense-a body ‘comes away’ from the magnitude, evading the division. Even then the same argument applies. For in what sense is that

section divisible? But if what ‘came away’ was not a body but a separable form or quality, and if the magnitude is ‘points or contacts thus qualified’: it is paradoxical that a magnitude should consist of elements, which are not magnitudes. Moreover, where will the points be? And are they motionless or moving? And every contact is always a contact of two somethings, i.e. there is always something besides the contact or the division or the point.

These, then, are the difficulties resulting from the supposition that any and every body, whatever its size, is divisible through and through. There is, besides, this further consideration. If, having divided a piece of wood or anything else, I put it together, it is again equal to what it was, and is one. Clearly this is so, whatever the point at which I cut the wood. The wood, therefore, has been divided potentially through and through. What, then, is there in the wood besides the division? For even if we suppose there is some quality, yet how is the wood dissolved into such constituents and how does it come-to-be out of them? Or how are such constituents separated so as to exist apart from one another? Since, therefore, it is impossible for magnitudes to consist of contacts or points, there must be indivisible bodies and magnitudes. Yet, if we do postulate the latter, we are confronted with equally impossible consequences, which we have examined in other works.’ But we must try to disentangle these perplexities, and must therefore formulate the whole problem over again.

On the one hand, then, it is in no way paradoxical that every perceptible body should be indivisible as well as divisible at any and every point. For the second predicate will at. tach to it potentially, but the first actually. On the other hand, it would seem to be impossible for a body to be, even potentially, divisible at all points simultaneously. For if it were possible, then it might actually occur, with the result, not that the body would simultaneously be actually both (indivisible and divided), but that it would be simultaneously divided at any and every point. Consequently, nothing will remain and the body will have passed-away into what is incorporeal: and so it might come-to-be again either out of points or absolutely out of nothing. And how is that possible? But now it is obvious that a body is in fact divided into separable magnitudes which are smaller at each division-into magnitudes which fall apart from one another and are actually separated. Hence (it is urged) the process of dividing a body part by part is not a ‘breaking up’ which could continue ad infinitum; nor can a body be simultaneously divided at every point, for that is not possible; but there is a limit, beyond which the ‘breaking up’ cannot proceed. The necessary consequence-especially if coming-to-be and passing-away are to take place by ‘association’ and ‘dissociation’ respectively-is that a body must contain atomic magnitudes which are invisible. Such is the argument which is believed to establish the necessity of atomic magnitudes: we must now show that it conceals a faulty inference, and exactly where it conceals it.

For, since point is not ‘immediately-next’ to point, magnitudes are ‘divisible through and through’ in one sense, and yet not in another. When, however, it is admitted that a magnitude is ‘divisible through and through’, it is thought there is a point not only anywhere, but also everywhere, in it: hence it is supposed to follow, from the admission, that the magnitude must be divided away into nothing. For it is supposed-there is a point everywhere within it, so that it consists either of contacts or of points. But it is only in one sense that the magnitude is ‘divisible through and through’, viz. in so far as there is one point anywhere within it and all its points are everywhere within it if you take them singly one by one. But there are not more points than one anywhere within it, for the points are not ‘consecutive’: hence it is not simultaneously ‘divisible through and through’. For if it were, then, if it be divisible at its centre, it will be divisible also at a point ‘immediately-next’ to its centre. But it is not so divisible: for position is not ‘immediately-next’ to position, nor

point to point-in other words, division is not ‘immediately-next’ to division, nor composition to composition.

Hence there are both ‘association’ and ‘dissociation’, though neither (a) into, and out of, atomic magnitudes (for that involves many impossibilities), nor (b) so that division takes place through and through-for this would have resulted only if point had been ‘immediately-next’ to point: but ‘dissociation’ takes place into small (i.e. relatively small) parts, and ‘association’ takes place out of relatively small parts.

It is wrong, however, to suppose, as some assert, that coming-to-be and passing-away in the unqualified and complete sense are distinctively defined by ‘association’ and ‘dissociation’, while the change that takes place in what is continuous is ‘alteration’.

On the contrary, this is where the whole error lies. For unqualified coming-to-be and passing-away are not effected by ‘association’ and ‘dissociation’. They take place when a thing changes, from this to that, as a whole. But the philosophers we are criticizing suppose that all such change is ‘alteration’: whereas in fact there is a difference. For in that which underlies the change there is a factor corresponding to the definition and there is a material factor.

When, then, the change is in these constitutive factors, there will be coming-to-be or passing-away: but when it is in the thing’s qualities, i.e. a change of the thing per accidents, there will be ‘alteration’.

‘Dissociation’ and ‘association’ affect the thing’s susceptibility to passing-away. For if water has first been ‘dissociated’ into smallish drops, air comes-to-be out of it more quickly: while, if drops of water have first been ‘associated’, air comes-to-be more slowly. Our doctrine will become clearer in the sequel.’ Meantime, so much may be taken as established-viz. that coming-to-be cannot be ‘association’, at least not the kind of ‘association’ some philosophers assert it to be.

3

Now that we have established the preceding distinctions, we must first consider whether there is anything which comes-to-be and passes-away in the unqualified sense: or whether nothing comes-to-be in this strict sense, but everything always comes-to-be something and out of something-I mean, e.g. comes-to-be-healthy out of being-ill and ill out of being-healthy, comes-to-be-small out of being big and big out of being-small, and so on in every other instance. For if there is to be coming-to-be without qualification, ‘something’ must-without qualification-’come-to-be out of not-being’, so that it would be true to say that ‘not-being is an attribute of some things’. For qualified coming-to-be is a process out of qualified not-being (e.g. out of not-white or not-beautiful), but unqualified coming-to-be is a process out of unqualified not-being.

Now ‘unqulified’ means either (i) the primary predication within each Category, or (ii) the universal, i.e. the all-comprehensive, predication. Hence, if’unqualified not-being ‘means the negation of ‘being’ in the sense of the primary term of the Category in question, we shall have, in ‘unqualified coming-to-be’, a coming-to-be of a substance out of not-substance. But that which is not a substance or a ‘this’ clearly cannot possess predicates drawn from any of the other Categories either-e.g. we cannot attribute to it any quality, quantity, or position. Otherwise, properties would admit of existence in separation from substances. If, on the other hand, ‘unqualified not-being’ means ‘what is not in any sense at all’, it will be a universal negation of all forms of being, so that what comes-to-be will have to come-to-be out of nothing.

Although we have dealt with these problems at greater length in another work,where we have set forth the difficulties and established the distinguishing definitions, the following concise restatement of our results must here be offered: In one sense things come-to-be out of that which has no ‘being’ without qualification: yet in another sense they come-to-be always out of what is’. For coming-to-be necessarily implies the pre-existence of something which potentially ‘is’, but actually ‘is not’; and this something is spoken of both as ‘being’ and as ‘not-being’.

These distinctions may be taken as established: but even then it is extraordinarily difficult to see how there can be ‘unqualified coming-to-be’ (whether we suppose it to occur out of what potentially ‘is’, or in some other way), and we must recall this problem for further examination. For the question might be raised whether substance (i.e. the ‘this’) comes-to-be at all. Is it not rather the ‘such’, the ‘so great’, or the ‘somewhere’, which comes-to-be? And the same question might be raised about ‘passing-away’ also. For if a substantial thing comes-to-be, it is clear that there will ‘be’ (not actually, but potentially) a substance, out of which its coming-to-be will proceed and into which the thing that is passing-away will necessarily change. Then will any predicate belonging to the remaining Categories attach actually to this presupposed substance? In other words, will that which is only potentially a ‘this’ (which only potentially is), while without the qualification ‘potentially’ it is not a ‘this’ (i.e. is not), possess, e.g. any determinate size or quality or position? For (i) if it possesses none of these determinations actually, but all of them only potentially, the result is first that a being, which is not a determinate being, is capable of separate existence; and in addition that coming-to-be proceeds out of nothing pre-existing-a thesis which, more than any other, preoccupied and alarmed the earliest philosophers. On the other hand (ii) if, although it is not a ‘this somewhat’ or a substance, it is to possess some of the remaining determinations quoted above, then (as we said)’ properties will be separable from substances.

We must therefore concentrate all our powers on the discussion of these difficulties and on the solution of a further question-viz. What is the cause of the perpetuity of coming-to-be? Why is there always unqualified, as well as partial, coming-to-be? Cause’ in this connexion has two senses. It means (i) the source from which, as we say, the process ‘originates’, and (ii) the matter. It is the material cause that we have here to state. For, as to the other cause, we have already explained (in our treatise on Motion that it involves (a) something immovable through all time and (b) something always being moved. And the accurate treatment of the first of these-of the immovable ‘originative source’-belongs to the province of the other, or ‘prior’, philosophy: while as regards ‘that which sets everything else in motion by being itself continuously moved’, we shall have to explain later’ which amongst the so-called ‘specific’ causes exhibits this character. But at present we are to state the material cause-the cause classed under the head of matter-to which it is due that passing-away and coming-to-be never fail to occur in Nature.

For perhaps, if we succeed in clearing up this question, it will simultaneously become clear what account we ought to give of that which perplexed us just now, i.e. of unqualified passingaway and coming-to-be.

Our new question too-viz. ‘what is the cause of the unbroken continuity of coming-to-be?’-is sufficiently perplexing, if in fact what passes-away vanishes into ‘what is not’ and ‘what is not’ is nothing (since ‘what is not’ is neither a thing, nor possessed of a quality or quantity, nor in any place). If, then, some one of the things ‘which are’ constantly disappearing, why has not the whole of ‘what is’ been used up long ago and vanished away assuming of course that the material of all the several comings-to-be was finite? For, presumably, the unfailing continuity of coming-to-be cannot be attributed to the infinity of the

material. That is impossible, for nothing is actually infinite. A thing is infinite only potentially, i.e. the dividing of it can continue indefinitely: so that we should have to suppose there is only one kind of coming-to-be in the world-viz. one which never fails, because it is such that what comes-to-be is on each successive occasion smaller than before. But in fact this is not what we see occurring.

Why, then, is this form of change necessarily ceaseless? Is it because the passing-away of this is a coming-to-be of something else, and the coming-to-be of this a passing-away of something else? The cause implied in this solution must no doubt be considered adequate to account for coming-to-be and passing-away in their general character as they occur in all existing things alike. Yet, if the same process is a coming to-be of this but a passing-away of that, and a passing-away of this but a coming-to-be of that, why are some things said to come-to-be and pass-away without qualification, but others only with a qualification? The distinction must be investigated once more, for it demands some explanation. (It is applied in a twofold manner.) For (i) we say ‘it is now passing-away’ without qualification, and not merely ‘this is passing-away’: and we call this change ‘coming-to-be’, and that ‘passing-away’, without qualification. And (ii) so-and-so ‘comes-to-be-something’, but does not ‘come-to-be’ without qualification; for we say that the student ‘comes-to-be-learned’, not ‘comes-to-be’ without qualification.

(i) Now we often divide terms into those which signify a ‘this somewhat’ and those which do not. And (the first form of) the distinction, which we are investigating, results from a similar division of terms: for it makes a difference into what the changing thing changes. Perhaps, e.g. the passage into Fire is ‘coming-to-be’ unqualified, but ‘passing-away-of-something’ (e.g. Earth): whilst the coming-to-be of Earth is qualified (not unqualified) ‘coming-to-be’, though unqualified ‘passing-away’ (e.g. of Fire). This would be the case on the theory set forth in Parmenides: for he says that the things into which change takes place are two, and he asserts that these two, viz. what is and what is not, are Fire and Earth. Whether we postulate these, or other things of a similar kind, makes no difference. For we are trying to discover not what undergoes these changes, but what is their characteristic manner. The passage, then, into what ‘is’ not except with a qualification is unqualified passing-away, while the passage into what ‘is’ without qualification is unqualified coming-to-be. Hence whatever the contrasted ‘poles’ of the changes may be whether Fire and Earth, or some other couple-the one of them will be ‘a being’ and the other ‘a not-being’.

We have thus stated one characteristic manner in which unqualified will be distinguished from qualified coming-to-be and passing-away: but they are also distinguished according to the special nature of the material of the changing thing. For a material, whose constitutive differences signify more a ‘this somewhat’, is itself more ‘substantial’ or ‘real’: while a material, whose constitutive differences signify privation, is ‘not real’. (Suppose, e.g. that ‘the hot’ is a positive predication, i.e. a ‘form’, whereas ‘cold’ is a privation, and that Earth and Fire differ from one another by these constitutive differences.) The opinion, however, which most people are inclined to prefer, is that the distinction depends upon the difference between ‘the perceptible’ and ‘the imperceptible’. Thus, when there is a change into perceptible material, people say there is ‘coming-to-be’; but when there is a change into invisible material, they call it ‘passing-away’. For they distinguish ‘what is’ and ‘what is not’ by their perceiving and not-perceiving, just as what is knowable ‘is’ and what is unknowable ‘is not’-perception on their view having the force of knowledge. Hence, just as they deem themselves to live and to ‘be’ in virtue of their perceiving or their capacity to perceive, so too they deem the things to ‘be’ qua perceived or perceptible-and in this they are in a sense on the track of the truth, though what they actually say is not true.

Thus unqualified coming-to-be and passingaway turn out to be different according to common opinion from what they are in truth. For Wind and Air are in truth more real more a ‘this somewhat’ or a ‘form’-than Earth. But they are less real to perception which explains why things are commonly said to ‘pass-away’ without qualification when they change into Wind and Air, and to ‘come-to-be’ when they change into what is tangible, i.e. into Earth.

We have now explained why there is ‘unqualified coming-to-be’ (though it is a passing-away-of-something) and ‘unqualified passingaway (though it is a coming-to-be-of-some-thing). For this distinction of appellation depends upon a difference in the material out of which, and into which, the changes are effected. It depends either upon whether the material is or is not ‘substantial’, or upon whether it is more or less ‘substantial’, or upon whether it is more or less perceptible.

(ii) But why are some things said to ‘come to-be’ without qualification, and others only to ‘come-to-be-so-and-so’, in cases different from the one we have been considering where two things come-to-be reciprocally out of one another? For at present we have explained no more than this:-why, when two things change reciprocally into one another, we do not attribute coming-to-be and passing-away uniformly to them both, although every coming-to-be is a passing-away of something else and every passing-away some other thing’s coming-to-be. But the question subsequently formulated involves a different problem-viz. why, although the learning thing is said to ‘come-to-be-learned’ but not to ‘come-tobe’ without qualification, yet the growing thing is said to ‘come-to-be’.

The distinction here turns upon the difference of the Categories.

For some things signify a this somewhat, others a such, and others a so-much. Those things, then, which do not signify substance, are not said to ‘come-to-be’ without qualification, but only to ‘come-to-be-so-and-so’. Nevertheless, in all changing things alike, we speak of ‘coming-to-be’ when the thing comes-to-be something in one of the two Columns-e.g. in Substance, if it comes-to-be Fire but not if it comes-to-be Earth; and in Quality, if it comes-to-be learned but not when it comes-to-be ignorant.

We have explained why some things come to-be without qualification, but not others both in general, and also when the changing things are substances and nothing else; and we have stated that the substratum is the material cause of the continuous occurrence of coming to-be, because it is such as to change from contrary to contrary and because, in substances, the coming-to-be of one thing is always a passing-away of another, and the passing-away of one thing is always another’s coming-to-be. But there is no need even to discuss the other question we raised-viz. why coming-to-be continues though things are constantly being destroyed. For just as people speak of ‘a passing-away’ without qualification when a thing has passed into what is imperceptible and what in that sense ‘is not’, so also they speak of ‘a coming-to-be out of a not-being’ when a thing emerges from an imperceptible. Whether, therefore, the substratum is or is not something, what comes-tobe emerges out of a ‘not-being’: so that a thing comes-to-be out of a not-being’ just as much as it ‘passes-away into what is not’. Hence it is reasonable enough that coming-to-be should never fail. For coming-to-be is a passing-away of ‘what is not’ and passing-away is a coming to-be of ‘what is not’.

But what about that which ‘is’ not except with a qualification? Is it one of the two contrary poles of the chang-e.g. Earth (i.e. the heavy) a ‘not-being’, but Fire (i.e. the light) a ‘being’? Or, on the contrary, does what is ‘include Earth as well as Fire, whereas what is not’ is matter-the matter of Earth and Fire alike? And again, is the matter of each different? Or is it the same, since otherwise they would not come-to-be reciprocally out of one

another, i.e. contraries out of contraries? For these things-Fire, Earth, Water, Air-are characterized by ‘the contraries’.

Perhaps the solution is that their matter is in one sense the same, but in another sense different. For that which underlies them, whatever its nature may be qua underlying them, is the same: but its actual being is not the same. So much, then, on these topics.

4

Next we must state what the difference is between coming-to-be and ‘alteration’-for we maintain that these changes are distinct from one another.

Since, then, we must distinguish (a) the substratum, and (b) the property whose nature it is to be predicated of the substratum; and since change of each of these occurs; there is ‘alteration’ when the substratum is perceptible and persists, but changes in its own properties, the properties in question being opposed to one another either as contraries or as intermediates. The body, e.g. although persisting as the same body, is now healthy and now ill; and the bronze is now spherical and at another time angular, and yet remains the same bronze. But when nothing perceptible persists in its identity as a substratum, and the thing changes as a whole (when e.g. the seed as a whole is converted into blood, or water into air, or air as a whole into water), such an occurrence is no longer ‘alteration’. It is a coming-to-be of one substance and a passing-away of the other-especially if the change proceeds from an imperceptible something to something perceptible (either to touch or to all the senses), as when water comes-to-be out of, or passes-away into, air: for air is pretty well imperceptible. If, however, in such cases, any property (being one of a pair of contraries) persists, in the thing that has come-to-be, the same as it was in the thing which has passedaway-if, e.g. when water comes-to-be out of air, both are transparent or cold-the second thing, into which the first changes, must not be a property of this persistent identical something.

Otherwise the change will be ‘alteration.’ Suppose, e.g. that the musical man passed-away and an unmusical man came-tobe, and that the man persists as something identical. Now, if ‘musicalness and unmusicalness’ had not been a property essentially inhering in man, these changes would have been a coming-to-be of unmusicalness and a passing-away of musicalness: but in fact ‘musicalness and unmusicalness’ are a property of the persistent identity, viz. man.

(Hence, as regards man, these changes are ‘modifications’; though, as regards musical man and unmusical man, they are a passing-away and a coming-to-be.) Consequently such changes are ‘alteration.’ When the change from contrary to contrary is in quantity, it is ‘growth and diminution’; when it is in place, it is ‘motion’; when it is in property, i.e. in quality, it is ‘alteration’: but, when nothing persists, of which the resultant is a property (or an ‘accident’ in any sense of the term), it is ‘coming-to-be’, and the converse change is ‘passing-away’.

‘Matter’, in the most proper sense of the term, is to be identified with the substratum which is receptive of coming-to-be and passingaway: but the substratum of the remaining kinds of change is also, in a certain sense, ‘matter’, because all these substrata are receptive of ‘contrarieties’ of some kind. So much, then, as an answer to the questions (i) whether coming-to-be ‘is’ or ‘is not’-i.e. what are the precise conditions of its occurrence and (ii) what ‘alteration’ is: but we have still to treat of growth.

5

We must explain (i) wherein growth differs from coming-to-be and from ‘alteration’, and

ii) what is the process of growing and the sprocess of diminishing in each and all of the things that grow and diminish.

Hence our first question is this: Do these changes differ from one another solely because of a difference in their respective ‘spheres’? In other words, do they differ because, while a change from this to that (viz. from potential to actual substance) is coming-to-be, a change in the sphere of magnitude is growth and one in the sphere of quality is ‘alteration’-both growth and ‘alteration’ being changes from what is-potentially to what is-actually magnitude and quality respectively? Or is there also a difference in the manner of the change, since it is evident that, whereas neither what is ‘altering’ nor what is coming-to-be necessarily changes its place, what is growing or diminishing changes its spatial position of necessity, though in a different manner from that in which the moving thing does so? For that which is being moved changes its place as a whole: but the growing thing changes its place like a metal that is being beaten, retaining its position as a whole while its parts change their places. They change their places, but not in the same way as the parts of a revolving globe. For the parts of the globe change their places while the whole continues to occupy an equal place: but the parts of the rowing thing expand over an ever-increasing place and the parts of the diminishing thing contract within an ever-diminishing area.

It is clear, then, that these changes-the changes of that which is coming-to-be, of that which is ‘altering’, and of that which is growing-differ in manner as well as in sphere. But how are we to conceive the ‘sphere’ of the change which is growth and diminution? The sphere’ of growing and diminishing is believed to be magnitude.

Are we to suppose that body and magnitude come-to-be out of something which, though potentially magnitude and body, is actually incorporeal and devoid of magnitude? And since this description may be understood in two different ways, in which of these two ways are we to apply it to the process of growth? Is the matter, out of which growth takes place, (i) ‘separate’ and existing alone by itself, or (ii) ‘separate’ but contained in another body? Perhaps it is impossible for growth to take place in either of these ways. For since the matter is ‘separate’, either (a) it will occupy no place (as if it were a point), or (b) it will be a ‘void’, i.e. a non-perceptible body. But the first of these alternatives is impossible. For since what comes-to-be out of this incorporeal and sizeless something will always be ‘somewhere’, it too must be ‘somewhere’-either intrinsically or indirectly. And the second alternative necessarily implies that the matter is contained in some other body. But if it is to be ‘in’ another body and yet remains ‘separate’ in such a way that it is in no sense a part of that body (neither a part of its substantial being nor an ‘accident’ of it), many impossibilities will result. It is as if we were to suppose that when, e.g. air comes-to-be out of water the process were due not to a change of the but to the matter of the air being ‘contained in’ the water as in a vessel. This is impossible. For (i) there is nothing to prevent an indeterminate number of matters being thus ‘contained in’ the water, so that they might come-to-be actually an indeterminate quantity of air; and (ii) we do not in fact see air coming-to-be out of water in this fashion, viz. withdrawing out of it and leaving it unchanged.

It is therefore better to suppose that in all instances of coming-to-be the matter is inseparable, being numerically identical and one with the ‘containing’ body, though isolable from it by definition. But the same reasons also forbid us to regard the matter, out of which the body comes-to-be, as points or lines. The matter is that of which points and lines are limits, and it is something that can never exist without quality and without form.

Now it is no doubt true, as we have also established elsewhere,’ that one thing

‘comes-tobe’ (in the unqualified sense) out of another thing: and further it is true that the efficient cause of its coming-to-be is either (i) an actual thing (which is the same as the effect either generically-or the efficient cause of the coming-to-be of a hard thing is not a hard thing or specifically, as e.g. fire is the efficient cause of the coming-to-be of fire or one man of the birth of another), or (ii) an actuality. Nevertheless, since there is also a matter out of which corporeal substance itself comes-to-be (corporeal substance, however, already characterized as such-and-such a determinate body, for there is no such thing as body in general), this same matter is also the matter of magnitude and quality-being separable from these matters by definition, but not separable in place unless Qualities are, in their turn, separable.

It is evident, from the preceding development and discussion of difficulties, that growth is not a change out of something which, though potentially a magnitude, actually possesses no magnitude.

For, if it were, the ‘void’ would exist in separation; but we have explained in a former work’ that this is impossible. Moreover, a change of that kind is not peculiarly distinctive of growth, but characterizes coming-to-be as such or in general. For growth is an increase, and diminution is a lessening, of the magnitude which is there already-that, indeed, is why the growing thing must possess some magnitude. Hence growth must not be regarded as a process from a matter without magnitude to an actuality of magnitude: for this would be a body’s coming-to-be rather than its growth.

We must therefore come to closer quarters with the subject of our inquiry. We must grapple’ with it (as it were) from its beginning, and determine the precise character of the growing and diminishing whose causes we are investigating.

It is evident (i) that any and every part of the growing thing has increased, and that similarly in diminution every part has become smaller: also (ii) that a thing grows by the accession, and diminishes by the departure, of something. Hence it must grow by the accession either (a) of something incorporeal or (b) of a body. Now, if (a) it grows by the accession of something incorporeal, there will exist separate a void: but (as we have stated before)’ is impossible for a matter of magnitude to exist ‘separate’. If, on the other hand (b) it grows by the accession of a body, there will be two bodies-that which grows and that which increases it-in the same place: and this too is impossible.

But neither is it open to us to say that growth or diminution occurs in the way in which e.g. air is generated from water. For, although the volume has then become greater, the change will not be growth, but a coming to-be of the one-viz. of that into which the change is taking place-and a passing-away of the contrasted body. It is not a growth of either. Nothing grows in the process; unless indeed there be something common to both things (to that which is coming-to-be and to that which passed-away), e.g. ‘body’, and this grows. The water has not grown, nor has the air: but the former has passed-away and the latter has come-to-be, and-if anything has grown-there has been a growth of ‘body.’ Yet this too is impossible. For our account of growth must preserve the characteristics of that which is growing and diminishing.

And these characteristics are three: (i) any and every part of the growing magnitude is made bigger (e.g. if flesh grows, every particle of the flesh gets bigger), (ii) by the accession of something, and (iii) in such a way that the growing thing is preserved and persists. For whereas a thing does not persist in the processes of unqualified coming-to-be or passing-away, that which grows or ‘alters’ persists in its identity through the ‘altering’ and through the growing or diminishing, though the quality (in ‘alteration’) and the size (in growth) do not remain the same. Now if the generation of air from water is to be regarded

as growth, a thing might grow without the accession (and without the persistence) of anything, and diminish without the departure of anything-and that which grows need not persist. But this characteristic must be preserved: for the growth we are discussing has been assumed to be thus characterized.

One might raise a further difficulty. What is ‘that which grows’? Is it that to which something is added? If, e.g. a man grows in his shin, is it the shin which is greater-but not that ‘whereby’ he grows, viz. not the food? Then why have not both ‘grown’? For when A is added to B, both A and B are greater, as when you mix wine with water; for each ingredient is alike increased in volume. Perhaps the explanation is that the substance of the one remains unchanged, but the substance of the other (viz. of the food) does not. For indeed, even in the mixture of wine and water, it is the prevailing ingredient which is said to have increased in volume. We say, e.g. that the wine has increased, because the whole mixture acts as wine but not as water. A similar principle applies also to ‘alteration’. Flesh is said to have been ‘altered’ if, while its character and substance remain, some one of its essential properties, which was not there before, now qualifies it: on the other hand, that ‘whereby’ it has been ‘altered’ may have undergone no change, though sometimes it too has been affected. The altering agent, however, and the originative source of the process are in the growing thing and in that which is being ‘altered’: for the efficient cause is in these. No doubt the food, which has come in, may sometimes expand as well as the body that has consumed it (that is so, e.g. if, after having come in, a food is converted into wind), but when it has undergone this change it has passedaway: and the efficient cause is not in the food.

We have now developed the difficulties sufficiently and must therefore try to find a solution of the problem. Our solution must preserve intact the three characteristics of growth-that the growing thing persists, that it grows by the accession (and diminishes by the departure) of something, and further that every perceptible particle of it has become either larger or smaller. We must recognize also (a) that the growing body is not ‘void’ and that yet there are not two magnitudes in the same place, and (b) that it does not grow by the accession of something incorporeal.

Two preliminary distinctions will prepare us to grasp the cause of growth. We must note (i) that the organic parts grow by the growth of the tissues (for every organ is composed of these as its constituents); and (ii) that flesh, bone, and every such part-like every other thing which has its form immersed in matter-has a twofold nature: for the form as well as the matter is called ‘flesh’ or ‘bone’.

Now, that any and every part of the tissue qua form should grow-and grow by the accession of something-is possible, but not that any and every part of the tissue qua matter should do so. For we must think of the tissue after the image of flowing water that is measured by one and the same measure: particle after particle comes-to-be, and each successive particle is different. And it is in this sense that the matter of the flesh grows, some flowing out and some flowing in fresh; not in the sense that fresh matter accedes to every particle of it. There is, however, an accession to every part of its figure or ‘form’.

That growth has taken place proportionally, is more manifest in the organic parts-e.g. in the hand. For there the fact that the matter is distinct from the form is more manifest than in flesh, i.e. than in the tissues. That is why there is a greater tendency to suppose that a corpse still possesses flesh and bone than that it still has a hand or an arm.

Hence in one sense it is true that any and every part of the flesh has grown; but in another sense it is false. For there has been an accession to every part of the flesh in respect to its form, but not in respect to its matter. The whole, however, has become larg-

er. And this increase is due (a) on the one hand to the accession of something, which is called ‘food’ and is said to be ‘contrary’ to flesh, but (b) on the other hand to the transformation of this food into the same form as that of flesh as if, e.g. ‘moist’ were to accede to ‘dry’ and, having acceded, were to be transformed and to become ‘dry’. For in one sense ‘Like grows by Like’, but in another sense ‘Unlike grows by Unlike’.

One might discuss what must be the character of that ‘whereby’ a thing grows. Clearly it must be potentially that which is growing-potentially flesh, e.g. if it is flesh that is growing.

Actually, therefore, it must be ‘other’ than the growing thing. This ‘actual other’, then, has passed-away and come-to-be flesh. But it has not been transformed into flesh alone by itself (for that would have been a coming-to-be, not a growth): on the contrary, it is the growing thing which has come-to-be flesh (and grown) by the food. In what way, then, has the food been modified by the growing thing? Perhaps we should say that it has been ‘mixed’ with it, as if one were to pour water into wine and the wine were able to convert the new ingredient into wine. And as fire lays hold of the inflammable, so the active principle of growth, dwelling in the growing thing that which is actually flesh), lays hold of an acceding food which is potentially flesh and converts it into actual flesh. The acceding food, therefore, must be together with the growing thing: for if it were apart from it, the change would be a coming-to-be. For it is possible to produce fire by piling logs on to the already burning fire. That is ‘growth’. But when the logs themselves are set on fire, that is ‘coming-to-be’.

‘Quantum-in-general’ does not come-to-be any more than ‘animal’ which is neither man nor any other of the specific forms of animal: what ‘animal-in-general’ is in coming-to-be, that ‘quantum-in-general’ is in growth. But what does come-to-be in growth is flesh or bone-or a hand or arm (i.e. the tissues of these organic parts). Such things come-to-be, then, by the accession not of quantified-flesh but of a quantified-something. In so far as this acceding food is potentially the double result e.g. is potentially so-much-flesh-it produces growth: for it is bound to become actually both so-much and flesh. But in so far as it is potentially flesh only, it nourishes: for it is thus that ‘nutrition’ and ‘growth’ differ by their definition. That is why a body’s’ nutrition’ continues so long as it is kept alive (even when it is diminishing), though not its ‘growth’; and why nutrition, though ‘the same’ as growth, is yet different from it in its actual being. For in so far as that which accedes is potentially ‘so much-flesh’ it tends to increase flesh: whereas, in so far as it is potentially ‘flesh’ only, it is nourishment.

The form of which we have spoken is a kind of power immersed in matter-a duct, as it were. If, then, a matter accedes-a matter, which is potentially a duct and also potentially possesses determinate quantity the ducts to which it accedes will become bigger. But if it is no longer able to act-if it has been weakened by the continued influx of matter, just as water, continually mixed in greater and greater quantity with wine, in the end makes the wine watery and converts it into water-then it will cause a diminution of the quantum; though still the form persists.

6

(In discussing the causes of coming-tobe) we must first investigate the matter, i.e. the so-called ‘elements’. We must ask whether they really are clements or not, i.e. whether each of them is eternal or whether there is a sense in which they come-to-be: and, if they do come-to-be, whether all of them come-to-be in the same manner reciprocally out of one another, or whether one amongst them is something primary. Hence we must begin by explaining certain preliminary matters, about which the statements now current are

vague.

For all (the pluralist philosophers)- those who generate the ‘elements’ as well as those who generate the bodies that are compounded of the elements- make use of ‘dissociation’ and ‘association’, and of ‘action’ and ‘passion’. Now ‘association’ is ‘combination’; but the precise meaning of the process we call ‘combining’ has not been explained. Again, (all the monists make use of ‘alteration’: but) without an agent and a patient there cannot be ‘altering’ any more than there can be ‘dissociating’ and ‘associating’. For not only those who postulate a plurality of elements employ their reciprocal action and passion to generate the compounds: those who derive things from a single element are equally compelled to introduce ‘acting’. And in this respect Diogenes is right when he argues that ‘unless all things were derived from one, reciprocal action and passion could not have occurred’. The hot thing, e.g. would not be cooled and the cold thing in turn be warmed: for heat and cold do not change reciprocally into one another, but what changes (it is clear) is the substratum. Hence, whenever there is action and passion between two things, that which underlies them must be a single something. No doubt, it is not true to say that all things are of this character: but it is true of all things between which there is reciprocal action and passion.

But if we must investigate ‘action-passion’ and ‘combination’, we must also investigate ‘contact’. For action and passion (in the proper sense of the terms) can only occur between things which are such as to touch one another; nor can things enter into combination at all unless they have come into a certain kind of contact. Hence we must give a definite account of these three things- of ‘contact’, ‘combination’, and ‘acting’.

Let us start as follows. All things which admit of ‘combination’ must be capable of reciprocal contact: and the same is true of any two things, of which one ‘acts’ and the other ‘suffers action’ in the proper sense of the terms. For this reason we must treat of ‘contact’ first. every term which possesses a variety of meaning includes those various meanings either owing to a mere coincidence of language, or owing to a real order of derivation in the different things to which it is applied: but, though this may be taken to hold of ‘contact’ as of all such terms, it is nevertheless true that contact’ in the proper sense applies only to things which have ‘position’. And ‘position’ belongs only to those things which also have a Place’: for in so far as we attribute ‘contact’ to the mathematical things, we must also attribute ‘place’ to them, whether they exist in separation or in some other fashion. Assuming, therefore, that ‘to touch’ is-as we have defined it in a previous work’-’to have the extremes together’, only those things will touch one another which, being separate magnitudes and possessing position, have their extremes ‘together’. And since position belongs only to those things which also have a ‘place’, while the primary differentiation of ‘place’ is the above’ and ‘the below’ (and the similar pairs of opposites), all things which touch one another will have ‘weight’ or ‘lightness’ either both these qualities or one or the other of them. But bodies which are heavy or light are such as to ‘act’ and ‘suffer action’. Hence it is clear that those things are by nature such as to touch one another, which (being separate magnitudes) have their extremes ‘together’ and are able to move, and be moved by, one another.

The manner in which the ‘mover’ moves the moved’ not always the same: on the contrary, whereas one kind of ‘mover’ can only impart motion by being itself moved, another kind can do so though remaining itself unmoved. Clearly therefore we must recognize a corresponding variety in speaking of the ‘acting’ thing too: for the ‘mover’ is said to ‘act’ (in a sense) and the ‘acting’ thing to ‘impart motion’. Nevertheless there is a difference and we must draw a distinction. For not every ‘mover’ can ‘act’, if (a) the term ‘agent’ is to be used in contrast to ‘patient’ and (b) ‘patient’ is to be applied only to those things whose

motion is a ‘qualitative affection’-i.e. a quality, like white’ or ‘hot’, in respect to which they are moved’ only in the sense that they are ‘altered’: on the contrary, to ‘impart motion’ is a wider term than to ‘act’. Still, so much, at any rate, is clear: the things which are ‘such as to impart motion’, if that description be interpreted in one sense, will touch the things which are ‘such as to be moved by them’-while they will not touch them, if the description be interpreted in a different sense. But the disjunctive definition of ‘touching’ must include and distinguish (a) ‘contact in general’ as the relation between two things which, having position, are such that one is able to impart motion and the other to be moved, and (b) ‘reciprocal contact’ as the relation between two things, one able to impart motion and the other able to be moved in such a way that ‘action and passion’ are predicable of them.

As a rule, no doubt, if A touches B, B touches A. For indeed practically all the ‘movers’ within our ordinary experience impart motion by being moved: in their case, what touches inevitably must, and also evidently does, touch something which reciprocally touches it. Yet, if A moves B, it is possible-as we sometimes express it-for A ‘merely to touch’ B, and that which touches need not touch a something which touches it. Nevertheless it is commonly supposed that ‘touching’ must be reciprocal. The reason of this belief is that ‘movers’ which belong to the same kind as the ‘moved’ impart motion by being moved.

Hence if anything imparts motion without itself being moved, it may touch the ‘moved’ and yet itself be touched by nothing-for we say sometimes that the man who grieves us ‘touches’ us, but not that we ‘touch’ him.

The account just given may serve to distinguish and define the ‘contact’ which occurs in the things of Nature.

7

Next in order we must discuss ‘action’ and ‘passion’. The traditional theories on the subject are conflicting. For (i) most thinkers are unanimous in maintaining (a) that ‘like’ is always unaffected by ‘like’, because (as they argue) neither of two ‘likes’ is more apt than the other either to act or to suffer action, since all the properties which belong to the one belong identically and in the same degree to the other; and (b) that ‘unlikes’, i.e.

‘differents’, are by nature such as to act and suffer action reciprocally. For even when the smaller fire is destroyed by the greater, it suffers this effect (they say) owing to its ‘contrariety’ since the great is contrary to the small. But (ii) Democritus dissented from all the other thinkers and maintained a theory peculiar to himself. He asserts that agent and patient are identical, i.e. ‘like’. It is not possible (he says) that ‘others’, i.e. ‘differents’, should suffer action from one another: on the contrary, even if two things, being ‘others’, do act in some way on one another, this happens to them not qua ‘others’ but qua possessing an identical property.

Such, then, are the traditional theories, and it looks as if the statements of their advocates were in manifest conflict. But the reason of this conflict is that each group is in fact stating a part, whereas they ought to have taken a comprehensive view of the subject as a whole. For (i) if A and B are ‘like’-absolutely and in all respects without difference from one another -it is reasonable to infer that neither is in any way affected by the other. Why, indeed, should either of them tend to act any more than the other? Moreover, if ‘like’ can be affected by ‘like’, a thing can also be affected by itself: and yet if that were so-if ‘like’ tended in fact to act qua ‘like’-there would be nothing indestructible or immovable, for everything would move itself. And (ii) the same consequence follows if A and B are absolutely ‘other’, i.e. in no respect identical. Whiteness could not be affected in any way by line nor line by whiseness-except perhaps ‘coincidentally’, viz. if the line happened to

be white or black: for unless two things either are, or are composed of, ‘contraries’, neither drives the other out of its natural condition. But (iii) since only those things which either involve a ‘contrariety’ or are ‘contraries’-and not any things selected at random-are such as to suffer action and to act, agent and patient must be ‘like’ (i.e. identical) in kind and yet ‘unlike’ (i.e. contrary) in species. (For it is a law of nature that body is affected by body, flavour by flavour, colour by colour, and so in general what belongs to any kind by a member of the same kind-the reason being that ‘contraries’ are in every case within a single identical kind, and it is ‘contraries’ which reciprocally act and suffer action.) Hence agent and patient must be in one sense identical, but in another sense other than (i.e. ‘unlike’) one another. And since (a) patient and agent are generically identical (i.e. ‘like’) but specifically ‘unlike’, while (b) it is ‘contraries’ that exhibit this character: it is clear that ‘contraries’ and their ‘intermediates’ are such as to suffer action and to act reciprocally-for indeed it is these that constitute the entire sphere of passing-away and coming-to-be.

We can now understand why fire heats and the cold thing cools, and in general why the active thing assimilates to itself the patient. For agent and patient are contrary to one another, and coming-to-be is a process into the contrary: hence the patient must change into the agent, since it is only thus that coming-to be will be a process into the contrary. And, again, it is intelligible that the advocates of both views, although their theories are not the same, are yet in contact with the nature of the facts. For sometimes we speak of the substratum as suffering action (e.g. of ‘the man’ as being healed, being warmed and chilled, and similarly in all the other cases), but at other times we say ‘what is cold is ‘being warmed’, ‘what is sick is being healed’: and in both these ways of speaking we express the truth, since in one sense it is the ‘matter’, while in another sense it is the ‘contrary’, which suffers action. (We make the same distinction in speaking of the agent: for sometimes we say that ‘the man’, but at other times that ‘what is hot’, produces heat.) Now the one group of thinkers supposed that agent and patient must possess something identical, because they fastened their attention on the substratum: while the other group maintained the opposite because their attention was concentrated on the ‘contraries’. We must conceive the same account to hold of action and passion as that which is true of ‘being moved’ and ‘imparting motion’. For the ‘mover’, like the ‘agent’, has two meanings. Both (a) that which contains the originative source of the motion is thought to ‘impart motion’ (for the originative source is first amongst the causes), and also (b) that which is last, i.e. immediately next to the moved thing and to the coming-to-be. A similar distinction holds also of the agent: for we speak not only (a) of the doctor, but also (b) of the wine, as healing. Now, in motion, there is nothing to prevent the firs; mover being unmoved (indeed, as regards some ‘first’ movers’ this is actually necessary) although the last mover always imparts motion by being itself moved: and, in action, there is nothing to prevent the first agent being unaffected, while the last agent only acts by suffering action itself. For agent and patient have not the same matter, agent acts without being affected: thus the art of healing produces health without itself being acted upon in any way by that which is being healed. But (b) the food, in acting, is itself in some way acted upon: for, in acting, it is simultaneously heated or cooled or otherwise affected. Now the art of healing corresponds to an ‘originative source’, while the food corresponds to ‘the last’ (i.e.

‘continuous’) mover.

Those active powers, then, whose forms are not embodied in matter, are unaffected: but those whose forms are in matter are such as to be affected in acting. For we maintain that one and the same ‘matter’ is equally, so to say, the basis of either of the two opposed things-being as it were a ‘kind’; and that that which can he hot must be made hot, provided the heating agent is there, i.e. comes near. Hence (as we have said) some of the active powers are unaffected while others are such as to be affected; and what

holds of motion is true also of the active powers. For as in motion ‘the first mover’ is unmoved, so among the active powers ‘the first agent’ is unaffected.

The active power is a ‘cause’ in the sense of that from which the process originates: but the end, for the sake of which it takes place, is not ‘active’. (That is why health is not ‘active’, except metaphorically.) For when the agent is there, the patient he-comes something: but when ‘states’ are there, the patient no longer becomes but already is-and ‘forms’ (i.e. lends’) are a kind of ‘state’. As to the ‘matter’, it (qua matter) is passive. Now fire contains ‘the hot’ embodied in matter: but a ‘hot’ separate from matter (if such a thing existed) could not suffer any action. Perhaps, indeed, it is impossible that ‘the hot’ should exist in separation from matter: but if there are any entities thus separable, what we are saying would be true of them.

We have thus explained what action and passion are, what things exhibit them, why they do so, and in what manner. We must go on to discuss how it is possible for action and passion to take place.

8

Some philosophers think that the ‘last’ agent-the ‘agent’ in the strictest sense-enters in through certain pores, and so the patient suffers action. It is in this way, they assert, that we see and hear and exercise all our other senses. Moreover, according to them, things are seen through air and water and other transparent bodies, because such bodies possess pores, invisible indeed owing to their minuteness, but close-set and arranged in rows: and the more transparent the body, the more frequent and serial they suppose its pores to be. Such was the theory which some philosophers (induding Empedocles) advanced in regard to the structure of certain bodies. They do not restrict it to the bodies which act and suffer action: but ‘combination’ too, they say, takes place ‘only between bodies whose pores are in reciprocal symmetry’. The most systematic and consistent theory, however, and one that applied to all bodies, was advanced by Leucippus and Democritus: and, in maintaining it, they took as their starting-point what naturally comes first.

For some of the older philosophers thought that ‘what is’ must of necessity be ‘one’ and immovable. The void, they argue, ‘is not’: but unless there is a void with a separate being of its own, ‘what is’ cannot be moved-nor again can it be ‘many’, since there is nothing to keep things apart. And in this respect, they insist, the view that the universe is not ‘continuous’ but ‘discretes-in-contact’ is no better than the view that there are ‘many’ (and not ‘one’) and a void.

For (suppose that the universe is discretes-in-contact. Then), if it is divisible through and through, there is no ‘one’, and therefore no ‘many’ either, but the Whole is void; while to maintain that it is divisible at some points, but not at others, looks like an arbitrary fiction. For up to what limit is it divisible? And for what reason is part of the Whole indivisible, i.e. a plenum, and part divided? Further, they maintain, it is equally necessary to deny the existence of motion.

Reasoning in this way, therefore, they were led to transcend sense-perception, and to disregard it on the ground that ‘one ought to follow the argument’: and so they assert that the universe is ‘one’ and immovable. Some of them add that it is ‘infinite’, since the limit (if it had one) would be a limit against the void.

There were, then, certain thinkers who, for the reasons we have stated, enunciated views of this kind as their theory of ‘The Truth’.... Moreover, although these opinions appear to follow logically in a dialectical discussion, yet to believe them seems next door

to madness when one considers the facts. For indeed no lunatic seems to be so far out of his senses as to suppose that fire and ice are ‘one’: it is only between what is right and what seems right from habit, that some people are mad enough to see no difference.

Leucippus, however, thought he had a theory which harmonized with sense-perception and would not abolish either coming-to-be and passing-away or motion and the multiplicity of things. He made these concessions to the facts of perception: on the other hand, he conceded to the Monists that there could be no motion without a void. The result is a theory which he states as follows: ‘The void is a “not being”, and no part of “what is” is a “not-being”; for what “is” in the strict sense of the term is an absolute plenum. This plenum, however, is not “one”: on the contrary, it is a many” infinite in number and invisible owing to the minuteness of their bulk. The “many” move in the void (for there is a void): and by coming together they produce “coming to-be”, while by separating they produce “passing-away”. Moreover, they act and suffer action wherever they chance to be in contact (for there they are not “one”), and they generate by being put together and becoming intertwined. From the genuinely-one, on the other hand, there never could have come-to-be a multiplicity, nor from the genuinely-many a “one”: that is impossible. But’ (just as Empedocles and some of the other philosophers say that things suffer action through their pores, so) ‘all “alteration” and all “passion” take place in the way that has been explained: breaking-up (i.e. passing-away) is effected by means of the void, and so too is growth-solids creeping in to fill the void places.’ Empedocles too is practically bound to adopt the same theory as Leucippus. For he must say that there are certain solids which, however, are indivisible-unless there are continuous pores all through the body. But this last alternative is impossible: for then there will be nothing solid in the body (nothing beside the pores) but all of it will be void. It is necessary, therefore, for his ‘contiguous discretes’ to be indivisible, while the intervals between them-which he calls ‘pores’-must be void. But this is precisely Leucippus’ theory of action and passion.

Such, approximately, are the current explanations of the manner in which some things ‘act’ while others ‘suffer action’. And as regards the Atomists, it is not only clear what their explanation is: it is also obvious that it follows with tolerable consistency from the assumptions they employ. But there is less obvious consistency in the explanation offered by the other thinkers. It is not clear, for instance, how, on the theory of Empedocles, there is to be ‘passing-away’ as well as ‘alteration’. For the primary bodies of the Atomists-the primary constituents of which bodies are composed, and the ultimate elements into which they are dissolved-are indivisible, differing from one another only in figure. In the philosophy of Empedocles, on the other hand, it is evident that all the other bodies down to the ‘elements’ have their coming-to-be and their passingaway: but it is not clear how the ‘elements’ themselves, severally in their aggregated masses, come-to-be and pass-away. Nor is it possible for Empedocles to explain how they do so, since he does not assert that Fire too (and similarly every one of his other ‘elements’) possesses ‘elementary constituents’ of itself.

Such an assertion would commit him to doctrines like those which Plato has set forth in the Timaeus. For although both Plato and Leucippus postulate elementary constituents that are indivisible and distinctively characterized by figures, there is this great difference between the two theories: the ‘indivisibles’ of Leucippus (i) are solids, while those of Plato are planes, and (ii) are characterized by an infinite variety of figures, while the characterizing figures employed by Plato are limited in number. Thus the ‘comings-to-be’ and the ‘dissociations’ result from the ‘indivisibles’ (a) according to Leucippus through the void and through contact (for it is at the point of contact that each of the composite bodies is divisible), but (b) according to Plato in virtue of contact alone, since he denies there is a void.

Now we have discussed ‘indivisible planes’ in the preceding treatise.’ But with regard to the assumption of ‘indivisible solids’, although we must not now enter upon a detailed study of its consequences, the following criticisms fall within the compass of a short digression: i. The Atomists are committed to the view that every ‘indivisible’ is incapable alike of receiving a sensible property (for nothing can ‘suffer action’ except through the void) and of producing one-no ‘indivisible’ can be, e.g. either hard or cold. Yet it is surely a paradox that an exception is made of ‘the hot’-’the hot’ being assigned as peculiar to the spherical figure: for, that being so, its ‘contrary’ also (‘the cold’) is bound to belong to another of the figures. If, however, these properties (heat and cold) do belong to the ‘indivisibles’, it is a further paradox that they should not possess heaviness and lightness, and hardness and softness. And yet Democritus says ‘the more any indivisible exceeds, the heavier it is’-to which we must clearly add ‘and the hotter it is’. But if that is their character, it is impossible they should not be affected by one another: the ‘slightly-hot indivisible’, e.g.

will inevitably suffer action from one which far exceeds it in heat.

Again, if any ‘indivisible’ is ‘hard’, there must also be one which is ‘soft’: but ‘the soft’ derives its very name from the fact that it suffers a certain action-for ‘soft’ is that which yields to pressure.

II. But further, not only is it paradoxical (i) that no property except figure should belong to the ‘indivisibles’: it is also paradoxical (ii) that, if other properties do belong to them, one only of these additional properties should attach to each-e.g. that this ‘indivisible’ should be cold and that ‘indivisible’ hot. For, on that supposition, their substance would not even be uniform. And it is equally impossible (iii) that more than one of these additional properties should belong to the single ‘indivisible’. For, being indivisible, it will possess these properties in the same point-so that, if it ‘suffers action’ by being chilled, it will also, qua chilled, ‘act’ or ‘suffer action’ in some other way. And the same line of argument applies to all the other properties too: for the difficulty we have just raised confronts, as a necessary consequence, all who advocate ‘indivisibles’ (whether solids or planes), since their ‘indivisibles’ cannot become either ‘rarer’ or ‘derser’ inasmuch as there is no void in them.

III. It is a further paradox that there should be small ‘indivisibles’, but not large ones. For it is natural enough, from the ordinary point of view, that the larger bodies should be more liable to fracture than the small ones, since they (viz. the large bodies) are easily broken up because they collide with many other bodies.

But why should indivisibility as such be the property of small, rather than of large, bodies? IV. Again, is the substance of all those solids uniform, or do they fall into sets which differ from one another-as if, e.g. some of them, in their aggregated bulk, were ‘fiery’, others earthy’? For (i) if all of them are uniform in substance, what is it that separated one from another? Or why, when they come into contact, do they not coalesce into one, as drops of water run together when drop touches drop (for the two cases are precisely parallel)? On the other hand (ii) if they fall into differing sets, how are these characterized? It is clear, too, that these, rather than the ‘figures’, ought to be postulated as ‘original reals’, i.e. causes from which the phenomena result. Moreover, if they differed in substance, they would both act and suffer action on coming into reciprocal contact.

V. Again, what is it which sets them moving? For if their ‘mover’ is other than themselves, they are such as to ‘suffer action’. If, on the other hand, each of them sets itself in motion, either (a) it will be divisible (‘imparting motion’ qua this, ‘being moved’ qua that), or (b) contrary properties will attach to it in the same respect-i.e.

‘matter’ will be identical in-potentiality as well as numerically-identical.

As to the thinkers who explain modification of property through the movement facilitated by the pores, if this is supposed to occur notwithstanding the fact that the pores are filled, their postulate of pores is superfluous. For if the whole body suffers action under these conditions, it would suffer action in the same way even if it had no pores but were just its own continuous self. Moreover, how can their account of ‘vision through a medium’ be correct? It is impossible for (the visual ray) to penetrate the transparent bodies at their ‘contacts’; and impossible for it to pass through their pores if every pore be full. For how will that differ from having no pores at all? The body will be uniformly ‘full’ throughout. But, further, even if these passages, though they must contain bodies, are ‘void’, the same consequence will follow once more. And if they are ‘too minute to admit any body’, it is absurd to suppose there is a ‘minute’ void and yet to deny the existence of a ‘big’ one (no matter how small the ‘big’ may be), or to imagine ‘the void’ means anything else than a body’s place-whence it clearly follows that to every body there will correspond a void of equal cubic capacity.

As a general criticism we must urge that to postulate pores is superfluous. For if the agent produces no effect by touching the patient, neither will it produce any by passing through its pores.

On the other hand, if it acts by contact, then-even without pores-some things will ‘suffer action’ and others will ‘act’, provided they are by nature adapted for reciprocal action and passion. Our arguments have shown that it is either false or futile to advocate pores in the sense in which some thinkers conceive them. But since bodies are divisible through and through, the postulate of pores is ridiculous: for, qua divisible, a body can fall into separate parts.

9

Let explain the way in which things in fact possess the power of generating, and of acting and suffering action: and let us start from the principle we have often enunciated. For, assuming the distinction between (a) that which is potentially and (b) that which is actually such-and-such, it is the nature of the first, precisely in so far as it is what it is, to suffer action through and through, not merely to be susceptible in some parts while insusceptible in others. But its susceptibility varies in degree, according as it is more or less; such-and such, and one would be more justified in speaking of ‘pores’ in this connexion: for instance, in the metals there are veins of ‘the susceptible’ stretching continuously through the substance.

So long, indeed, as any body is naturally coherent and one, it is insusceptible. So, too, bodies are insusceptible so long as they are not in contact either with one another or with other bodies which are by nature such as to act and suffer action. (To illustrate my meaning: Fire heats not only when in contact, but also from a distance. For the fire heats the air, and the air-being by nature such as both to act and suffer action-heats the body.) But the supposition that a body is ‘susceptible in some parts, but insusceptible in others’ (is only possible for those who hold an erroneous view concerning the divisibility of magnitudes. For us) the following account results from the distinctions we established at the beginning. For (i) if magnitudes are not divisible through and through-if, on the contrary, there are indivisible solids or planes-then indeed no body would be susceptible through and through :but neither would any be continuous. Since, however, (ii) this is false, i.e. since every body is divisible, there is no difference between ‘having been divided into parts which remain in contact’ and ‘being divisible’. For if a body ‘can be separated at the contacts’ (as some thinkers express it), then, even though it has not yet been divided, it

will be in a state of dividedness-since, as it can be divided, nothing inconceivable results. And (iii) the suposition is open to this general objection-it is a paradox that ‘passion’ should occur in this manner only, viz. by the bodies being split. For this theory abolishes ‘alteration’: but we see the same body liquid at one time and solid at another, without losing its continuity. It has suffered this change not by ‘division’ and composition’, nor yet by ‘turning’ and ‘intercontact’ as Democritus asserts; for it has passed from the liquid to the solid state without any change of ‘grouping’ or ‘position’ in the constituents of its substance. Nor are there contained within it those ‘hard’ (i.e. congealed) particles ‘indivisible in their bulk’: on the contrary, it is liquid-and again, solid and congealed-uniformly all through. This theory, it must be added, makes growth and diminution impossible also. For if there is to be opposition (instead of the growing thing having changed as a whole, either by the admixture of something or by its own transformation), increase of size will not have resulted in any and every part.

So much, then, to establish that things generate and are generated, act and suffer action, reciprocally; and to distinguish the way in which these processes can occur from the (impossible) way in which some thinkers say they occur.

10

But we have still to explain ‘combination’, for that was the third of the subjects we originally proposed to discuss. Our explanation will proceed on the same method as before. We must inquire: What is ‘combination’, and what is that which can ‘combine’? Of what things, and under what conditions, is ‘combination’ a property? And, further, does ‘combination’ exist in fact, or is it false to assert its existence? For, according to some thinkers, it is impossible for one thing to be combined with another. They argue that (i) if both the ‘combined’ constituents persist unaltered, they are no more ‘combined’ now than they were before, but are in the same condition: while (ii) if one has been destroyed, the constituents have not been ‘combined’-on the contrary, one constituent is and the other is not, whereas ‘combination’ demands uniformity of condition in them both: and on the same principle (iii) even if both the combining constituents have been destroyed as the result of their coalescence, they cannot ‘have been combined’ since they have no being at all.

What we have in this argument is, it would seem, a demand for the precise distinction of ‘combination’ from coming-to-be and passingaway (for it is obvious that ‘combination’, if it exists, must differ from these processes) and for the precise distinction of the ‘combinable’ from that which is such as to come-to-be and pass-away.

As soon, therefore, as these distinctions are clear, the difficulties raised by the argument would be solved.

Now (i) we do not speak of the wood as ‘combined’ with the fire, nor of its burning as a ‘combining’ either of its particles with one another or of itself with the fire: what we say is that ‘the fire is coming-to-be, but the wood is ‘passing-away’. Similarly, we speak neither (ii) of the food as ‘combining’ with the body, nor (iii) of the shape as ‘combining’ with the wax and thus fashioning the lump.

Nor can body ‘combine’ with white, nor (to generalize) ‘properties’ and ‘states’ with ‘things’: for we see them persisting unaltered.

But again (iv) white and knowledge cannot be ‘combined’ either, nor any other of the ‘adjectivals’. (Indeed, this is a blemish in the theory of those who assert that ‘once upon a time all things were together and combined’. For not everything can ‘combine’ with everything. On the contrary, both of the constituents that are combined in the compound must

originally have existed in separation: but no property can have separate existence.) Since, however, some things are-potentially while others are-actually, the constituents combined in a compound can ‘be’ in a sense and yet ‘not-be’. The compound may he-actually other than the constituents from which it has resulted; nevertheless each of them may still he-potentially what it was before they were combined, and both of them may survive undestroyed. (For this was the difficulty that emerged in the previous argument: and it is evident that the combining constituents not only coalesce, having formerly existed in separation, but also can again be separated out from the compound.) The constituents, therefore, neither (a) persist actually, as ‘body’ and ‘white’ persist: nor (b) are they destroyed (either one of them or both), for their ‘power of action’ is preserved. Hence these difficulties may be dismissed: but the problem immediately connected with them-whether combination is something relative to perception’ must be set out and discussed.

When the combining constituents have been divided into parts so small, and have been juxtaposed in such a manner, that perception fails to discriminate them one from another, have they then ‘been combined Or ought we to say ‘No, not until any and every part of one constituent is juxtaposed to a part of the other’? The term, no doubt, is applied in the former sense: we speak, e.g. of wheat having been ‘combined’ with barley when each grain of the one is juxtaposed to a grain of the other. But every body is divisible and therefore, since body ‘combined’ with body is uniform in texture throughout, any and every part of each constituent ought to be juxtaposed to a part of the other.

No body, however, can be divided into its ‘least’ parts: and ‘composition’ is not identical with ‘combination’, but other than it. From these premises it clearly follows (i) that so long as the constituents are preserved in small particles, we must not speak of them as ‘combined’. (For this will be a ‘composition’ instead of a ‘blending’ or ‘combination’: nor will every portion of the resultant exhibit the same ratio between its constituents as the whole. But we maintain that, if ‘combination’ has taken place, the compound must be uniform in texture throughout-any part of such a compound being the same as the whole, just as any part of water is water: whereas, if ‘combination’ is ‘composition of the small particles’, nothing of the kind will happen. On the contrary, the constituents will only be ‘combined’ relatively to perception: and the same thing will be ‘combined’ to one percipient, if his sight is not sharp, (but not to another,) while to the eye of Lynceus nothing will be ‘combined’.) It clearly follows (ii) that we must not speak of the constituents as ‘combined in virtue of a division such that any and every part of each is juxtaposed to a part of the other: for it is impossible for them to be thus divided. Either, then, there is no ‘combination’, or we have still to explain the manner in which it can take place.

Now, as we maintain, some things are such as to act and others such as to suffer action from them. Moreover, some things-viz. those Which have the same matter-’reciprocate’, i.e. are such as to act upon one another and to suffer action from one another; while other things, viz. agents which have not the same matter as their patients, act without themselves suffering action. Such agents cannot ‘combine’-that is why neither the art of healing nor health produces health by ‘combining’ with the bodies of the patients. Amongst those things, however, which are reciprocally active and passive, some are easily-divisible. Now (i) if a great quantity (or a large bulk) of one of these easily-divisible ‘reciprocating’ materials be brought together with a little (or with a small piece) of another, the effect produced is not ‘combination’, but increase of the dominant: for the other material is transformed into the dominant. (That is why a drop of wine does not ‘combine’ with ten thousand gallons of water: for its form is dissolved, and it is changed so as to merge in the total volume of water.) On the other hand (ii) when there is a certain equilibrium between their ‘powers of action’, then each of them changes out of its own nature towards the dominant: yet neither becomes the other, but both become an intermediate

with properties common to both.

Thus it is clear that only those agents are ‘combinable’ which involve a contrariety-for these are such as to suffer action reciprocally. And, further, they combine more freely if small pieces of each of them are juxtaposed. For in that condition they change one another more easily and more quickly; whereas this effect takes a long time when agent and patient are present in bulk.

Hence, amongst the divisible susceptible materials, those whose shape is readily adaptable have a tendency to combine: for they are easily divided into small particles, since that is precisely what ‘being readily adaptable in shape’ implies. For instance, liquids are the most ‘combinable’ of all bodies-because, of all divisible materials, the liquid is most readily adaptable in shape, unless it be viscous. Viscous liquids, it is true, produce no effect except to increase the volume and bulk. But when one of the constituents is alone susceptible-or superlatively susceptible, the other being susceptible in a very slight degree-the compound resulting from their combination is either no greater in volume or only a little greater. This is what happens when tin is combined with bronze. For some things display a hesitating and ambiguous attitude towards one another-showing a slight tendency to combine and also an inclination to behave as ‘receptive matter’ and ‘form’ respectively. The behaviour of these metals is a case in point. For the tin almost vanishes, behaving as if it were an immaterial property of the bronze: having been combined, it disappears, leaving no trace except the colour it has imparted to the bronze. The same phenomenon occurs in other instances too.

It is clear, then, from the foregoing account, that ‘combination’ occurs, what it is, to what it is due, and what kind of thing is ‘combinable’. The phenomenon depends upon the fact that some things are such as to be (a) reciprocally susceptible and (b) readily adaptable in shape, i.e. easily divisible. For such things can be ‘combined’ without its being necessary either that they should have been destroyed or that they should survive absolutely unaltered: and their ‘combination’ need not be a ‘composition’, nor merely ‘relative to perception’. On the contrary: anything is ‘combinable’ which, being readily adaptable in shape, is such as to suffer action and to act; and it is ‘combinable with’ another thing similarly characterized (for the ‘combinable’ is relative to the ‘combinable’); and ‘combination’ is unification of the ‘combinables’, resulting from their ‘alteration’.

Book II

1

WE have explained under what conditions ‘combination’, ‘contact’, and ‘action-passion’ are attributable to the things which undergo natural change. Further, we have discussed ‘unqualified’ coming-to-be and passing-away, and explained under what conditions they are predicable, of what subject, and owing to what cause.

Similarly, we have also discussed ‘alteration’, and explained what ‘altering’ is and how it differs from coming-to-be and passing-away.

But we have still to investigate the so-called ‘elements’ of bodies.

For the complex substances whose formation and maintenance are due to natural processes all presuppose the perceptible bodies as the condition of their coming-to-be and passing-away: but philosophers disagree in regard to the matter which underlies these perceptible bodies. Some maintain it is single, supposing it to be, e.g. Air or Fire, or

an ‘intermediate’ between these two (but still a body with a separate existence). Others, on the contrary, postulate two or more materials-ascribing to their ‘association’ and ‘dissociation’, or to their ‘alteration’, the coming-to-be and passing-away of things.

(Some, for instance, postulate Fire and Earth: some add Air, making three: and some, like Empedocles, reckon Water as well, thus postulating four.) Now we may agree that the primary materials, whose change (whether it be ‘association and dissociation’ or a process of another kind) results in coming-to-be and passingaway, are rightly described as ‘originative sources, i.e. elements’. But (i) those thinkers are in error who postulate, beside the bodies we have mentioned, a single matter-and that corporeal and separable matter. For this ‘body’ of theirs cannot possibly exist without a ‘perceptible contrariety’: this ‘Boundless’, which some thinkers identify with the ‘original real’, must be either light or heavy, either cold or hot. And (ii) what Plato has written in the Timaeus is not based on any precisely-articulated conception. For he has not stated clearly whether his ‘Omnirecipient” exists in separation from the ‘elements’; nor does he make any use of it. He says, indeed, that it is a substratum prior to the so-called ‘elements’-underlying them, as gold underlies the things that are fashioned of gold. (And yet this comparison, if thus expressed, is itself open to criticism. Things which come-to-be and pass-away cannot be called by the name of the material out of which they have come-tobe: it is only the results of ‘alteration’ which retain the name of the substratum whose ‘alterations’ they are. However, he actually says’ that the truest account is to affirm that each of them is “gold”’.) Nevertheless he carries his analysis of the ‘elements’-solids though they are-back to ‘planes’, and it is impossible for ‘the Nurse’ (i.e. the primary matter) to be identical with ‘the planes’.

Our own doctrine is that although there is a matter of the perceptible bodies (a matter out of which the so-called ‘clements’ come-to-be), it has no separate existence, but is always bound up with a contrariety. A more precise account of these presuppositions has been given in another work’: we must, however, give a detailed explanation of the primary bodies as well, since they too are similarly derived from the matter. We must reckon as an ‘originative source’ and as ‘primary’ the matter which underlies, though it is inseparable from, the contrary qualities: for the hot’ is not matter for ‘the cold’ nor ‘the cold’ for ‘the hot’, but the substratum is matter for them both. We therefore have to recognize three ‘originative sources’: firstly that which potentially perceptible body, secondly the contrarieties (I mean, e.g. heat and cold), and thirdly Fire, Water, and the like. Only ‘thirdly’, however: for these bodies change into one another (they are not immutable as Empedocles and other thinkers assert, since ‘alteration’ would then have been impossible), whereas the contrarieties do not change.

Nevertheless, even so the question remains: What sorts of contrarieties, and how many of them, are to be accounted ‘originative sources’ of body? For all the other thinkers assume and use them without explaining why they are these or why they are just so many.

2

Since, then, we are looking for ‘originative sources’ of perceptible body; and since ‘perceptible’ is equivalent to ‘tangible’, and ‘tangible’ is that of which the perception is touch; it is clear that not all the contrarieties constitute ‘forms’ and ‘originative sources’ of body, but only those which correspond to touch. For it is in accordance with a contrariety-a contrariety, moreover, of tangible qualities-that the primary bodies are differentiated. That is why neither whiteness (and blackness), nor sweetness (and bitterness), nor (similarly) any quality belonging to the other perceptible contrarieties either, constitutes an ‘element’.

And yet vision is prior to touch, so that its object also is prior to the object of touch. The object of vision, however, is a quality of tangible body not qua tangible, but qua something else-qua something which may well be naturally prior to the object of touch.

Accordingly, we must segregate the tangible differences and contrarieties, and distinguish which amongst them are primary.

Contrarieties correlative to touch are the following: hot-cold, dry-moist, heavy-light, hard-soft, viscous-brittle, rough-smooth, coarse-fine. Of these (i) heavy and light are neither active nor susceptible. Things are not called ‘heavy’ and ‘light’ because they act upon, or suffer action from, other things. But the ‘elements’ must be reciprocally active and susceptible, since they ‘combine’ and are transformed into one another. On the other hand (ii) hot and cold, and dry and moist, are terms, of which the first pair implies power to act and the second pair susceptibility. ‘Hot’ is that which ‘associates’ things of the same kind (for ‘dissociating’, which people attribute to Fire as its function, is ‘associating’ things of the same class, since its effect is to eliminate what is foreign), while ‘cold’ is that which brings together, i.e. ‘associates’, homogeneous and heterogeneous things alike. And moise is that which, being readily adaptable in shape, is not determinable by any limit of its own: while ‘dry’ is that which is readily determinable by its own limit, but not readily adaptable in shape.

From moist and dry are derived (iii) the fine and coarse, viscous and brittle, hard and soft, and the remaining tangible differences.

For (a) since the moist has no determinate shape, but is readily adaptable and follows the outline of that which is in contact with it, it is characteristic of it to be ‘such as to fill up’. Now ‘the fine’ is ‘such as to fill up’. For the fine’ consists of subtle particles; but that which consists of small particles is ‘such as to fill up’, inasmuch as it is in contact whole with whole-and ‘the fine’ exhibits this character in a superlative degree. Hence it is evident that the fine derives from the moist, while the coarse derives from the dry. Again (b) the viscous’ derives from the moist: for ‘the viscous’ (e.g. oil) is a ‘moist’ modified in a certain way. ‘The brittle’, on the other hand, derives from the dry: for ‘brittle’ is that which is completely dry-so completely, that its solidification has actually been due to failure of moisture. Further (c) ‘the soft’ derives from the moist. For ‘soft’ is that which yields to pressure by retiring into itself, though it does not yield by total displacement as the moist does-which explains why the moist is not ‘soft’, although ‘the soft’ derives from the moist. ‘The hard’, on the other hand, derives from the dry: for ‘hard’ is that which is solidified, and the solidified is dry.

The terms ‘dry’ and ‘moist’ have more senses than one. For ‘the damp’, as well as the moist, is opposed to the dry: and again ‘the solidified’, as well as the dry, is opposed to the moist. But all these qualities derive from the dry and moist we mentioned first.’ For (i) the dry is opposed to the damp: i.e. ‘damp’ is that which has foreign moisture on its surface (‘sodden’ being that which is penetrated to its core), while ‘dry’ is that which has lost foreign moisture. Hence it is evident that the damp will derive from the moist, and ‘the dry’ which is opposed to it will derive from the primary dry. Again (ii) the ‘moist’ and the solidified derive in the same way from the primary pair. For ‘moist’ is that which contains moisture of its-own deep within it (‘sodden’ being that which is deeply penetrated by foreign mosture), whereas ‘solidigied’ is that which has lost this inner moisture. Hence these too derive from the primary pair, the ‘solidified’ from the dry and the ‘solidified’ from the dry the ‘liquefiable’ from the moist.

It is clear, then, that all the other differences reduce to the first four, but that these admit of no further reduction. For the hot is not essentially moist or dry, nor the moist

essentially hot or cold: nor are the cold and the dry derivative forms, either of one another or of the hot and the moist. Hence these must be four.

3

The elementary qualities are four, and any four terms can be combined in six couples. Contraries, however, refuse to be coupled: for it is impossible for the same thing to be hot and cold, or moist and dry. Hence it is evident that the ‘couplings’ of the elementary qualities will be four: hot with dry and moist with hot, and again cold with dry and cold with moist. And these four couples have attached themselves to the apparently ‘simple’ bodies (Fire, Air, Water, and Earth) in a manner consonant with theory. For Fire is hot and dry, whereas Air is hot and moist (Air being a sort of aqueous vapour); and Water is cold and moist, while Earth is cold and dry.

Thus the differences are reasonably distributed among the primary bodies, and the number of the latter is consonant with theory. For all who make the simple bodies ‘elements’ postulate either one, or two, or three, or four. Now (i) those who assert there is one only, and then generate everything else by condensation and rarefaction, are in effect making their ‘originative sources’ two, viz. the rare and the dense, or rather the hot and the cold: for it is these which are the moulding forces, while the ‘one’ underlies them as a ‘matter’. But (ii) those who postulate two from the start-as Parmenides postulated Fire and Earth-make the intermediates (e.g. Air and Water) blends of these. The same course is followed (iii) by those who advocate three. (We may compare what Plato does in Me Divisions’: for he makes ‘the middle’ a blend.) Indeed, there is practically no difference between those who postulate two and those who postulate three, except that the former split the middle ‘element’ into two, while the latter treat it as only one. But (iv) some advocate four from the start, e.g. Empedocles: yet he too draws them together so as to reduce them to the two, for he opposes all the others to Fire.

In fact, however, fire and air, and each of the bodies we have mentioned, are not simple, but blended. The ‘simple’ bodies are indeed similar in nature to them, but not identical with them. Thus the ‘simple’ body corresponding to fire is ‘such-as-fire, not fire: that which corresponds to air is ‘such-as-air’: and so on with the rest of them. But fire is an excess of heat, just as ice is an excess of cold. For freezing and boiling are excesses of heat and cold respectively. Assuming, therefore, that ice is a freezing of moist and cold, fire analogously will be a boiling of dry and hot: a fact, by the way, which explains why nothing comes-to-be either out of ice or out of fire.

The ‘simple’ bodies, since they are four, fall into two pairs which belong to the two regions, each to each: for Fire and Air are forms of the body moving towards the ‘limit’, while Earth and Water are forms of the body which moves towards the ‘centre’. Fire and Earth, moreover, are extremes and purest: Water and Air, on the contrary are intermediates and more like blends. And, further, the members of either pair are contrary to those of the other, Water being contrary to Fire and Earth to Air; for the qualities constituting Water and Earth are contrary to those that constitute Fire and Air.

Nevertheless, since they are four, each of them is characterized par excellence a single quality: Earth by dry rather than by cold, Water by cold rather than by moist, Air by moist rather than by hot, and Fire by hot rather than by dry.

4

It has been established before’ that the coming-to-be of the ‘simple’ bodies is reciprocal. At the same time, it is manifest, even on the evidence of perception, that they do come-to-be: for otherwise there would not have been ‘alteration, since ‘alteration’ is

change in respect to the qualities of the objects of touch.

Consequently, we must explain (i) what is the manner of their reciprocal transformation, and (ii) whether every one of them can come to-be out of every one-or whether some can do so, but not others.

Now it is evident that all of them are by nature such as to change into one another: for coming-to-be is a change into contraries and out of contraries, and the ‘elements’ all involve a contrariety in their mutual relations because their distinctive qualities are contrary. For in some of them both qualities are contrary-e.g. in Fire and Water, the first of these being dry and hot, and the second moist and cold: while in others one of the qualities (though only one) is contrary-e.g. in Air and Water, the first being moist and hot, and the second moist and cold. It is evident, therefore, if we consider them in general, that every one is by nature such as to come-to-be out of every one: and when we come to consider them severally, it is not difficult to see the manner in which their transformation is effected.

For, though all will result from all, both the speed and the facility of their conversion will differ in degree.

Thus (i) the process of conversion will be quick between those which have interchangeable ‘complementary factors’, but slow between those which have none. The reason is that it is easier for a single thing to change than for many. Air, e.g. will result from Fire if a single quality changes: for Fire, as we saw, is hot and dry while Air is hot and moist, so that there will be Air if the dry be overcome by the moist. Again, Water will result from Air if the hot be overcome by the cold: for Air, as we saw, is hot and moist while Water is cold and moist, so that, if the hot changes, there will be Water. So too, in the same manner, Earth will result from Water and Fire from Earth, since the two ‘elements’ in both these couples have interchangeable ‘complementary factors’. For Water is moist and cold while Earth is cold and dry-so that, if the moist be overcome, there will be Earth: and again, since Fire is dry and hot while Earth is cold and dry, Fire will result from Earth if the cold pass-away.

It is evident, therefore, that the coming-to-be of the ‘simple’ bodies will be cyclical; and that this cyclical method of transformation is the easiest, because the consecutive ‘clements’ contain interchangeable ‘complementary factors’. On the other hand (ii) the transformation of Fire into Water and of Air into Earth, and again of Water and Earth into Fire and Air respectively, though possible, is more difficult because it involves the change of more qualities. For if Fire is to result from Water, both the cold and the moist must pass-away: and again, both the cold and the dry must pass-away if Air is to result from Earth. So’ too, if Water and Earth are to result from Fire and Air respectively-both qualities must change.

This second method of coming-to-be, then, takes a longer time. But (iii) if one quality in each of two ‘elements’ pass-away, the transformation, though easier, is not reciprocal. Still, from Fire plus Water there will result Earth and Air, and from Air plus Earth Fire and Water. For there will be Air, when the cold of the Water and the dry of the Fire have passed-away (since the hot of the latter and the moist of the former are left): whereas, when the hot of the Fire and the moist of the Water have passed-away, there will be Earth, owing to the survival of the dry of the Fire and the cold of the Water. So, too, in the same Way, Fire and Water will result from Air plus Earth. For there will be Water, when the hot of the Air and the dry of the Earth have passed-away (since the moist of the former and the cold of the latter are left): whereas, when the moist of the Air and the cold of the Earth have passed-away, there will be Fire, owing to the survival of the hot of the Air

and the dry of the Earth-qualities essentially constitutive of Fire. Moreover, this mode of Fire's coming-to-be is confirmed by perception. For flame is par excellence Fire: but flame is burning smoke, and smoke consists of Air and Earth.

No transformation, however, into any of the 'simple' bodies can result from the passin-gaway of one elementary quality in each of two 'elements' when they are taken in their consecutive order, because either identical or contrary qualities are left in the pair: but no 'simple' body can be formed either out of identical, or out of contrary, qualities. Thus no 'simple' body would result, if the dry of Fire and the moist of Air were to pass-away: for the hot is left in both. On the other hand, if the hot pass-away out both, the contraries-dry and moist-are left. A similar result will occur in all the others too: for all the consecutive 'elements' contain one identical, and one contrary, quality. Hence, too, it clearly follows that, when one of the consecutive 'elements' is transformed into one, the coming-to-be is effected by the passing-away of a single quality: whereas, when two of them are trans-formed into a third, more than one quality must have passedaway.

We have stated that all the 'elements' come-to-be out of any one of them; and we have explained the manner in which their mutual conversion takes place. Let us nevertheless supplement our theory by the following speculations concerning them.

5

If Water, Air, and the like are a 'matter' of which the natural bodies consist, as some thinkers in fact believe, these 'clements' must be either one, or two, or more. Now they cannot all of them be one-they cannot, e.g. all be Air or Water or Fire or Earth-because 'Change is into contraries'. For if they all were Air, then (assuming Air to persist) there will be 'alteration' instead of coming-to-be. Besides, nobody supposes a single 'element' to persist, as the basis of all, in such a way that it is Water as well as Air (or any other 'ele-ment') at the same time. So there will be a certain contrariety, i.e. a differentiating quality: and the other member of this contrariety, e.g. heat, will belong to some other 'element', e.g. to Fire. But Fire will certainly not be 'hot Air'. For a change of that kind (a) is 'alter-ation', and (b) is not what is observed. Moreover (c) if Air is again to result out of the Fire, it will do so by the conversion of the hot into its contrary: this contrary, therefore, will belong to Air, and Air will be a cold something: hence it is impossible for Fire to be 'hot Air', since in that case the same thing will be simultaneously hot and cold. Both Fire and Air, therefore, will be something else which is the same; i.e. there will be some 'matter', other than either, common to both.

The same argument applies to all the 'elements', proving that there is no single one of them out of which they all originate. But neither is there, beside these four, some other body from which they originate-a something intermediate, e.g. between Air and Water (coarser than Air, but finer than Water), or between Air and Fire (coarser than Fire, but finer than Air). For the supposed 'intermediate' will be Air and Fire when a pair of con-trasted qualities is added to it: but, since one of every two contrary qualities is a 'priva-tion', the 'intermediate' never can exist-as some thinkers assert the 'Boundless' or the 'Environing' exists-in isolation. It is, therefore, equally and indifferently any one of the 'ele-ments', or else it is nothing.

Since, then, there is nothing-at least, nothing perceptible-prior to these, they must be all. That being so, either they must always persist and not be transformable into one another: or they must undergo transformation-either all of them, or some only (as Plato wrote in the Timacus).' Now it has been proved before that they must undergo reciprocal transformation. It has also been proved that the speed with which they come-to-be, one out of another, is not uniform-since the process of reciprocal transformation is relatively

quick between the ‘elements’ with a ‘complementary factor’, but relatively slow between those which possess no such factor.

Assuming, then, that the contrariety, in respect to which they are transformed, is one, the elements’ will inevitably be two: for it is ‘matter’ that is the ‘mean’ between the two contraries, and matter is imperceptible and inseparable from them. Since, however, the ‘elements’ are seen to be more than two, the contrarieties must at the least be two. But the contrarieties being two, the ‘elements’ must be four (as they evidently are) and cannot be three: for the couplings’ are four, since, though six are possible, the two in which the qualities are contrary to one another cannot occur.

These subjects have been discussed before:’ but the following arguments will make it clear that, since the ‘elements’ are transformed into one another, it is impossible for any one of them-whether it be at the end or in the middle-to be an ‘originative source’ of the rest. There can be no such ‘originative element’ at the ends: for all of them would then be Fire or Earth, and this theory amounts to the assertion that all things are made of Fire or Earth.

Nor can a ‘middle-element’ be such an originative source’-as some thinkers suppose that Air is transformed both into Fire and into Water, and Water both into Air and into Earth, while the ‘end-elements’ are not further transformed into one another. For the process must come to a stop, and cannot continue ad infinitum in a straight line in either direction, since otherwise an infinite number of contrarieties would attach to the single ‘element’. Let E stand for Earth, W for Water, A for Air, and F for Fire. Then (i) since A is transformed into F and W, there will be a contrariety belonging to A F. Let these contraries be whiteness and blackness.

Again (ii) since A is transformed into W, there will be another contrariety: for W is not the same as F. Let this second contrariety be dryness and moistness, D being dryness and M moistness. Now if, when A is transformed into W, the ‘white’ persists, Water will be moist and white: but if it does not persist, Water will be black since change is into contraries. Water, therefore, must be either white or black. Let it then be the first. On similar grounds, therefore, D (dryness) will also belong to F. Consequently F (Fire) as well as Air will be able to be transformed into Water: for it has qualities contrary to those of Water, since Fire was first taken to be black and then to be dry, while Water was moist and then showed itself white.

Thus it is evident that all the ‘elements’ will be able to be transformed out of one another; and that, in the instances we have taken, E (Earth) also will contain the remaining two ‘complementary factors’, viz. the black and the moist (for these have not yet been coupled).

We have dealt with this last topic before the thesis we set out to prove. That thesis-viz. that the process cannot continue ad infinitum-will be clear from the following considerations. If Fire (which is represented by F) is not to revert, but is to be transformed in turn into some other ‘element’ (e.g. into Q), a new contrariety, other than those mentioned, will belong to Fire and Q: for it has been assumed that Q is not the same as any of the four, E W A and F. Let K, then, belong to F and Y to Q. Then K will belong to all four, E W A and F: for they are transformed into one another. This last point, however, we may admit, has not yet been proved: but at any rate it is clear that if Q is to be transformed in turn into yet another ‘element’, yet another contrariety will belong not only to Q but also to F (Fire). And, similarly, every addition of a new ‘element’ will carry with it the attachment of a new contrariety to the preceding elements’. Consequently, if the ‘elements’ are infinitely many, there will also belong to the single ‘element’ an infinite number of contrarieties. But

if that be so, it will be impossible to define any ‘element’: impossible also for any to come-to-be. For if one is to result from another, it will have to pass through such a vast number of contrarieties-and indeed even more than any determinate number. Consequently (i) into some ‘elements’ transformation will never be effected-viz. if the intermediates are infinite in number, as they must be if the ‘elements’ are infinitely many: further (ii) there will not even be a transformation of Air into Fire, if the contrarieties are infinitely many: moreover (iii) all the ‘elements’ become one. For all the contrarieties of the ‘elements’ above F must belong to those below F, and vice versa: hence they will all be one.

6

As for those who agree with Empedocles that the ‘elements’ of body are more than one, so that they are not transformed into one another-one may well wonder in what sense it is open to them to maintain that the ‘elements’ are comparable. Yet Empedocles says ‘For these are all not only equal...’ If it is meant that they are comparable in their amount, all the ‘comparables’ must possess an identical something whereby they are measured. If, e.g. one pint of Water yields ten of Air, both are measured by the same unit; and therefore both were from the first an identical something. On the other hand, suppose (ii) they are not ‘comparable in their amount’ in the sense that so-much of the one yields so much of the other, but comparable in ‘power of action (a pint of Water, e.g. having a power of cooling equal to that of ten pints of Air); even so, they are ‘comparable in their amount’, though not qua ‘amount’ but qua Iso-much power’. There is also (iii) a third possibility. Instead of comparing their powers by the measure of their amount, they might be compared as terms in a ‘correspondence’: e.g. ‘as x is hot, so correspondingly y is white’. But ‘correspondence’, though it means equality in the quantum, means similarity in a quale. Thus it is manifestly absurd that the ‘simple’ bodies, though they are not transformable, are comparable not merely as ‘corresponding’, but by a measure of their powers; i.e. that so-much Fire is comparable with many times-that-amount of Air, as being ‘equally’ or ‘similarly’ hot. For the same thing, if it be greater in amount, will, since it belongs to the same kind, have its ratio correspondingly increased.

A further objection to the theory of Empedocles is that it makes even growth impossible, unless it be increase by addition. For his Fire increases by Fire: ‘And Earth increases its own frame and Ether increases Ether.” These, however, are cases of addition: but it is not by addition that growing things are believed to increase. And it is far more difficult for him to account for the coming-to-be which occurs in nature. For the things which come-to-be by natural process all exhibit, in their coming-to-be, a uniformity either absolute or highly regular: while any exceptions any results which are in accordance neither with the invariable nor with the general rule are products of chance and luck. Then what is the cause determining that man comes-to-be from man, that wheat (instead of an olive) comes-to-be from wheat, either invariably or generally? Are we to say ‘Bone comes-to-be if the “elements” be put together in such-and such a manner’? For, according to his own estatements, nothing comes-to-be from their ‘fortuitous consilience’, but only from their ‘consilience’ in a certain proportion. What, then, is the cause of this proportional consilience? Presumably not Fire or Earth. But neither is it Love and Strife: for the former is a cause of ‘association’ only, and the latter only of ‘dissociation’. No: the cause in question is the essential nature of each thing-not merely to quote his words) ‘a mingling and a divorce of what has been mingled’. And chance, not proportion, ‘is the name given to these occurrences’: for things can be ‘mingled’ fortuitously.

The cause, therefore, of the coming-to-be of the things which owe their existence to nature is that they are in such-and-such a determinate condition: and it is this which constitutes, the ‘nature’ of each thing-a ‘nature’ about which he says nothing. What he says,

therefore, is no explanation of ‘nature’. Moreover, it is this which is both ‘the excellence’ of each thing and its ‘good’: whereas he assigns the whole credit to the ‘mingling’. (And yet the ‘elements’ at all events are ‘dissociated’ not by Strife, but by Love: since the ‘elements’ are by nature prior to the Deity, and they too are Deities.) Again, his account of motion is vague. For it is not an adequate explanation to say that ‘Love and Strife set things moving, unless the very nature of Love is a movement of this kind and the very nature of Strife a movement of that kind. He ought, then, either to have defined or to have postulated these characteristic movements, or to have demonstrated them-whether strictly or laxly or in some other fashion. Moreover, since (a) the ‘simple’ bodies appear to move ‘naturally’ as well as by compulsion, i.e. in a manner contrary to nature (fire, e.g. appears to move upwards without compulsion, though it appears to move by compulsion downwards); and since (b) what is ‘natural’ is contrary to that which is due to compulsion, and movement by compulsion actually occurs; it follows that ‘natural movement’ can also occur in fact. Is this, then, the movement that Love sets going? No: for, on the contrary, the ‘natural movement’ moves Earth downwards and resembles ‘dissociation’, and Strife rather than Love is its cause-so that in general, too, Love rather than Strife would seem to be contrary to nature. And unless Love or Strife is actually setting them in motion, the ‘simple’ bodies themselves have absolutely no movement or rest. But this is paradoxical: and what is more, they do in fact obviously move. For though Strife ‘dissociated’, it was not by Strife that the ‘Ether’ was borne upwards. On the contrary, sometimes he attributes its movement to something like chance (‘For thus, as it ran, it happened to meet them then, though often otherwise”), while at other times he says it is the nature of Fire to be borne upwards, but ‘the Ether’ (to quote his words) ‘sank down upon the Earth with long roots’. With such statements, too, he combines the assertion that the Order of the World is the same now, in the reign of Strife, as it was formerly in the reign of Love. What, then, is the ‘first mover’ of the ‘elements’? What causes their motion? Presumably not Love and Strife: on the contrary, these are causes of a particular motion, if at least we assume that ‘first mover’ to be an originative source’.

An additional paradox is that the soul should consist of the ‘elements’, or that it should be one of them. How are the soul’s ‘alterations’ to take Place? How, e.g. is the change from being musical to being unmusical, or how is memory or forgetting, to occur? For clearly, if the soul be Fire, only such modifications will happen to it as characterize Fire qua Fire: while if it be compounded out of the elements’, only the corporeal modifications will occur in it. But the changes we have mentioned are none of them corporeal.

7

The discussion of these difficulties, however, is a task appropriate to a different investigation:’ let us return to the ‘elements’ of which bodies are composed. The theories that ‘there is something common to all the “elements”’, and that they are reciprocally transformed’, are so related that those who accept either are bound to accept the other as well. Those, on the other hand, who do not make their coming-to-be reciprocal-who refuse to suppose that any one of the ‘elements’ comes-to-be out of any other taken singly, except in the sense in which bricks come-to-be out of a wall-are faced with a paradox. How, on their theory, are flesh and bones or any of the other compounds to result from the ‘elements’ taken together? Indeed, the point we have raised constitutes a problem even for those who generate the ‘elements’ out of one another. In what manner does anything other than, and beside, the ‘elements’ come-to-be out of them? Let me illustrate my meaning. Water can come-to-be out of Fire and Fire out of Water; for their substralum is something common to them both. But flesh too, presumably, and marrow come-to-be out of them. How, then, do such things come to-be? For (a) how is the manner of their coming-to-be to be conceived by those who maintain a theory like that of Empedocles?

They must conceive it as composition-just as a wall comes-to-be out of bricks and stones: and the ‘Mixture’, of which they speak, will be composed of the ‘elements’, these being preserved in it unaltered but with their small particles juxtaposed each to each. That will be the manner, presumably, in which flesh and every other compound results from the ‘elements’. Consequently, it follows that Fire and Water do not come-to-be ‘out of any and every part of flesh’. For instance, although a sphere might come-to-be out of this part of a lump of wax and a pyramid out of some other part, it was nevertheless possible for either figure to have come-to-be out of either part indifferently: that is the manner of coming-to-be when ‘both Fire and Water come-to-be out of any and every part of flesh’. Those, however, who maintain the theory in question, are not at liberty to conceive that ‘both come-to-be out of flesh’ in that manner, but only as a stone and a brick ‘both come-to-be out of a wall’-viz. each out of a different place or part. Similarly (b) even for those who postulate a single matter of their ‘elements’ there is a certain difficulty in explaining how anything is to result from two of them taken together-e.g. from ‘cold’ and hot’, or from Fire and Earth. For if flesh consists of both and is neither of them, nor again is a ‘composition’ of them in which they are preserved unaltered, what alternative is left except to identify the resultant of the two ‘elements’ with their matter? For the passing-away of either ‘element’ produces either the other or the matter.

Perhaps we may suggest the following solution. (i) There are differences of degree in hot and cold. Although, therefore, when either is fully real without qualification, the other will exist potentially; yet, when neither exists in the full completeness of its being, but both by combining destroy one another’s excesses so that there exist instead a hot which (for a ‘hot’) is cold and a cold which (for a ‘cold’) is hot; then what results from these two contraries will be neither their matter, nor either of them existing in its full reality without qualification. There will result instead an ‘intermediate’: and this ‘intermediate’, according as it is potentially more hot than cold or vice versa, will possess a power-of-heating that is double or triple its power-of-cooling, or otherwise related thereto in some similar ratio. Thus all the other bodies will result from the contraries, or rather from the ‘elements’, in so far as these have been ‘combined’: while the elements’ will result from the contraries, in so far as these ‘exist potentially’ in a special sense-not as matter ‘exists potentially’, but in the sense explained above. And when a thing comes-to-be in this manner, the process is cobination’; whereas what comes-to-be in the other manner is matter. Moreover (ii) contraries also ‘suffer action’, in accordance with the disjunctively-articulated definition established in the early part of this work.’ For the actually-hot is potentially-cold and the actually cold potentially-hot; so that hot and cold, unless they are equally balanced, are transformed into one another (and all the other contraries behave in a similar way). It is thus, then, that in the first place the ‘elements’ are transformed; and that (in the second place) out of the ‘elements’ there come-to-be flesh and bones and the like-the hot becoming cold and the cold becoming hot when they have been brought to the ‘mean’. For at the ‘mean’ is neither hot nor cold. The ‘mean’, however, is of considerable extent and not indivisible. Similarly, it is qua reduced to a ‘mean’ condition that the dry and the moist, as well as the contraries we have used as examples, produce flesh and bone and the remaining compounds.

8

All the compound bodies-all of which exist in the region belonging to the central body-are composed of all the ‘simple’ bodies. For they all contain Earth because every ‘simple’ body is to be found specially and most abundantly in its own place. And they all contain Water because (a) the compound must possess a definite outline and Water, alone of the ‘simple’ bodies, is readily adaptable in shape: moreover (b) Earth has no power of cohesion without the moist. On the contrary, the moist is what holds it together; for it would fall

to pieces if the moist were eliminated from it completely.

They contain Earth and Water, then, for the reasons we have given: and they contain Air and Fire, because these are contrary to Earth and Water (Earth being contrary to Air and Water to Fire, in so far as one Substance can be ‘contrary’ to another). Now all compounds presuppose in their coming-to-be constituents which are contrary to one another: and in all compounds there is contained one set of the contrasted extremes. Hence the other set must be contained in them also, so that every compound will include all the ‘simple’ bodies.

Additional evidence seems to be furnished by the food each compound takes. For all of them are fed by substances which are the same as their constituents, and all of them are fed by more substances than one. Indeed, even the plants, though it might be thought they are fed by one substance only, viz. by Water, are fed by more than one: for Earth has been mixed with the Water. That is why farmers too endeavour to mix before watering. Although food is akin to the matter, that which is fed is the ‘figure’-i.e. the ‘form’ taken along with the matter. This fact enables us to understand why, whereas all the ‘simple’ bodies come-to-be out of one another, Fire is the only one of them which (as our predecessors also assert) ‘is fed’. For Fire alone-or more than all the rest-is akin to the ‘form’ because it tends by nature to be borne towards the limit. Now each of them naturally tends to be borne towards its own place; but the ‘figure’-i.e. the ‘form’-Of them all is at the limits.

Thus we have explained that all the compound bodies are composed of all the ‘simple’ bodies.

9

Since some things are such as to come-to-be and pass-away, and since coming-to-be in fact occurs in the region about the centre, we must explain the number and the nature of the ‘originative sources’ of all coming-to-be alike: for a grasp of the true theory of any universal facilitates the understanding of its specific forms.

The ‘originative sources’, then, of the things which come-to-be are equal in number to, and identical in kind with, those in the sphere of the eternal and primary things. For there is one in the sense of ‘matter’, and a second in the sense of ‘form’: and, in addition, the third ‘originative source’ must be present as well.

For the two first are not sufficient to bring things into being, any more than they are adequate to account for the primary things.

Now cause, in the sense of material origin, for the things which are such as to come-to-be is ‘that which can be-and-not-be’: and this is identical with’that which can come-to-be-and-pass-away’, since the latter, while it is at one time, at another time is not. (For whereas some things are of necessity, viz. the eternal things, others of necessity are not. And of these two sets of things, since they cannot diverge from the necessity of their nature, it is impossible for the first not to he and impossible for the second to he. Other things, however, can both be and not he.) Hence coming-to-be and passing-away must occur within the field of ‘that which can be-and not-be’. This, therefore, is cause in the sense of material origin for the things which are such as to come-to-be; while cause, in the sense of their ‘end’, is their ‘figure’ or ‘form’-and that is the formula expressing the essential nature of each of them.

But the third ‘originative source’ must be present as well-the cause vaguely dreamed of by all our predecessors, definitely stated by none of them. On the contrary (a) some

amongst them thought the nature of ‘the Forms’ was adequate to account for coming-to-be. Thus Socrates in the Phaedo first blames everybody else for having given no explanation; and then lays it down; that ‘some things are Forms, others Participants in the Forms’, and that ‘while a thing is said to “be” in virtue of the Form, it is said to “come-to-be” qua sharing in,” to “pass-away” qua “losing,” the ‘Form’. Hence he thinks that ‘assuming the truth of these theses, the Forms must be causes both of coming-to-be and of passing-away’. On the other hand (b) there were others who thought ‘the matter’ was adequate by itself to account for coming-to-be, since ‘the movement originates from the matter’.

Neither of these theories, however, is sound. For (a) if the Forms are causes, why is their generating activity intermittent instead of perpetual and continuous-since there always are Participants as well as Forms? Besides, in some instances we see that the cause is other than the Form. For it is the doctor who implants health and the man of science who implants science, although ‘Health itself’ and ‘Science itself’ are as well as the Participants: and the same principle applies to everything else that is produced in accordance with an art.

On the other hand (b) to say that ‘matter generates owing to its movement’ would be, no doubt, more scientific than to make such statements as are made by the thinkers we have been criticizing. For what ‘alters’ and transfigures plays a greater part in bringing, things into being; and we are everywhere accustomed, in the products of nature and of art alike, to look upon that which can initiate movement as the producing cause. Nevertheless this second theory is not right either.

For, to begin with, it is characteristic of matter to suffer action, i.e. to be moved: but to move, i.e. to act, belongs to a different ‘power’. This is obvious both in the things that come-to-be by art and in those that come to-be by nature. Water does not of itself produce out of itself an animal: and it is the art, not the wood, that makes a bed. Nor is this their only error. They make a second mistake in omitting the more controlling cause: for they eliminate the essential nature, i.e. the ‘form’. And what is more, since they remove the formal cause, they invest the forces they assign to the ‘simple’ bodies-the forces which enable these bodies to bring things into being-with too instrumental a character. For ‘since’ (as they say) ‘it is the nature of the hot to dissociate, of the cold to bring together, and of each remaining contrary either to act or to suffer action’, it is out of such materials and by their agency (so they maintain) that everything else comes-to-be and passes-away. Yet (a) it is evident that even Fire is itself moved, i.e. suffers action.

Moreover (b) their procedure is virtually the same as if one were to treat the saw (and the various instruments of carpentry) as ‘the cause’ of the things that come-to-be: for the wood must be divided if a man saws, must become smooth if he planes, and so on with the remaining tools. Hence, however true it may be that Fire is active, i.e. sets things moving, there is a further point they fail to observe-viz. that Fire is inferior to the tools or instruments in the manner in which it sets things moving.

10

As to our own theory-we have given a general account of the causes in an earlier work,’ we have now explained and distinguished the ‘matter’ and the ‘form’. Further, since the change which is motion has been proved’ to be eternal, the continuity of the occurrence of coming-to-be follows necessarily from what we have established: for the eternal motion, by causing ‘the generator’ to approach and retire, will produce coming-to-be uninterruptedly. At the same time it is clear that we were right when, in an earlier work,’ we called motion (not coming-to-be) ‘the primary form of change’. For it is far more reason-

able that what is should cause the coming-to-be of what is not, than that what is not should cause the being of what is. Now that which is being moved is, but that which is coming-to-be is not: hence, also, motion is prior to coming-to-be.

We have assumed, and have proved, that coming-to-be and passing-away happen to things continuously; and we assert that motion causes coming-to-be. That being so, it is evident that, if the motion be single, both processes cannot occur since they are contrary to one another: for it is a law of nature that the same cause, provided it remain in the same condition, always produces the same effect, so that, from a single motion, either coming-to-be or passing-away will always result. The movements must, on the contrary, be more than one, and they must be contrasted with one another either by the sense of their motion or by its irregularity: for contrary effects demand contraries as their causes.

This explains why it is not the primary motion that causes coming-to-be and passing-away, but the motion along the inclined circle: for this motion not only possesses the necessary continuity, but includes a duality of movements as well. For if coming-to-be and passing-away are always to be continuous, there must be some body always being moved (in order that these changes may not fail) and moved with a duality of movements (in order that both changes, not one only, may result). Now the continuity of this movement is caused by the motion of the whole: but the approaching and retreating of the moving body are caused by the inclination. For the consequence of the inclination is that the body becomes alternately remote and near; and since its distance is thus unequal, its movement will be irregular. Therefore, if it generates by approaching and by its proximity, it-this very same body-destroys by retreating and becoming remote: and if it generates by many successive approaches, it also destroys by many successive retirements. For contrary effects demand contraries as their causes; and the natural processes of passing-away and coming-to-be occupy equal periods of time. Hence, too, the times-i.e. the lives-of the several kinds of living things have a number by which they are distinguished: for there is an Order controlling all things, and every time (i.e. every life) is measured by a period. Not all of them, however, are measured by the same period, but some by a smaller and others by a greater one: for to some of them the period, which is their measure, is a year, while to some it is longer and to others shorter.

And there are facts of observation in manifest agreement with our theories. Thus we see that coming-to-be occurs as the sun approaches and decay as it retreats; and we see that the two processes occupy equal times. For the durations of the natural processes of passing-away and coming-to-be are equal. Nevertheless it Often happens that things pass-away in too short a time. This is due to the ‘intermingling’ by which the things that come-to-be and pass-away are implicated with one another. For their matter is ‘irregular’, i.e.

is not everywhere the same: hence the processes by which they come-to-be must be ‘irregular’ too, i.e. some too quick and others too slow. Consequently the phenomenon in question occurs, because the ‘irregular’ coming-to-be of these things is the passing-away of other things.

Coming-to-be and passing-away will, as we have said, always be continuous, and will never fail owing to the cause we stated. And this continuity has a sufficient reason on our theory. For in all things, as we affirm, Nature always strives after ‘the better’. Now ‘being’ (we have explained elsewhere the exact variety of meanings we recognize in this term) is better than ‘not-being’: but not all things can possess ‘being’, since they are too far removed from the ‘originative source. ‘God therefore adopted the remaining alternative, and fulfilled the perfection of the universe by making coming-to-be uninterrupted: for the

greatest possible coherence would thus be secured to existence, because that ‘coming-to-be should itself come-to-be perpetually’ is the closest approximation to eternal being.

The cause of this perpetuity of coming-to-be, as we have often said, is circular motion: for that is the only motion which is continuous.

That, too, is why all the other things-the things, I mean, which are reciprocally transformed in virtue of their ‘passions’ and their ‘powers of action’ e.g. the ‘simple’ bodiesimitate circular motion.

For when Water is transformed into Air, Air into Fire, and the Fire back into Water, we say the coming-to-be ‘has completed the circle’, because it reverts again to the beginning. Hence it is by imitating circular motion that rectilinear motion too is continuous.

These considerations serve at the same time to explain what is to some people a baffling problem-viz. why the ‘simple’ bodies, since each them is travelling towards its own place, have not become dissevered from one another in the infinite lapse of time. The reason is their reciprocal transformation. For, had each of them persisted in its own place instead of being transformed by its neighbour, they would have got dissevered long ago. They are transformed, however, owing to the motion with its dual character: and because they are transformed, none of them is able to persist in any place allotted to it by the Order.

It is clear from what has been said (i) that coming-to-be and passing-away actually occur, (ii) what causes them, and (iii) what subject undergoes them. But (a) if there is to be movement (as we have explained elsewhere, in an earlier work’) there must be something which initiates it; if there is to be movement always, there must always be something which initiates it; if the movement is to be continuous, what initiates it must be single, unmoved, ungenerated, and incapable of ‘alteration’; and if the circular movements are more than one, their initiating causes must all of them, in spite of their plurality, be in some way subordinated to a single ‘originative source’. Further (b) since time is continuous, movement must be continuous, inasmuch as there can be no time without movement.

Time, therefore, is a ‘number’ of some continuous movement-a ‘number’, therefore, of the circular movement, as was established in the discussions at the beginning. But (c) is movement continuous because of the continuity of that which is moved, or because that in which the movement occurs (I mean, e.g. the place or the quality) is continuous? The answer must clearly be ‘because that which is moved is continuous’. (For how can the quality be continuous except in virtue of the continuity of the thing to which it belongs? But if the continuity of ‘that in which’ contributes to make the movement continuous, this is true only of ‘the place in which’; for that has ‘magnitude’ in a sense.) But (d) amongst continuous bodies which are moved, only that which is moved in a circle is ‘continuous’ in such a way that it preserves its continuity with itself throughout the movement. The conclusion therefore is that this is what produces continuous movement, viz. the body which is being moved in a circle; and its movement makes time continuous.

11

Wherever there is continuity in any process (coming-to-be or ‘alteration’ or any kind of change whatever) we observe consecutiveness’, i.e. this coming-to-be after that without any interval. Hence we must investigate whether, amongst the consecutive members, there is any whose future being is necessary; or whether, on the contrary, every one of them may fail to come-to-be. For that some of them may fail to occur, is clear. (a) We need only appeal to the distinction between the statements ‘x will be’ and ‘x is about to

which depends upon this fact. For if it be true to say of x that it ‘will be’, it must at some time be true to say of it that ‘it is’: whereas, though it be true to say of x now that ‘it is about to occur’, it is quite possible for it not to come-to-be-thus a man might not walk, though he is now ‘about to’ walk. And (b) since (to appeal to a general principle) amongst the things which ‘are’ some are capable also of ‘not-being’, it is clear that the same ambiguous character will attach to them no less when they are coming-to-be: in other words, their coming-to-be will not be necessary.

Then are all the things that come-to-be of this contingent character? Or, on the contrary, is it absolutely necessary for some of them to come-to-be? Is there, in fact, a distinction in the field of ‘coming-to-be’ corresponding to the distinction, within the field of ‘being’, between things that cannot possibly ‘not-be’ and things that can ‘not-be’? For instance, is it necessary that solstices shall come-to-be, i.e. impossible that they should fail to be able to occur? Assuming that the antecedent must have come-to-be if the consequent is to be (e.g. that foundations must have come-to-be if there is to be a house: clay, if there are to be foundations), is the converse also true? If foundations have come-to-be, must a house come-to-be? The answer seems to be that the necessary nexus no longer holds, unless it is ‘necessary’ for the consequent (as well as for the antecedent) to come-to-be-’necessary’ absolutely. If that be the case, however, ‘a house must come to-be if foundations have come-to-be’, as well as vice versa. For the antecedent was assumed to be so related to the consequent that, if the latter is to be, the antecedent must have come-tobe before it. If, therefore, it is necessary that the consequent should come-to-be, the antecedent also must have come-to-be: and if the antecedent has come-to-be, then the consequent also must come-to-be-not, however, because of the antecedent, but because the future being of the consequent was assumed as necessary. Hence, in any sequence, when the being of the consequent is necessary, the nexus is reciprocal-in other words, when the antecedent has come-to-be the consequent must always come-to-be too.

Now (i) if the sequence of occurrences is to proceed ad infinitum ‘downwards’, the coming to-be of any determinate ‘this’ amongst the later members of the sequence will not be absolutely, but only conditionally, necessary. For it will always be necessary that some other member shall have come-to-be before ‘this’ as the presupposed condition of the necessity that ‘this’ should come-to-be: consequently, since what is ‘infinite’ has no ‘originative source’, neither will there be in the infinite sequence any ‘primary’ member which will make it ‘necessary’ for the remaining members to come-to-be.

Nor again (ii) will it be possible to say with truth, even in regard to the members of a limited sequence, that it is ‘absolutely necessary’ for any one of them to come-to-be. We cannot truly say, e.g. that ‘it is absolutely necessary for a house to come-to-be when foundations have been laid’: for (unless it is always necessary for a house to be coming-to-be) we should be faced with the consequence that, when foundations have been laid, a thing, which need not always be, must always be. No: if its coming-to-be is to be ‘necessary’, it must be ‘always’ in its coming-to-be. For what is ‘of necessity’ coincides with what is ‘always’, since that which ‘must be’ cannot possibly ‘not-be’. Hence a thing is eternal if its ‘being’ is necessary: and if it is eternal, its ‘being’ is necessary. And if, therefore, the ‘coming-to-be’ of a thing is necessary, its ‘coming-to-be’ is eternal; and if eternal, necessary.

It follows that the coming-to-be of anything, if it is absolutely necessary, must be cyclical-i.e. must return upon itself. For coming to-be must either be limited or not limited: and if not limited, it must be either rectilinear or cyclical. But the first of these last two alternatives is impossible if coming-to-be is to be eternal, because there could not be any ‘origi-

native source' whatever in an infinite rectilinear sequence, whether its members be taken 'downwards' (as future events) or 'upwards' (as past events). Yet coming-to-be must have an 'originative source' (if it is to be necessary and therefore eternal), nor can it be eternal if it is limited. Consequently it must be cyclical. Hence the nexus must be reciprocal. By this I mean that the necessary occurrence of 'this' involves the necessary occurrence of its antecedent: and conversely that, given the antecedent, it is also necessary for the consequent to come-to-be. And this reciprocal nexus will hold continuously throughout the sequence: for it makes no difference whether the reciprocal nexus, of which we are speaking, is mediated by two, or by many, members.

It is in circular movement, therefore, and in cyclical coming-to-be that the 'absolutely necessary' is to be found. In other words, if the coming-to-be of any things is cyclical, it is 'necessary' that each of them is coming-to-be and has come-to-be: and if the coming-to-be of any things is 'necessary', their coming-to-be is cyclical.

The result we have reached is logically concordant with the eternity of circular motion, i.e. the eternity of the revolution of the heavens (a fact which approved itself on other and independent evidence),' since precisely those movements which belong to, and depend upon, this eternal revolution 'come-to-be' of necessity, and of necessity 'will be'. For since the revolving body is always setting something else in motion, the movement of the things it moves must also be circular. Thus, from the being of the 'upper revolution' it follows that the sun revolves in this determinate manner; and since the sun revolves thus, the seasons in consequence come-to-be in a cycle, i.e. return upon themselves; and since they come-to-be cyclically, so in their turn do the things whose coming-to-be the seasons initiate.

Then why do some things manifestly come to-be in this cyclical fashion (as, e.g. showers and air, so that it must rain if there is to be a cloud and, conversely, there must be a cloud if it is to rain), while men and animals do not 'return upon themselves' so that the same individual comes-to-be a second time (for though your coming-to-be presupposes your father's, his coming-to-be does not presuppose yours)? Why, on the contrary, does this coming-to-be seem to constitute a rectilinear sequence? In discussing this new problem, we must begin by inquiring whether all things 'return upon themselves' in a uniform manner; or whether, on the contrary, though in some sequences what recurs is numerically the same, in other sequences it is the same only in species. In consequence of this distinction, it is evident that those things, whose 'substance'-that which is undergoing the process-is imperishable, will be numerically, as well as specifically, the same in their recurrence: for the character of the process is determined by the character of that which undergoes it. Those things, on the other hand, whose 'substance' is perish, able (not imperishable) must 'return upon themselves' in the sense that what recurs, though specifically the same, is not the same numerically. That why, when Water comes-to-be from Air and Air from Water, the Air is the same 'specifically', not 'numerically': and if these too recur numerically the same, at any rate this does not happen with things whose 'substance' comes-to-be-whose 'substance' is such that it is essentially capable of not-being.

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