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Book 1

All men naturally desire knowledge. An indication of this is our esteem for the senses; for apart from their use we esteem them for their own sake, and most of all the sense of sight. Not only with a view to action, but even when no action is contemplated, we prefer sight, generally speaking, to all the other senses.
The reason of this is that of all the senses sight best helps us to know things, and reveals many distinctions.

Now animals are by nature born with the power of sensation, and from this some acquire the faculty of memory, whereas others do not. Accordingly the former are more intelligent and capable of learning than those which cannot remember.
Such as cannot hear sounds (as the bee, and any other similar type of creature) are intelligent, but cannot learn; those only are capable of learning which possess this sense in addition to the faculty of memory.

Thus the other animals live by impressions and memories, and have but a small share of experience; but the human race lives also by art and reasoning.
It is from memory that men acquire experience, because the numerous memories of the same thing eventually produce the effect of a single experience. Experience seems very similar to science and art,
but actually it is through experience that men acquire science and art; for as Polus rightly says, "experience produces art, but inexperience chance." [1] Art is produced when from many notions of experience a single universal judgement is formed with regard to like objects.
To have a judgement that when Callias was suffering from this or that disease this or that benefited him, and similarly with Socrates and

[1] *Plat. Gorgias 448c*, *Plat. Gorg. 462b-c.*

various other individuals, is a matter of experience; but to judge that it benefits all persons of a certain type, considered as a class, who suffer from this or that disease (e.g. the phlegmatic or bilious when suffering from burning fever) is a matter of art.
It would seem that for practical purposes experience is in no way inferior to art; indeed we see men of experience succeeding more than those who have theory without experience.
The reason of this is a that experience is knowledge of particulars, but art of universals; and actions and the effects produced are all concerned with the particular. For it is not man that the physician cures, except incidentally, but Callias or Socrates or some other person similarly named, who is incidentally a man as well.
So if a man has theory without experience, and knows the universal, but does not know the particular contained in it, he will often fail in his treatment; for it is the particular that must be treated.
Nevertheless we consider that knowledge and proficiency belong to art rather than to experience, and we assume that artists are wiser than men of mere experience (which implies that in all cases wisdom depends rather upon knowledge);
and this is because the former know the cause, whereas the latter do not. For the experienced know the fact, but not the wherefore; but the artists know the wherefore and the cause. For the same reason we consider that the master craftsmen in every profession are more estimable and know more and are wiser than the artisans, because they know the reasons of the things which are done; but we think that the artisans, like certain inanimate objects, do things, but without knowing what they are doing (as, for instance, fire burns);
only whereas inanimate objects perform all their actions in virtue of a certain natural quality, artisans perform theirs through habit. Thus the master craftsmen are superior in wisdom, not because they can do things, but because they possess a theory and know the causes.

In general the sign of knowledge or ignorance is the ability to teach, and for this reason we hold that art rather than experience is scientific knowledge; for the artists can teach, but the others cannot.
Further, we do not consider any of the senses to be Wisdom. They are indeed our chief sources of knowledge about particulars, but they do not tell us the reason for anything, as for example why fire is hot, but only that it *is* hot.
It is therefore probable that at first the inventor of any art which went further than the ordinary sensations was admired by his fellow-men, not merely because some of his inventions were useful, but as being a

wise and superior person.

And as more and more arts were discovered, some relating to the necessities and some to the pastimes of life, the inventors of the latter were always considered wiser than those of the former, because their branches of knowledge did not aim at utility.

Hence when all the discoveries of this kind were fully developed, the sciences which relate neither to pleasure nor yet to the necessities of life were invented, and first in those places where men had leisure. Thus the mathematical sciences originated in the neighborhood of Egypt, because there the priestly class was allowed leisure.[2]

The difference between art and science and the other kindred mental activities has been stated in the*Ethics*[3]; the reason for our present discussion is that it is generally assumed that what is called Wisdom[4] is concerned with the primary causes and principles, so that, as has been already stated, the man of experience is held to be wiser than the mere possessors of any power of sensation, the artist than the man of experience, the master craftsman than the artisan; and the speculative sciences to be more learned than the productive. Thus it is clear that Wisdom is knowledge of certain principles and causes.

Since we are investigating this kind of knowledge, we must consider what these causes and principles are whose knowledge is Wisdom. Perhaps it will be clearer if we take the opinions which we hold about the wise man.

We consider first, then, that the wise man knows all things, so far as it is possible, without having knowledge of every one of them individually; next, that the wise man is he who can comprehend difficult things, such as are not easy for human comprehension (for sense-perception, being common to all, is easy, and has nothing to do with Wisdom); and further that in every branch of knowledge a man is wiser in proportion as he is more accurately informed and better able to expound the causes.

Again among the sciences we consider that that science which is desirable in itself and for the sake of knowledge is more nearly Wisdom than that which is desirable for its results, and that the superior is more nearly Wisdom than the subsidiary; for the wise man should give orders, not receive them; nor should he obey others, but the less wise should obey him.

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[2] Cf. *Plat. Phaedrus 274*, *Hdt. 2.109.*

[3] *Aristot. Nic. Eth. 6.1139b 14-1141b 8.*

[4] i.e. Metaphysics.

Such in kind and in number are the opinions which we hold with regard to Wisdom and the wise. Of the qualities there described the knowledge of everything must necessarily belong to him who in the highest degree possesses knowledge of the universal, because he knows in a sense all the particulars which it comprises. These things, viz. the most universal, are perhaps the hardest for man to grasp, because they are furthest removed from the senses.

Again, the most exact of the sciences are those which are most concerned with the first principles; for those which are based on fewer principles are more exact than those which include additional principles; e.g., arithmetic is more exact than geometry.

Moreover, the science which investigates causes is more instructive than one which does not, for it is those who tell us the causes of any particular thing who instruct us. Moreover, knowledge and understanding which are desirable for their own sake are most attainable in the knowledge of that which is most knowable. For the man who desires knowledge for its own sake will most desire the most perfect knowledge, and this is the knowledge of the most knowable, and the things which are most knowable are first principles and causes; for it is through these and from these that other things come to be known, and not these through the particulars which fall under them.

And that science is supreme, and superior to the subsidiary, which knows for what end each action is to be done; i.e. the Good in each particular case, and in general the highest Good in the whole of nature.

Thus as a result of all the above considerations the term which we are investigating falls under the same science, which must speculate about first principles and causes; for the Good, i.e. the *end* , is one of the causes.

That it is not a productive science is clear from a consideration of the first philosophers.

It is through wonder that men now begin and originally began to philosophize; wondering in the first place at obvious perplexities, and then by gradual progression raising questions about the greater matters too, e.g. about the changes of the moon and of the sun, about the stars and about the origin of the universe.

Now he who wonders and is perplexed feels that he is ignorant (thus the myth-lover is in a sense a philosopher, since myths are composed of wonders); therefore if it was to escape ignorance that men studied philosophy, it is obvious that they pursued science for the sake of knowledge, and not for any practical utility.

The actual course of events bears witness to this; for speculation of

this kind began with a view to recreation and pastime, at a time when practically all the necessities of life were already supplied. Clearly then it is for no extrinsic advantage that we seek this knowledge; for just as we call a man independent who exists for himself and not for another, so we call this the only independent science, since it alone exists for itself.

For this reason its acquisition might justly be supposed to be beyond human power, since in many respects human nature is servile; in which case, as Simonides[5] says, "God alone can have this privilege," and man should only seek the knowledge which is within his reach.

Indeed if the poets are right and the Deity is by nature jealous, it is probable that in this case He would be particularly jealous, and all those who excel in knowledge unfortunate. But it is impossible for the Deity to be jealous (indeed, as the proverb[6] says, "poets tell many a lie"), nor must we suppose that any other form of knowledge is more precious than this; for what is most divine is most precious.

Now there are two ways only in which it can be divine. A science is divine if it is peculiarly the possession of God, or if it is concerned with divine matters. And this science alone fulfils both these conditions; for (a) all believe that God is one of the causes and a kind of principle, and (b) God is the sole or chief possessor of this sort of knowledge. Accordingly, although all other sciences are more necessary than this, none is more excellent.

The acquisition of this knowledge, however, must in a sense result in something which is the reverse of the outlook with which we first approached the inquiry. All begin, as we have said, by wondering that things should be as they are, e.g. with regard to marionettes, or the solstices, or the incommensurability[7] of the diagonal of a square; because it seems wonderful to everyone who has not yet perceived the cause that a thing should not be measurable by the smallest unit.

But we must end with the contrary and (according to the proverb)[8] the better view, as men do even in these cases when they understand them; for a geometrician would wonder at nothing so much as if the diagonal were to become measurable.

Thus we have stated what is the nature of the science which we

[5] *Simon. Fr. 3 (Hiller).*

[6] Cf. *Solon, Fr. 26 (Hiller)*; Leutsch and Schneidwin, *Paroemiographi*, 1.371.

[7] i.e. the fact that the diagonal of a square cannot be rationally expressed in terms of the side.

[8] i.e. *δευτέρον ἀμεινόνων*("second thoughts are better"). Leutsch and Schneidwin 1.62.

are seeking, and what is the object which our search and our whole investigation must attain.

It is clear that we must obtain knowledge of the primary causes, because it is when we think that we understand its primary cause that we claim to know each particular thing. Now there are four recognized kinds of cause. Of these we hold that one is the essence or essential nature of the thing (since the "reason why" of a thing is ultimately reducible to its formula, and the ultimate "reason why" is a cause and principle); another is the matter or substrate; the third is the source of motion; and the fourth is the cause which is opposite to this, namely the purpose or "good";

for this is the end of every generative or motive process. We have investigated these sufficiently in the *Physics*[9]; however, let us avail ourselves of the evidence of those who have before us approached the investigation of reality and philosophized about Truth. For clearly they too recognize certain principles and causes, and so it will be of some assistance to our present inquiry if we study their teaching; because we shall either discover some other kind of cause, or have more confidence in those which we have just described.

Most of the earliest philosophers conceived only of material principles as underlying all things. That of which all things consist, from which they first come and into which on their destruction they are ultimately resolved, of which the essence persists although modified by its affections—this, they say, is an element and principle of existing things. Hence they believe that nothing is either generated or destroyed, since this kind of primary entity always persists. Similarly we do not say that Socrates comes into being *absolutely* when he becomes handsome or cultured, nor that he is destroyed when he loses these qualities; because the substrate, Socrates himself, persists.

In the same way nothing else is generated or destroyed; for there is some one entity (or more than one) which always persists and from which all other things are generated.

All are not agreed, however, as to the number and character of these principles. Thales,[10] the founder of this school of philosophy,[11] says the permanent entity is water (which is why he also propounded that the earth floats on water). Presumably he derived this assumption from seeing that the nutriment of everything is moist, and that heat

[9] *Phys. 2.3*, *Phys. 2.7*

[10] Thales of Miletus, fl. 585 B.C.

[11] That of the Ionian monists, who sought a single material principle of everything.

itself is generated from moisture and depends upon it for its existence (and that from which a thing is generated is always its first principle). He derived his assumption, then, from this; and also from the fact that the seeds of everything have a moist nature, whereas water is the first principle of the nature of moist things.

There are some[12] who think that the men of very ancient times, long before the present era, who first speculated about the gods, also held this same opinion about the primary entity. For they[13] represented Oceanus and Tethys to be the parents of creation, and the oath of the gods to be by water—Styx,[14] as they call it. Now what is most ancient is most revered, and what is most revered is what we swear by.

Whether this view of the primary entity is really ancient and time-honored may perhaps be considered uncertain; however, it is said that this was Thales' opinion concerning the first cause. (I say nothing of Hippo,[15] because no one would presume to include him in this company, in view of the paltriness of his intelligence.)

Anaximenes[16] and Diogenes[17] held that air is prior to water, and is of all corporeal elements most truly the first principle. Hippasus[18] of Metapontum and Heraclitus[19] of Ephesus hold this of fire; and Empedocles[20]—adding earth as a fourth to those already mentioned—takes all four. These, he says, always persist, and are only generated in respect of multitude and paucity, according as they are combined into unity or differentiated out of unity.[21]

Anaxagoras of Clazomenae—prior to Empedocles in point of age, but posterior in his activities—says that the first principles are infinite in number. For he says that as a general rule all things which are, like fire and water,[22] homoeomerous, are generated and destroyed in this sense only, by combination and differentiation; otherwise they are neither

[12]Cf. *Plat. Crat. 402b*, *Plat. Theaet. 152e*, *Plat. Theaet. 180c,d.*

[13]cf. *Hom. Il. 14. 201*, *Hom. Il. 14.246.*

[14]Cf. *Hom. Il. 2.755*, *Hom. Il. 14.271*, *Hom. Il.15.37.*

[15]Hippo of Samos, a medical writer and eclectic philosopher who lived in the latter half of the fifth century B.C. Cf.*Aristot. De Anima 405b 2.*

[16]The third Milesian monist; fl. circa 545 B.C.

[17]Diogenes of Apollonia, an eclectic philosopher roughly contemporary with Hippo.

[18]A Pythagorean, probably slightly junior to Heraclitus.

[19]Fl. about 500 B.C.

[20]Of Acragas; fl. 450 B.C.

[21]Cf. *Empedocles, Fr. 17 (Diels), R.P. 166; Burnet, E.G.P. 108-109.*

[22]This is Aristotle's illustration; apparently Anaxagoras did not regard the "elements" as homoeomerous (i.e. composed of parts which are similar to one another and to the whole). Cf. *Aristot. De Caelo 302a 28*, *Aristot. De Gen. et Corr. 314a 24.*

generated nor destroyed, but persist eternally.[23]
From this account it might be supposed that the only cause is of the kind called "material." But as men proceeded in this way, the very circumstances of the case led them on and compelled them to seek further; because if it is really true that all generation and destruction is out of some one entity or even more than one, *why* does this happen, and what is the cause?
It is surely not the substrate itself which causes itself to change. I mean, e.g., that neither wood nor bronze is responsible for changing itself; wood does not make a bed, nor bronze a statue, but something else is the cause of the change. Now to investigate this is to investigate the second type of cause: the source of motion, as we should say.
Those who were the very first to take up this inquiry, and who maintained that the substrate is one thing, had no misgivings on the subject; but some of those[24] who regard it as one thing, being baffled, as it were, by the inquiry, say that that one thing (and indeed the whole physical world) is immovable in respect not only of generation and destruction (this was a primitive belief and was generally admitted) but of all other change. This belief is peculiar to them.
None of those who maintained that the universe is a unity achieved any conception of this type of cause, except perhaps Parmenides[25]; and him only in so far as he admits, in a sense, not one cause only but two.[26]
But those who recognize more than one entity, e.g. hot and cold, or fire and earth, are better able to give a systematic explanation, because they avail themselves of fire as being of a kinetic nature, and of water, earth, etc., as being the opposite.[27]

After these thinkers and the discovery of these causes, since they were insufficient to account for the generation of the actual world, men were again compelled (as we have said) by truth itself to investigate the next first principle.
For presumably it is unnatural that either fire or earth or any other such element should cause existing things to be or become well and beautifully disposed; or indeed that those thinkers should hold such a view. Nor again was it satisfactory to commit so important a matter to spontaneity and chance.

[23] Cf. *Anaxagoras Fr. 4 (Diels)*; and see Burnet, E.G.P. 130.
[24] i.e. the Eleatic school.
[25] Founder of the above; fl. about 475.
[26] i.e. in the *Δόξα*. *Parmenides Fr. 8 (Diels)*; R.P. 121.
[27] Aristotle is probably thinking of Empedocles. Cf. *Aristot. Met. 4.8.*

Hence when someone[28] said that there is Mind in nature, just as in animals, and that this is the cause of all order and arrangement, he seemed like a sane man in contrast with the haphazard statements of his predecessors.[29]

We know definitely that Anaxagoras adopted this view; but Hermotimus[30] of Clazomenae is credited with having stated it earlier. Those thinkers, then, who held this view assumed a principle in things which is the cause of beauty, and the sort of cause by which motion is communicated to things.

It might be inferred that the first person to consider this question was Hesiod, or indeed anyone else who assumed Love or Desire as a first principle in things; e.g. Parmenides. For he says, where he is describing the creation of the universe, " Love she[31] created first of all the gods . . . "*Parmenides Fr. 13 (Diels)*And Hesiod says,[32] " First of all things was Chaos made, and then/Broad-bosomed Earth . . ./And Love, the foremost of immortal beings, " thus implying that there must be in the world some cause to move things and combine them.

The question of arranging these thinkers in order of priority may be decided later. Now since it was apparent that nature also contains the opposite of what is good, i.e. not only order and beauty, but disorder and ugliness; and that there are more bad and common things than there are good and beautiful: in view of this another thinker introduced Love and Strife[33] as the respective causes of these things—

because if one follows up and appreciates the statements of Empedocles with a view to his real meaning and not to his obscure language, it will be found that Love is the cause of good, and Strife of evil. Thus it would perhaps be correct to say that Empedocles in a sense spoke of evil and good as first principles, and was the first to do so—that is, if the cause of all good things is absolute good.

These thinkers then, as I say, down to the time of Empedocles, seem to have grasped two of the causes which we have defined in the *Physics*[34]: the material cause and the source of motion; but only vaguely and indefinitely. They are like untrained soldiers in a battle, who rush about and often strike good blows, but without science; in the same

[28] Anaxagoras.

[29] Cf. *Plat. Phaedo 97b-98b.*

[30] A semi-mythical person supposed to have been a preincarnation of Pythagoras.

[31] Probably Aphrodite (so Simplicius, Plutarch).

[32] *Hes. Th. 116-20.* The quotation is slightly inaccurate.

[33] *Empedocles Fr. 17, 26 (Diels)*; R.P. 166. Cf. Burnet, E.G.P. 108 ff.

[34] *Aristot. Phys. 2.3, 7.*

way these thinkers do not seem to understand their own statements, since it is clear that upon the whole they seldom or never apply them. Anaxagoras avails himself of Mind as an artificial device for producing order, and drags it in whenever he is at a loss to explain some necessary result; but otherwise he makes anything rather than Mind the cause of what happens.[35] Again, Empedocles does indeed use causes to a greater degree than Anaxagoras, but not sufficiently; nor does he attain to consistency in their use.

At any rate Love often differentiates and Strife combines: because whenever the universe is differentiated into its elements by Strife, fire and each of the other elements are agglomerated into a unity; and whenever they are all combined together again by Love, the particles of each element are necessarily again differentiated.

Empedocles, then, differed from his predecessors in that he first introduced the division of this cause, making the source of motion not one but two contrary forces.

Further, he was the first to maintain that the so-called material elements are four—not that he uses them as four, but as two only, treating fire on the one hand by itself, and the elements opposed to it—earth, air and water—on the other, as a single nature.[36] This can be seen from a study of his writings.[37]

Such, then, as I say, is his account of the nature and number of the first principles.

Leucippus,[38] however, and his disciple Democritus[39] hold that the elements are the Full and the Void—calling the one "what is" and the other "what is not." Of these they identify the full or solid with "what is," and the void or rare with "what is not" (hence they hold that what is not is no less real than what is,[40] because Void is as real as Body); and they say that these are the material causes of things.

And just as those who make the underlying substance a unity generate all other things by means of its modifications, assuming rarity and density as first principles of these modifications, so these thinkers hold that the "differences"[41] are the causes of everything else.

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[35] Cf. *Plat. Phaedo 98b*, *Plat. Laws 967b*; also *Aristot. Met. 7.5.*

[36] Cf. 3.14.

[37] e.g. *Empedocles, Fr. 62 (Diels).*

[38] Of Miletus; fl. circa 440 (?) B.C. See Burnet, E.G.P. 171 ff.

[39] Of Abdera; fl. circa 420 B.C. E.G.P loc. cit.

[40] For the probable connection between the Atomists and the Eleatics see E.G.P. 173, 175, and cf. *De Gen. et Corr. 324b 35-325a 32.*

[41] i.e., of the atoms.

These differences, they say, are three: shape, arrangement, and position; because they hold that what is differs only in contour, inter-contact, and *inclination* .[42](Of these contour means shape, inter-contact arrangement, and inclination position.) Thus, e.g., A differs from N in shape, AN from NA in arrangement, and Z from N[43] in position.

As for motion, whence and how it arises in things, they casually ignored this point, very much as the other thinkers did. Such, then, as I say, seems to be the extent of the inquiries which the earlier thinkers made into these two kinds of cause.

At the same time, however, and even earlier the so-called[44] Pythagoreans applied themselves to mathematics, and were the first to develop this science[45]; and through studying it they came to believe that its principles are the principles of everything.

And since *numbers* are by nature first among these principles, and they fancied that they could detect in numbers, to a greater extent than in fire and earth and water, many analogues[46] of what is and comes into being—such and such a property of number being *justice* ,[47] and such and such *soul* or *mind* , another *opportunity* , and similarly, more or less, with all the rest—and since they saw further that the properties and ratios of the musical scales are based on numbers,[48] and since it seemed clear that all other things have their whole nature modelled upon numbers, and that numbers are the ultimate things in the whole physical universe, they assumed the elements of numbers to be the elements of everything, and the whole universe to be a proportion[49] or number. Whatever analogues to the processes and parts of the heavens and to the whole order of the universe they could exhibit in numbers and proportions, these they collected and correlated;

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[42]Cf. R.P. 194.

[43]These letters will convey Aristotle's point better to the English reader, but see critical note.

[44]Aristotle seems to have regarded Pythagoras as a legendary person.

[45]Pythagoras himself (fl. 532 B.C.) is said by Aristoxenus (ap. *Stobaeus 1.20.1*) to have been the first to make a theoretical study of arithmetic.

[46]Cf. *Aristot. Met. 14.6ff.*.

[47]Apparently (cf. infra, *Aristot. Met. 1.17*) they identified these not only with properties of number but with numbers themselves. Thus justice (properly=squareness)=4, the first square number; soul or mind=1, opportunity=7 (Alexander).

[48]Pythagoras himself is credited with having discovered the ratios of the octave (2 : 1), the fifth (3 : 2) and the fourth (4 : 3). Burnet, E.G.P. 51.

[49]Or "harmony." Cf. *Aristot. De Caelo 2.9*, and E.G.P. 152.

and if there was any deficiency anywhere, they made haste to supply it, in order to make their system a connected whole. For example, since the decad is considered to be a complete thing and to comprise the whole essential nature of the numerical system, they assert that the bodies which revolve in the heavens are ten; and there being only nine[50] that are visible, they make the "antichthon"[51] the tenth.

We have treated this subject in greater detail elsewhere[52]; but the object of our present review is to discover from these thinkers too what causes they assume and how these coincide with our list of causes.

Well, it is obvious that these thinkers too consider number to be a first principle, both as the material[53] of things and as constituting their properties and states.[54] The elements of number, according to them, are the Even and the Odd. Of these the former is limited and the latter unlimited; Unity consists of both (since it is both odd and even)[55]; number is derived from Unity; and numbers, as we have said, compose the whole sensible universe.

Others[56] of this same school hold that there are ten principles, which they enunciate in a series of corresponding pairs: (1.) Limit and the Unlimited; (2.) Odd and Even; (3.) Unity and Plurality; (4.) Right and Left; (5.) Male and Female; (6.) Rest and Motion; (7.) Straight and Crooked; (8.) Light and Darkness; (9.) Good and Evil; (10.) Square and Oblong.

Apparently Alcmaeon of Croton speculated along the same lines, and either he derived the theory from them or they from him; for [Alcmaeon was contemporary with the old age of Pythagoras, and][57] his doctrines were very similar to theirs.[58] He says that the majority of things in the world of men are in pairs; but the contraries which he mentions are not, as in the case of the Pythagoreans, carefully defined, but are taken at random, e.g. white and black, sweet and bitter, good and bad, great and small.

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[50]Earth, sun, moon, five planets, and the sphere of the fixed stars.

[51]i.e. "counter-earth"; a planet revolving round the "central fire" in such a way as to be always in opposition to the earth.

[52]In the lost work *On the Pythagoreans*; but cf. *Aristot. De Caelo 2.13.*

[53]See Burnet, E.G.P 143-146.

[54]i.e., as a formal principle. Cf. Ross ad loc.

[55]Either because by addition it makes odd numbers even and even odd (Alexander, Theo Smyrnaeus) or because it was regarded as the principle of both odd and even numbers (Heath).

[56]Zeller attributes the authorship of this theory to Philolaus.

[57]This statement is probably true, but a later addition.

[58]He was generally regarded as a Pythagorean.

Thus Alcmaeon only threw out vague hints with regard to the other instances of contrariety, but the Pythagoreans pronounced how many and what the contraries are. Thus from both these authorities[59] we can gather thus much, that the contraries are first principles of things; and from the former, how many and what the contraries are.

How these can be referred to our list of causes is not definitely expressed by them, but they appear to reckon their elements as material; for they say that these are the original constituents of which Being is fashioned and composed.

From this survey we can sufficiently understand the meaning of those ancients who taught that the elements of the natural world are a plurality. Others, however, theorized about the universe as though it were a single entity; but their doctrines are not all alike either in point of soundness or in respect of conformity with the facts of nature.

For the purposes of our present inquiry an account of their teaching is quite irrelevant, since they do not, while assuming a unity, at the same time make out that Being is generated from the unity as from matter, as do some physicists, but give a different explanation; for the physicists assume motion also, at any rate when explaining the generation of the universe; but these thinkers hold that it is immovable. Nevertheless thus much is pertinent to our present inquiry.

It appears that Parmenides conceived of the Unity as one in definition,[60] but Melissus[61] as materially one. Hence the former says that it is finite,[62] and the latter that it is infinite.[63] But Xenophanes,[64] the first exponent of the Unity (for Parmenides is said to have been his disciple), gave no definite teaching, nor does he seem to have grasped either of these conceptions of unity; but regarding the whole material universe he stated that the Unity is God.

This school then, as we have said, may be disregarded for the purposes of our present inquiry; two of them, Xenophanes and Melissus, may

[59] The section of Pythagoreans mentioned in 6, and Alcmaeon.

[60] His argument was "Everything that is is one, if "what is" has one meaning" (*πάντα ἕν, εἰ τὸ ὂν ἓν σημαίνει*, *Aristot. Phys. 187a 1*); but he probably believed, no less than Melissus, in the material unity of reality. Cf. *Melissus Fr. 8 (Diels).* It has been suggested, however (by the Rev. C. F. Angus), that he was simply trying to convey in figurative language a conception of absolute existence.

[61] Of Samos; defeated the Athenian fleet in 441 B.C.

[62] *Melissus Fr. 8, ll. 32-3, 42-3.*

[63] *Melissus Fr. 3.*

[64] Of Colophon, b. 565 (?) B.C. Criticized and ridiculed most of the views of his day, especially the anthropomorphic conception of the gods. Burnet, E.G.P. 55 ff., esp. 61-62. Cf. *Xenophanes Fr. 23 (Diels).*

be completely ignored, as being somewhat too crude in their views. Parmenides, however, seems to speak with rather more insight. For holding as he does that Not-being, as contrasted with Being, is nothing, he necessarily supposes that Being is one and that there is nothing else (we have discussed this point in greater detail in the *Physics*[65]); but being compelled to accord with phenomena, and assuming that Being is one in definition but many in respect of sensation, he posits in his turn two causes, i.e. two first principles, Hot and Cold; or in other words, Fire and Earth. Of these he ranks Hot under Being and the other under Not-being.[66]

From the account just given, and from a consideration of those thinkers who have already debated this question, we have acquired the following information. From the earliest philosophers we have learned that the first principle is corporeal (since water and fire and the like are bodies); some of them assume one and others more than one corporeal principle, but both parties agree in making these principles material. Others assume in addition to this cause the *source of motion*, which some hold to be one and others two.

Thus down to and apart from the Italian[67] philosophers the other thinkers have expressed themselves vaguely on the subject, except that, as we have said, they actually employ two causes, and one of these—the source of motion —some regard as one and others as two. The Pythagoreans, while they likewise spoke of two principles, made this further addition, which is peculiar to them: they believed, not that the Limited and the Unlimited are separate entities, like fire or water or some other such thing, but that the Unlimited itself and the One itself are the essence of those things of which they are predicated, and hence that number is the essence of all things.

Such is the nature of their pronouncements on this subject. They also began to discuss and define the "what" of things; but their procedure was far too simple. They defined superficially, and supposed that the essence of a thing is that to which the term under consideration first applies—e.g. as if it were to be thought that "double" and "2" are the same, because 2 is the first number which is double another.

But presumably "to be double a number" is not the same as "to be the number 2." Otherwise, one thing will be many—a consequence which actually followed in their system.[68] This much, then, can be learned

[65] *Aristot. Phys. 1.3*

[66] Cf. note on *Aristot. Met. 3.13.*

[67] The Pythagoreans; so called because Pythagoras founded his society at Croton.

from other and earlier schools of thought.
The philosophies described above were succeeded by the system of Plato,[69] which in most respects accorded with them, but contained also certain peculiar features distinct from the philosophy of the Italians.
In his youth Plato first became acquainted with Cratylus[70] and the Heraclitean doctrines—that the whole sensible world is always in a state of flux,[71] and that there is no scientific knowledge of it—and in after years he still held these opinions. And when Socrates, disregarding the physical universe and confining his study to moral questions, sought in this sphere for the universal and was the first to concentrate upon definition, Plato followed him and assumed that the problem of definition is concerned not with any sensible thing but with entities of another kind; for the reason that there can be no general definition of sensible things which are always changing.
These entities he called "Ideas,"[72] and held that all sensible things are named after[73] them sensible and in virtue of their relation to them; for the plurality of things which bear the same name as the Forms exist by participation in them. (With regard to the "participation," it was only the term that he changed; for whereas the Pythagoreans say that things exist by imitation of numbers, Plato says that they exist by participation—merely a change of term.
As to what this "participation" or "imitation" may be, they left this an open question.)

Further, he states that besides sensible things and the Forms there exists an intermediate class, the *objects of mathematics*,[74] which differ from sensible things in being eternal and immutable, and from the Forms in that there are many similar objects of mathematics, whereas each Form is itself unique.
Now since the Forms are the causes of everything else, he supposed that their elements are the elements of all things. Accordingly the

[68]i.e., the same number might be the first to which each of several definitions applied; then that number would be each of the concepts so defined.

[69]Compare *Aristot. Met. 12.4.2-5.*

[70]Cf. *Aristot. Met. 4.5.18.*

[71]*Plat. Crat. 402a (fr. 41 Bywater).*

[72]I have translated *ἰδέα* by Idea and *εἶδος* by Form wherever Aristotle uses the words with reference to the Platonic theory. Plato apparently uses them indifferently, and so does Aristotle in this particular connection, but he also uses *εἶδος* in the sense of form in general. For a discussion of the two words see Taylor, *Varia Socratica*, 178-267, and Gillespie, *Classical Quarterly*, 6.179-203.

[73]For this interpretation of *παρὰ ταῦτα* see Ross's note ad loc.

[74]i.e. arithmetical numbers and geometrical figures.

material principle is the "Great and Small," and the essence ⟨or formal principle⟩ is the One, since the numbers are derived from the "Great and Small" by participation in the the One.

In treating the One as a substance instead of a predicate of some other entity, his teaching resembles that of the Pythagoreans, and also agrees with it in stating that the numbers are the causes of Being in everything else; but it is peculiar to him to posit a duality instead of the single Unlimited, and to make the Unlimited consist of the "Great and Small." He is also peculiar in regarding the numbers as distinct from sensible things, whereas they hold that things themselves are numbers, nor do they posit an intermediate class of mathematical objects.

His distinction of the One and the numbers from ordinary things (in which he differed from the Pythagoreans) and his introduction of the Forms were due to his investigation of logic (the earlier thinkers were strangers to Dialectic)[75]; his conception of the other principle as a duality to the belief that numbers other than primes[76] can be readily generated from it, as from a matrix.[77]

The fact, however, is just the reverse, and the theory is illogical; for whereas the Platonists derive multiplicity from matter although their Form generates only once,[78] it is obvious that only one table can be made from one piece of timber, and yet he who imposes the form upon it, although he is but one, can make many tables. Such too is the relation of male to female: the female is impregnated in one coition,

[75] See *Aristot. Met. 4.2.19-20*, and cf. *Aristot. Met. 8.4.4*.

[76] *ἔξω τῶν πρώτων* is very difficult, but it can hardly be a gloss, and no convincing emendation has been suggested. Whatever the statement means, it is probably (as the criticism which follows is certainly) based upon a misunderstanding. From *Plat. Parm. 143c*, it might be inferred that the Great and Small (the Indeterminate Dyad) played no part in the generation of numbers; but there the numbers are not Ideal, as here they must be. In any case Aristotle is obsessed with the notion that the Dyad is a duplicative principle (*Aristot. Met. 13.8.14*), which if true would imply that it could generate no *odd* number. Hence Heinze proposed reading *περιττῶν*(odd) for *πρώτων*(which may be right, although the corruption is improbable) and Alexander tried to extract the meaning of "odd" from *πρώτων* by understanding it as "prime to 2." However, as Ross points out (note ad loc.), we may keep *πρώτων* in the sense of "prime" if we suppose Aristotle to be referring either (a) to the numbers within the decad (*Aristot. Met. 13.8.17*) and forgetting 9—the other odd numbers being primes; or (b) to numbers in general, and forgetting the entire class of compound odd numbers. Neither of these alternatives is very satisfactory, but it seems better to keep the traditional text.

[77] For a similar use of the word *ἐκμαγεῖον* cf. *Plat. Tim. 50c*.

[78] Aristotle's objection is that it is unreasonable that a single operation of the formal upon the material principle should result in more than one product; i.e. that the material principle should be in itself duplicative.

but one male can impregnate many females. And these relations are analogues of the principles referred to.

This, then, is Plato's verdict upon the question which we are investigating. From this account it is clear that he only employed two causes[79]: that of the essence, and the material cause; for the Forms are the cause of the essence in everything else, and the One is the cause of it in the Forms.

He also tells us what the material substrate is of which the Forms are predicated in the case of sensible things, and the One in that of the Forms—that it is this the duality, the "Great and Small." Further, he assigned to these two elements respectively the causation of good[80] and of evil; a problem which, as we have said,[81] had also been considered by some of the earlier philosophers, e.g. Empedocles and Anaxagoras.

We have given only a concise and summary account of those thinkers who have expressed views about the causes and reality, and of their doctrines. Nevertheless we have learned thus much from them: that not one of those who discuss principle or cause has mentioned any other type than those which we we have distinguished in the *Physics*.[82] Clearly it is after these types that they are groping, however uncertainly.

Some speak of the first principle as material, whether they regard it as one or several, as corporeal or incorporeal: e.g. Plato speaks of the "Great and Small"; the Italians[83] of the Unlimited; Empedocles of Fire, Earth, Water and Air; Anaxagoras of the infinity of homoeomeries.

All these have apprehended this type of cause; and all those too who make their first principle air or water or "something denser than fire but rarer than air"[84](for some have so described the primary element). These, then, apprehended this cause only, but others apprehended the *source of motion*—e.g. all such as make Love and Strife, or Mind, or Desire a first principle.

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[79]Plato refers several times in the dialogues to an efficient cause (e.g. the Demiurgus,*Plat. Soph. 265b-d*, *Plat. Tim. 28c ff.*) and a final cause (e.g. *Plat. Phil. 20d, 53e*, *Plat. Tim. 29d ff.*); but Aristotle does not seem to take these allusions seriously.

[80]Cf. *Plat. Phil. 25e-26b.*

[81]*Aristot. Met. 3.17; 4.3.*

[82]*Aristot. Phys. 2.3*

[83]See note on *Aristot. Met. 5.15.*

[84]The various references in Aristotle to material principles intermediate between certain pairs of "elements" have been generally regarded as applying to Anaximander's ἄπειρον or Indeterminate; but the references are so vague (cf. *Aristot. Met. 7.6*, *Aristot. Phys.187a 14*, *189b 3*, *203a 18*) that it seems better to connect them with later and minor members of the Milesian school. Cf. Ross's note ad loc.

As for the *essence* or *essential nature*, nobody has definitely introduced it; but the inventors of the Forms express it most nearly. For they do not conceive of the Forms as the *matter* of sensible things (and the One as the matter of the Forms), nor as producing the *source of motion* (for they hold that they are rather the cause of immobility and tranquillity); but they adduce the Forms as the *essential nature* of all other things, and the One as that of the Forms.
The *end* towards which actions, changes and motions tend they do in a way treat as a cause, but not in this sense, i.e. not in the sense in which it is naturally a cause. Those who speak of Mind or Love assume these causes as being something good; but nevertheless they do not profess that anything exists or is generated *for the sake* of them, but only that motions originate from them.[85]
Similarly also those who hold that Unity or Being is an entity of this kind state that it is the cause of existence, but not that things exist or are generated for the sake of it. So it follows that in a sense they both assert and deny that the Good is a cause; for they treat it as such not absolutely, but incidentally.
It appears, then, that all these thinkers too (being unable to arrive at any other cause) testify that we have classified the causes rightly, as regards both number and nature. Further, it is clear that all the principles must be sought either along these lines or in some similar way.

Let us next examine the possible difficulties arising out of the statements of each of these thinkers, and out of his attitude to the first principles.
All those who regard the universe as a unity, and assume as its matter some one nature, and that corporeal and extended, are clearly mistaken in many respects. They only assume elements of corporeal things, and not of incorporeal ones, which also exist. They attempt to state the causes of generation and destruction, and investigate the nature of everything; and at the same time do away with the cause of motion.
Then there is their failure to regard the *essence* or formula as a cause of anything; and further their readiness to call any one of the simple bodies—except earth—a first principle, without inquiring how their reciprocal generation is effected. I refer to fire, water, earth and air. Of these some are generated from each other by combination and others by differentiation;
and this difference is of the greatest importance in deciding their rela-

[85] Cf. *Aristot. Met. 3.17.*

tive priority. In one way it might seem that the most elementary body is that from which first other bodies are produced by combination; and this will be that body which is rarest and composed of the finest particles.

Hence all who posit Fire as first principle will be in the closest agreement with this theory. However, even among the other thinkers everyone agrees that the primary corporeal element is of this kind. At any rate none of the Monists thought earth likely to be an element—obviously on account of the size of its particles—

but each of the other three has had an advocate; for some name fire as the primary element, others water, and others air.[86] And yet why do they not suggest earth too, as common opinion does? for people say "Everything is earth."

And Hesiod too says[87] that earth was generated first of corporeal things—so ancient and popular is the conception found to be. Thus according to this theory anyone who suggests any of these bodies other than fire, or who assumes something "denser than air but rarer than water,"[88] will be wrong.

On the other hand if what is posterior in generation is prior in nature, and that which is developed and combined is posterior in generation, then the reverse will be the case; water will be prior to air, and earth to water. So much for those who posit *one* cause such as we have described.

The same will apply too if anyone posits more than one, as e.g. Empedocles says that matter consists of four bodies;

objections must occur in his case also, some the same as before, and some peculiar to him. First, we can see things being generated from each other in a way which shows that fire and earth do not persist as the same corporeal entity. (This subject has been treated in my works on Natural Science.[89]) Again with regard to the cause of motion in things, whether one or two should be assumed, it must not be thought that his account is entirely correct or even reasonable.[90]

And in general those who hold such views as these must of necessity do away with qualitative alteration; for on such a theory cold will not come from hot nor hot from cold, because to effect this there must be something which actually takes on these contrary qualities: some

[86] Cf. *Aristot. Met. 3.5, 8.*
[87] Cf. *Aristot. Met. 4.1.*
[88] Cf. *Aristot. Met. 7.3 n.*
[89] *Aristot. De Caelo, 3.7*; *Aristot. De Gen. et Corr. 2.6.*
[90] Cf. *Aristot. Met. 4.6.*

single element which becomes both fire and water—which Empedocles denies.

If one were to infer that Anaxagoras recognized two[91] elements, the inference would accord closely with a view which, although he did not articulate it himself, he must have accepted as developed by others.

To say that originally everything was a mixture is absurd for various reasons, but especially since (a) it follows that things must have existed previously in an unmixed state; (b) it is contrary to nature for *anything* to mix with *anything* ; (c) moreover affections and attributes would then be separable from their substances (because what is mixed can also be separated). At the same time, if one were to follow his doctrine carefully and interpret its meaning, perhaps it would be seen to be more up-to-date;

because when nothing was yet differentiated, obviously nothing could be truly predicated of that substance—e.g. that it was white or black or buff or any other color. It must necessarily have been colorless, since otherwise it would have had one of these colors.

Similarly by the same argument it had no taste or any other such attribute; for it cannot have had any quality or magnitude or individuality. Otherwise some particular form would have belonged to it; but this is impossible on the assumption that everything was mixed together, for then the form would have been already differentiated, whereas he says that everything was mixed together except Mind, which alone was pure and unmixed.[92]

It follows from this that he recognizes as principles the One (which is simple and unmixed) and the Other, which is such as we suppose the Indeterminate to be before it is determined and partakes of some form. Thus his account is neither correct nor clear, but his meaning approximates to more recent theories and what is now more obviously true.

However, these thinkers are really concerned only with the theories of generation and destruction and motion (for in general it is only with reference to this aspect of reality that they look for their principles and causes).

Those, however, who make their study cover the whole of reality, and who distinguish between sensible and non-sensible objects, clearly give their attention to both kinds; hence in their case we may consider at greater length what contributions, valuable or otherwise, they make to

[91] Mind, and the "mixture" of homoeomerous particles.

[92] *Anaxagoras. Fr. 12 (Diels).*

the inquiry which is now before us.

The so-called Pythagoreans employ abstruser principles and elements than the physicists. The reason is that they did not draw them from the sensible world; for mathematical objects, apart from those which are connected with astronomy, are devoid of motion.

Nevertheless all their discussions and investigations are concerned with the physical world. They account for the generation of the sensible universe, and observe what happens in respect of its parts and affections and activities, and they use up their principles and causes in this connection, as though they agreed with the others—the physicists—that reality is just so much as is sensible and is contained in the so-called "heavens."

All the same, as we have said,[93] the causes and principles which they describe are capable of application to the remoter class of realities as well, and indeed are better fitted to these than to their physical theories.

But as to how there is to be motion, if all that is premissed is Limit and the Unlimited, and Odd and Even, they do not even hint; nor how, without motion and change, there can be generation and destruction, or the activities of the bodies which traverse the heavens.

And further, assuming that it be granted to them or proved by them that *magnitude*[94] is composed of these factors, yet how is it to be explained that some bodies are light, and others have weight? For in their premisses and statements they are speaking just as much about sensible as about mathematical objects; and this is why they have made no mention of fire or earth or other similar bodies, because, I presume, they have no separate explanation of sensible things.

Again, how are we to understand that number and the modifications of number are the causes of all being and generation, both in the beginning and now, and at the same time that there is no other number than the number of which the universe is composed?[95]

Because when they make out that Opinion and Opportunity are in such and such a region, and a little above or below them Injustice and Separation or Mixture, and when they state as proof of this that each of these abstractions is a number; and that also in this region there is

[93] *Aristot. Met. 1.8.17.*

[94] Aristotle uses the word μέγεθος both of magnitude in general and of spatial magnitude or extension. Here the meaning seems to be the former. Numbers obviously have magnitude, and might be regarded as causing it; but (except on the Number-Atomism theory,) they are no more the cause of extension than that of gravity.

[95] i.e., how can number be both reality and the cause of reality?

already a plurality of the magnitudes composed of number, inasmuch as these modifications of number correspond to these several regions, —is the number which we must understand each of these abstractions to be the same number which is present in the sensible universe, or another kind of number?[96]

Plato at least says that it is another. It is true that he too supposes that numbers are both these magnitudes and their causes; but in his view the causative numbers are intelligible and the others sensible.

The Pythagoreans, then, may be dismissed for the present, for it is enough to touch upon them thus briefly. As for those who posit the Forms as causes,[97] in the first place in their attempt to find the causes of things in our sensible world, they introduced an equal number of other entities—as though a man who wishes to count things should suppose that it would be impossible when they are few, and should attempt to count them when he has added to them. For the Forms are as many as, or not fewer than, the things in search of whose causes these thinkers were led to the Forms; because corresponding to each thing there is a synonymous entity apart from the substances (and in the case of non-substantial things there is a One over the Many[98]), both in our everyday world and in the realm of eternal entities.[99]

Again, not one of the arguments by which we[100] try to prove that the Forms exist demonstrates our point: from some of them no necessary conclusion follows, and from others it follows that there are Forms of things of which we hold that there are no Forms.

For according to the arguments from the sciences[101] there will be Forms of all things of which there are sciences[102]; and according to the "One-over-Many" argument,[103] of negations too; and according to the argu-

[96]The point seems to be this. The Pythagoreans say that Opinion is a number, 3 (or 2, according to another version), and is located in a certain region of the universe because that region is proper to a corporeal magnitude composed of the number 3 (air was so composed according to Syrianus). Are we to understand, says Aristotle, that the abstract number identified with Opinion is the same as the concrete number of which air consists? The difficulty is probably due to an attempt to combine two different Pythagorean views of number.

[97]For a discussion of the Ideal theory and Aristotle's conception of it see Introduction; and with the whole contents of *Aristot. Met. 9.1-15* cf. *Aristot. Met. 13.4.6-5.*

[98]An Idea which represents their common denominator.

[99]The heavenly bodies.

[100]Aristotle is here speaking as a Platonist. Contrast the language of *Aristot. Met. 13.4.7ff.*, and see Introduction.

[101]Scientific knowledge must have a permanent object (cf. *Aristot. Met. 1.4.2.*

[102]Including artificial products; cf. *Aristot. Met. 1.15.*

ment that "we have some conception of what has perished," of perishable things; because we have a mental picture of these things.[104] Again, of Plato's more exact arguments some establish Ideas of relations,[105] which we do not hold to form a separate genus;
and others state the "Third Man." [106] And in general the arguments for the Forms do away with things which are more important to us exponents of the Forms than the existence of the Ideas; for they imply that it is not the Dyad that is primary, but Number[107]; and that the relative is prior to the absolute[108]; and all the other conclusions in respect of which certain persons, by following up the views held about the Ideas, have gone against the principles of the theory.
Again, according to the assumption by which we hold that the Ideas exist, there will be Forms not only of substances but of many other things (since the concept is one not only in the case of substances, but also in the case of all other things; and there are sciences not only of substances but of other things as well; and there are a thousand other similar consequences); but according to logical necessity, and from the views generally held about them, it follows that if the Forms are participated in, then there can only be Ideas of substances. For they are not participated in *qua* accidents; each Form can only be participated in in so far as it is not predicated of a subject.
I mean, e.g., that if anything participates in "absolute Doubleness" it participates also in "eternal," but only accidentally; because it is an *accident* of Doubleness to be eternal.[109]
Thus the Forms must be substance. But the same names denote substance in the sensible as in the Ideal world; otherwise what meaning

[103]The fact that several particulars can have a common quality or nature implies a single Idea of which they all partake (*Plat. Rep. 596a*).

[104]The theory always admitted Ideas of perishable things, e.g. "man." The objection here is that if the memory of dead men establishes the Idea of "man," the memory of a dead individual establishes an Idea of that (perishable) individual.

[105]*Plat. Phaedo 74a-77a*, *Plat. Rep. 479a-480a.*

[106]Several arguments bore this name. Here the reference is probably to the following: If X is a man because he resembles the Idea of Man, there must be a third "man" in whom the humanity of these two is united. Cf.*Plat. Parm. 132a-133a.*

[107]The Indeterminate Dyad, being to Aristotle a glorified 2, falls under the Idea of Number, which is therefore prior to it.

[108]This seems to be a development of the same objection. Number, which is relative, becomes prior to the supposedly self-subsistent Dyad.

[109]Sensible double things are not eternal; therefore they do not, in the proper sense of "participation," participate in the Idea of Doubleness *qua* having the accidental attribute "eternal." Therefore Ideas, *qua* participated in, are not attributes but substances.

will there be in saying that something exists beside the particulars, i.e. the unity comprising their multiplicity?
If the form of the Ideas and of the things which participate in them is the same, they will have something in common (for why should Duality mean one and the same thing in the case of perishable "twos"[110] and the "twos" which are many but eternal,[111] and not in the case of the Idea of Duality and a particular "two"?); but if the form is not the same, they will simply be homonyms; just as though one were to call both Callias and a piece of wood "man," without remarking any property common to them.[112]
Above all we might examine the question what on earth the Forms contribute to sensible things, whether eternal or subject to generation and decay; for they are not the cause of any motion or change in them. Again, they are no help towards the *knowledge* of other things[113](for they are not the substance of things, otherwise they would be *in* things), nor to their existence, since they are not present in the things which partake of them. If they were, it might perhaps seem that they are causes, in the sense in which the admixture of white causes a thing to be white;
but this theory, which was first stated by Anaxagoras[114] and later by Eudoxus[115] and others, is very readily refutable, for it is easy to adduce plenty of impossibilities against such a view. Again, other things are not in any accepted sense *derived* from the Forms.
To say that the Forms are patterns, and that other things participate in them, is to use empty phrases and poetical metaphors; for what is it that fashions things on the model of the Ideas[116] Besides, anything may both be and become like something else without being imitated from it; thus a man may become just like Socrates whether Socrates exists or not,
and even if Socrates were eternal, clearly the case would be the same.

[110]i.e. pairs of sensible objects.

[111]i.e. mathematical 2s.

[112]The argument of 7-8 is: Ideas are substances. The common name which an idea shares with its particulars must mean the same of both; otherwise "participation" is merely homonymy. But as applied to Ideas it denotes substance; therefore particulars must be substances.

[113]This objection, like the next, is chiefly directed against the transcendence of the Ideas. It is anticipated by Plato in *Plat. Parm. 134d.*

[114]*Anaxagoras Fr. 12*ad fin.

[115]See note on *Aristot. Met. 12.8.9.* Apparently he was a Platonist who regarded the Ideas as immanent in particulars.

[116]Plato says "the Demiurgus"?*Plat. Tim. 28c*, *Plat. Tim. 29a.*

Also there will be several "patterns," and hence Forms, of the same thing; e.g. "animal" and "two-footed" will be patterns of "man," and so too will the Idea of Man.[117]

Further, the Forms will be patterns not only of sensible things but of themselves (e.g. genus in the sense of genus of species), and thus the same thing will be both pattern and copy.[118] Further, it would seem impossible that the substance and the thing of which it is the substance exist in separation; hence how can the Ideas, if they are the substances of things, exist in separation from them?[119] It is stated in the *Phaedo*[120] that the Forms are the causes both of existence and of generation.

Yet, assuming that the Forms exist, still the things which participate in them are not generated unless there is something to impart motion; while many other things *are* generated (e.g. house, ring) of which we hold that there are no Forms. Thus it is clearly possible that all other things may both exist and be generated for the same causes as the things just mentioned.

Further, if the Forms are numbers, in what sense will they be causes? Is it because things are other numbers, e.g. such and such a number Man, such and such another Socrates, such and such another Callias? then why are those numbers the causes of these? Even if the one class is eternal and the other not, it will make no difference.

And if it is because the things of our world are ratios of numbers (e.g. a musical concord), clearly there is some one class of things of which they are ratios. Now if there is this something, i.e. their *matter* , clearly the numbers themselves will be ratios of one thing to another. I mean, e.g., that if Callias is a numerical ratio of fire, earth, water and air, the corresponding Idea too will be a number of certain other things which are its substrate. The Idea of Man, too, whether it is in a sense a number or not, will yet be an arithmetical ratio of certain things, and not a mere number; nor, on these grounds, will any Idea be a number.[121]

Again, one number can be composed of several numbers, but how can one Form be composed of several Forms? And if the one number is not

[117] Why this consequence is objectionable is not quite clear. Perhaps it is on the ground that to "account for appearances" in this way is not economical.

[118] The species will be the "pattern" of individuals, and the genus of the species.

[119] Cf. *Aristot. Met. 1.10.*

[120] *Plat. Phaedo 100d.*

[121] The point, which is not very clearly expressed, is that the Ideas will not be pure numerical expressions or ratios, but will have a substrate just as particulars have.

composed of the other numbers themselves, but of their constituents (e.g. those of the number 10,000), what is the relation of the units? If they are specifically alike, many absurdities will result, and also if they are not (whether (a) the units in a given number are unlike, or (b) the units in each number are unlike those in every other number).[122] For in what can they differ, seeing that they have no qualities? Such a view is neither reasonable nor compatible with our conception of units.

Further, it becomes necessary to set up another kind of number (with which calculation deals), and all the objects which are called "intermediate" by some thinkers.[123] But how or from what principles can these be derived? or on what grounds are they to be considered intermediate between things *here* and Ideal numbers? Further, each of the units in the number 2 comes from a prior 2; but this is impossible.[124]

Further, why should a number ⟨of units⟩, taken together, be one thing?

And further, in addition to the above objections, if the units are unlike, they should be treated as the thinkers who assume two or four elements treat those elements; for not one of them applies the term "element" to the common substrate, e.g. body, but to fire and earth—whether there is a common substrate (i.e. body) or not.[125]

As it is, the One is spoken of as though it were homogeneous, like fire or water. But if this is so, the numbers will not be substances. And if there is an absolute One which is a principle, clearly the term "one" is ambiguous; otherwise this is impossible.[126]

When we wish to refer substances to their principles we derive lines[127] from "Long and Short," a kind of "Great and Small"; and the plane from "Wide and Narrow," and the solid body from "Deep and Shallow." But in this case how can the plane contain a line,

or the solid a line and a plane? for "Wide and Narrow" and "Deep and Shallow" are different genera. Nor is Number contained in these

[122]That the words in brackets give the approximate sense seems clear from *Aristot. Met. 13.6.2-3*, *Aristot. Met. 13.7.15*; but it is difficult to get it out of the Greek.

[123]Cf. vi. 4.

[124]i.e., if 2 is derived from a prior 2 (the Indeterminate Dyad; Aristotle always regards this as a *number* 2), and at the same time consists of two units or 1s, 2 will be prior both to itself and to 1.

[125]In the *Aristot. De Gen. et Corr. 320b 23*Aristotle says that there is not.

[126]This last sentence shows that in what goes before A. has been regarding the Platonic One as a unit. If this is so, he says, substance cannot be composed of it. If on the other hand the One is something different from the unit, they ought to make this clear.

[127]The lines, planes, and solids here discussed are probably the Ideal lines, etc., which are immediately posterior to the Idea-Numbers. Cf. 30, *Aristot. Met. 13.6.10*, *Aristot. Met. 13.9.2*, and see Introduction.

objects (because "Many and Few" is yet another class); and in the same way it is clear that none of the other higher genera will be contained in the lower. Nor, again, is the Broad the genus of which the Deep is a species; for then body would be a kind of plane.

Further, how will it be possible for figures to contain points?[128] Plato steadily rejected this class of objects as a geometrical fiction, but he recognized "the beginning of a line," and he frequently assumed this latter class, i.e. the " indivisible lines." [129] But these must have some limit; and so by the same argument which proves the existence of the line, the point also exists.[130]

In general, although Wisdom is concerned with the cause of visible things, we have ignored this question (for we have no account to give of the cause from which change arises),[131] and in the belief that we are accounting for their substance we assert the existence of other substances; but as to *how* the latter are the substances of the former, our explanation is worthless—for "participation," as we have said before,[132] means nothing.

And as for that which we can see to be the cause in the sciences, and through which all mind and all nature works—this cause[133] which we hold to be one of the first principles—the Forms have not the slightest bearing upon it either. Philosophy has become mathematics for modern thinkers,[134] although they profess[135] that mathematics is only to be studied as a means to some other end.

Further, one might regard the substance which they make the material substrate as too mathematical, and as being a predicate and differentia of substance or matter rather than as matter itself, I mean the "Great and Small," which is like the "Rare and Dense" of which the physicists speak,[136] holding that they are the primary differentiae of the substrate; because these qualities are a species of excess and defect.

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[128]Lines, planes, and solids are generated from varieties of the Great and Small, but points cannot be, having no magnitude; how, then, can the latter be present in the former?

[129]That Plato denied the existence of the point and asserted that of indivisible lines is not directly stated elsewhere, but the same views are ascribed to Xenocrates, and were attacked in the treatise Xenocrates De lineis insecabilibus. See Ross ad loc.

[130]Sc. if the point is the limit of the line.

[131]Cf. *Aristot. Met. 7.5* and *Aristot. Met. 1.9.*

[132]*Aristot. Met. 1.12.*

[133]The final cause. Cf. *Aristot. Met. 1.6.9-10.*

[134]e.g. Speusippus, for whom see *Aristot. Met. 7.2.4.*

[135]Cf. *Plat. Rep.531c-d*

[136]Cf. iv. 10.

Also with regard to motion, if the "Great and Small" is to constitute motion, obviously the Forms will be moved; if not, whence did it come? On this view the whole study of physics is abolished. And what is supposed to be easy, to prove that everything is One, does not follow; because from their exposition[137] it does not follow, even if you grant them all their assumptions that everything is One, but only that there is an absolute One—
and not even this, unless you grant that the universal is a class; which is impossible in some cases.[138] Nor is there any explanation of the lines, planes and solids which "come after" the Numbers[139]: neither as to how they exist or can exist, nor as to what their importance is. They cannot be Forms (since they are not numbers) or Intermediates (which are the objects of mathematics) or perishables; clearly they form yet another fourth class.
In general, to investigate the elements of existing things without distinguishing the various senses in which things are said to exist is a hopeless task; especially when one inquires along these lines into the nature of the elements of which things are composed. For (a) we cannot surely conceive of the elements of activity or passivity or straightness; this is possible, if at all, only in the case of substances. Hence to look for, or to suppose that one has found, the elements of *everything* that exists, is a mistake.
(b) How *can* one apprehend the elements of *everything* ? Obviously one could not have any previous knowledge of anything; because just as a man who is beginning to learn geometry can have previous knowledge of other facts, but no previous knowledge of the principles of that science or of the things about which he is to learn, so it is in the case of all other branches of knowledge.
Hence if there is a science which embraces everything[140](as some say), the student of it can have no previous knowledge at all. But all learning proceeds, wholly or in part, from what is already known; whether it is through demonstration or through definition—since the parts of the definition must be already known and familiar. The same is true of

[137]The word ἔκθεσις has various technical meanings. The process referred to here apparently consisted in taking, e.g., particular men, and reducing them with reference to their common nature to a single unit or universal, "man"; then taking "man," "horse," "dog," etc. and treating them in the same way, until a unit is reached which embraces everything (Alexander).

[138]Probably those of relative or negative terms. Cf. *Aristot. Met. 1.3.*

[139]See note on *Aristot. Met. 1.23.*

[140]e.g. Plato's *Dialectic.*

induction.
On the other hand, assuming that this knowledge should turn out to be innate,[141] it is astonishing that we should possess unawares the most important of the sciences. Further, how is one to *know* of what elements things consist? how is it to be established?
Even this presents a difficulty, because the facts might be disputed, as happens in the case of certain syllables—for some say that ZA is composed of S, D and A, while others say that it is a distinct sound and not any one of those which are familiar to us.[142]
Further, how can one gain knowledge of the objects of a particular sense-perception without possessing that sense? Yet it should be possible, that if the elements of which all things consist, as composite sounds consist of their peculiar[143] elements, are the same.
Thus it is obvious, from the statements of earlier thinkers also, that all inquiry is apparently directed towards the causes described in the *Physics*,[144] and that we cannot suggest any other cause apart from these. They were, however, only vaguely conceived; and although in one sense they have all been stated before, in another they have not been stated at all.
For the earliest philosophy speaks falteringly, as it were, on all subjects; being new and in its infancy. Even Empedocles says that bone exists by virtue of its ratio,[145] which is the definition or essence of a thing.
But by similar reasoning both flesh and every other thing, or else nothing at all, must be ratio; for it must be because of this, and not because of their matter—which he calls fire, earth, water and air—that flesh and bone and every other thing exists.
If anyone else had stated this, he would necessarily have agreed, but his own statement was not clear.

These and similar points have been explained already. We will now return to the difficulties which might be raised about these same questions, for they may throw some light upon subsequent difficulties.[146]

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[141] Cf. the doctrine of *ἀνάμνησις* (recollection), *Plat. Meno 81c*, *Plat. Phaedo 72e.*

[142] *στοιχεῖον* means both "an element" and "a letter of the alphabet"; hence letters are often used as analogues of the material elements. The point here is: Is Z or rather the Greek *ζ*) a *στοιχεῖον*, or is it further analyzable? Since this can be disputed, we must expect differences of opinion about the elements in general.

[143] Peculiar to them as sounds, not as individual sounds. If sights and sounds had the same elements, sight, which knows those elements as composing sights, would know them as composing sounds; i.e., we could see sounds.

[144] *Aristot. Phys. 2.3, 7.*

[145] *Empedocles Fr. 96, 98 (Diels)*, Ritter and Preller 175. Aristotle says that Empedocles had some idea of the essence or formal cause, but did not apply it generally.

[146]The reference is to Book 3. See Introduction.

Book 2

The study of Truth is in one sense difficult, in another easy. This is shown by the fact that whereas no one person can obtain an adequate grasp of it, we cannot *all* fail in the attempt; each thinker makes some statement about the natural world, and as an individual contributes little or nothing to the inquiry; but a combination of all conjectures results in something considerable.

Thus in so far as it seems that Truth is like the proverbial door which no one can miss,[147] in this sense our study will be easy; but the fact that we cannot, although having some grasp of the whole, grasp a particular part, shows its difficulty. However, since difficulty also can be accounted for in two ways, its cause may exist not in the objects of our study but in ourselves:

just as it is with bats' eyes in respect of daylight, so it is with our mental intelligence in respect of those things which are by nature most obvious.

It is only fair to be grateful not only to those whose views we can share but also to those who have expressed rather superficial opinions. They too have contributed something; by their preliminary work they have formed our mental experience.

If there had been no Timotheus,[148] we should not possess much of our music; and if there had been no Phrynis,[149] there would have been no Timotheus. It is just the same in the case of those who have theorized about reality: we have derived certain views from some of them, and

[147] Leutsch and Schneidewin, *Paroemiographi*, 2.678.

[148] Of Miletus, 446 (?)—357 B.C.

[149] Of Mytilene; he is referred to as still alive in *Aristoph. Cl. 971.* Both Phrynis and Timotheus are criticized in the fragment of Pherecrates *Chiron*translated by Rogers in the appendix to his ed. of the *Clouds.*

they in turn were indebted to others.
Moreover, philosophy is rightly called a knowledge of Truth. The object of theoretic knowledge is truth, while that of practical knowledge is action; for even when they are investigating *how* a thing is so, practical men study not the eternal principle but the relative and immediate application.
But we cannot know the truth apart from the cause. Now every thing through which a common quality is communicated to other things is itself of all those things in the highest degree possessed of that quality (e.g. fire is hottest, because it is the cause of heat in everything else); hence that also is most true which causes all subsequent things to be true.
Therefore in every case the first principles of things must necessarily be true above everything else—since they are not merely *sometimes* true, nor is anything the cause of their existence, but they are the cause of the existence of other things,—and so as each thing is in respect of existence, so it is in respect of truth.
Moreover, it is obvious that there is some first principle, and that the causes of things are not infinitely many either in a direct sequence or in kind. For the material generation of one thing from another cannot go on in an infinite progression (e.g. flesh from earth, earth from air, air from fire, and so on without a stop); nor can the source of motion (e.g. man be moved by air, air by the sun, the sun by Strife,[150] with no limit to the series).
In the same way neither can the Final Cause recede to infinity—walking having health for its object, and health happiness, and happiness something else: one thing always being done for the sake of another.
And it is just the same with the Formal Cause. For in the case of all intermediate terms of a series which are contained between a first and last term, the prior term is necessarily the cause of those which follow it; because if we had to say which of the three is the cause, we should say "the first." At any rate it is not the last term, because what comes at the end is not the cause of anything. Neither, again, is the intermediate term, which is only the cause of one
(and it makes no difference whether there is one intermediate term or several, nor whether they are infinite or limited in number). But of series which are infinite in this way, and in general of the infinite, all the parts are equally intermediate, down to the present moment. Thus if there is no first term, there is no cause at all.

[150] Aristotle is evidently thinking of Empedocles' system.

On the other hand there can be no infinite progression downwards (where there is a beginning in the upper direction) such that from fire comes water, and from water earth, and in this way some other kind of thing is always being produced. There are two senses in which one thing "comes from" another—apart from that in which one thing is said to come *after* another, e.g. the Olympian "from"[151] the Isthmian games—either as a man comes from a child as it develops, or as air comes from water.

Now we say that a man "comes from" a child in the sense that that which *has* become something comes from that which *is* becoming: i.e. the perfect from the imperfect. (For just as "becoming" is always intermediate between being and not-being, so is that which is becoming between what is and what is not. The learner is becoming informed, and that is the meaning of the statement that the informed person "comes from" the learner.)

On the other hand A comes from B in the sense that water comes from air by the destruction of B. Hence the former class of process is not reversible (e.g. a child cannot come from a man, for the result of the process of becoming is not the thing which is becoming, but that which exists after the process is complete. So day comes from early dawn, because it is after dawn; and hence dawn does not come from day). But the other class is reversible.

In both cases progression to infinity is impossible; for in the former the intermediate terms must have an end, and in the second the process is reversible, for the destruction of one member of a pair is the generation of the other. At the same time the first cause, being eternal, cannot be destroyed; because, since the process of generation is not infinite in the upper direction, that cause which first, on its destruction, became something else, cannot possibly be eternal.[152]

Further, the Final cause of a thing is an *end* , and is such that it does not happen for the sake of some thing else, but all other things happen for its sake. So if there is to be a last term of this kind, the series will not be infinite; and if there is no such term, there will be no

[151] ἐκ means not only "from" but "after"; Aristotle dismisses this latter meaning. The Isthmian fell alternatively in the same year as the Olympian festival; when this happened the former was held in the spring and the latter in the summer. Cf. *Aristot. Met. 5.24.5.*

[152] The argument is elliptical and confused. The meaning is this: Since there is an upward limit, there is a first cause which is eternal, being independent of any other cause. Therefore this cause cannot cause other things by its destruction, in the manner just described.

Final cause. Those who introduce infinity do not realize that they are abolishing the nature of the Good (although no one would attempt to do anything if he were not likely to reach some limit);
nor would there be any intelligence in the world, because the man who has intelligence always acts for the sake of something, and this is a limit, because the *end* is a limit.

Nor again can the Formal cause be referred back to another fuller definition;
for the prior definition is always closer, and the posterior is not; and where the original definition does not apply, neither does the subsequent one. Further, those who hold such a view do away with scientific knowledge, for on this view it is impossible to know anything until one comes to terms which cannot be analyzed.
Understanding, too, is impossible; for how can one conceive of things which are infinite in this way? It is different in the case of the line, which, although in respect of divisibility it never stops, yet cannot be conceived of unless we make a stop (which is why, in examining an infinite[153] line, one cannot count the sections).[154]
Even matter has to be conceived under the form of something which changes,[155] and there can be nothing which is infinite.[156] In any case the concept of infinity is not infinite.[157]

Again, if the kinds of causes were infinite in *number* it would still be impossible to acquire knowledge; for it is only when we have become acquainted with the causes that we assume that we know a thing; and we cannot, in a finite time, go completely through what is additively infinite.
The effect of a lecture depends upon the habits of the listener; because we expect the language to which we are accustomed, and anything beyond this seems not to be on the same level, but somewhat strange and unintelligible on account of its unfamiliarity; for it is the familiar that is intelligible. The powerful effect of familiarity is clearly shown

[153] i.e. infinitely divisible.

[154] It does not follow that we can apprehend that which is infinite because we can apprehend a line which is infinitely divisible. We can only really apprehend the line by setting a limit to its divisibility and regarding it simply as divisible into a very great (but not infinite) number of sections. An infinite number of sections can neither be apprehended nor counted.

[155] Matter too, which is infinite in its varieties, can only be apprehended in the form of concrete sensible objects which are liable to change. This seems to be the meaning of the text, but Ross's reading and interpretation may be right: see his note ad loc.

[156] i.e. not actually, but only potentially.

[157] Cf. the third note above.

by the laws, in which the fanciful and puerile survivals prevail, through force of habit, against our recognition of them.
Thus some people will not accept the statements of a speaker unless he gives a mathematical proof; others will not unless he makes use of illustrations; others expect to have a poet adduced as witness. Again, some require exactness in everything, while others are annoyed by it, either because they cannot follow the reasoning or because of its pettiness; for there is something about exactness which seems to some people to be mean, no less in an argument than in a business transaction.
Hence one must have been already trained how to take each kind of argument, because it is absurd to seek simultaneously for knowledge and for the method of obtaining it; and neither is easy to acquire. Mathematical accuracy is not to be demanded in everything, but only in things which do not contain matter.
Hence this method is not that of natural science, because presumably all nature is concerned with matter. Hence we should first inquire what nature is; for in this way it will become clear what the objects of natural science are [and whether it belongs to one science or more than one to study the causes and principles of things].[158]

[158]These words have evidently been inserted to form a kind of link with the subject matter of the *Metaphysics*. The book is almost certainly part of a quite independent treatise; see Introduction.

Book 3

It is necessary, with a view to the science which we are investigating, that we first describe the questions which should first be discussed. These consist of all the divergent views which are held about the first principles; and also of any other view apart from these which happens to have been overlooked.

Now for those who wish to get rid of perplexities it is a good plan to go into them thoroughly; for the subsequent certainty is a release from the previous perplexities, and release is impossible when we do not know the knot. The perplexity of the mind shows that there is a "knot" in the subject; for in its perplexity it is in much the same condition as men who are fettered: in both cases it is impossible to make any progress.

Hence we should first have studied all the difficulties, both for the reasons given and also because those who start an inquiry without first considering the difficulties are like people who do not know where they are going; besides, one does not even know whether the thing required has been found or not. To such a man the *end* is not clear; but it is clear to one who has already faced the difficulties.

Further, one who has heard all the conflicting theories, like one who has heard both sides in a lawsuit, is necessarily more competent to judge.

The first difficulty is concerned with the subjects[159] which we discussed in our prefatory remarks. (1.) Does the study of the causes belong to one science or to more than one?[160](2.) Has that science only to contemplate the first principles of substance, or is it also concerned

[159]The principles and causes referred to in Book I.

[160]The problem is discussed *Aristot. Met. 3.2.1-10*, and answered *Aristot. Met. 4.1.*

with the principles which all use for demonstration—e.g. whether it is possible at the same time to assert and deny one and the same thing, and other similar principles?[161]

And if it is concerned with substance, (3.) is there one science which deals with all substances, or more than one; and if more than one, are they all cognate, or should we call some of them "kinds of Wisdom" and others something different?[162]

This too is a question which demands inquiry: (iv.) should we hold that only sensible substances exist, or that there are other besides? And should we hold that there is only one class of non-sensible substances, or more than one (as do those who posit the Forms and the mathematical objects as intermediate between the Forms and sensible things)?[163]

These questions, then, as I say, must be considered; and also (v.) whether our study is concerned only with substances, or also with the essential attributes of substance;

and further, with regard to Same and Other, and Like and Unlike and Contrariety, and Prior and Posterior, and all other such terms which dialecticians try to investigate, basing their inquiry merely upon popular opinions; we must consider whose province it is to study all of these.

Further, we must consider all the essential attributes of these same things, and not merely what each one of them is, but also whether each one has one opposite[164]; and (vi.) whether the first principles and elements of things are the genera under which they fall or the pre-existent parts into which each thing is divided; and if the genera, whether they are those which are predicated ultimately of individuals, or the primary genera—e.g., whether "animal" or "man" is the first principle and the more independent of the individual.[165]

Above all we must consider and apply ourselves to the question (7.) whether there is any other cause *per se* besides matter, and if so whether it is dissociable from matter, and whether it is numerically one or several; and whether there is anything apart from the concrete thing (by the concrete thing I mean matter together with whatever is

[161]Discussed *Aristot. Met. 3.2.10-15*; answered *Aristot. Met. 4.2.*

[162]Discussed *Aristot. Met. 3.2.15-17*; answered *Aristot. Met. 4.2.9-10*, *Aristot. Met. 6.1.*

[163]Discussed *Aristot. Met. 3.2.20-30* answered *Aristot. Met. 12.6-10*, and also by the refutation of the Platonic Ideas and Intermediates in Books 13 and 14.

[164]Discussed *Aristot. Met. 3.2.18-19*; answered *Aristot. Met. 4.2.8-25.*

[165]Discussed*Aristot. Met. 3.3*; answered *Aristot. Met. 7.10, 12-13*

predicated of it) or nothing; or whether there is in some cases but not in others; and what these cases are.[166]

Further, (8.) we must ask whether the first principles are limited in number or in kind[167]—both those in the definitions and those in the substrate—and (ix.) whether the principles of perishable and of imperishable things are the same or different; and whether all are imperishable, or those of perishable things are perishable.[168]

Further, there is the hardest and most perplexing question of all: (x.) whether Unity and Being (as the Pythagoreans and Plato maintained) are not distinct, but are the substance of things; or whether this is not so, and the substrate is something distinct[169](as Empedocles holds of Love,[170] another thinker[171] of fire, and another[172] of water or air[173]); and (xi.) whether the first principles are universal or like individual things[174]; and (12.) whether they exist potentially or actually; and further whether their potentiality or actuality depends upon anything other than motion[175]; for these questions may involve considerable difficulty.

Moreover we must ask (13.) whether numbers and lines and figures and points are substances in any sense, or not; and if they are, whether they are separate from sensible things or inherent in them.[176] With regard to these problems not only is it difficult to attain to the truth, but it is not even easy to state all the difficulties adequately.[177]

(1.) Firstly, then, with respect to the first point raised: whether it is

[166]Discussed iv. 1-8. For answers to these questions see *Aristot. Met. 7.8, 13-14*; *Aristot. Met. 12.6-10*; *Aristot. Met. 13.10.*

[167]Discussed *Aristot. Met. 3.4.8-10*; answered *Aristot. Met. 12.4-5*, *Aristot. Met. 13.10.*

[168]Discussed *Aristot. Met. 3.4.11-23*; for Aristotle's general views on the subject see *Aristot. Met. 7.7-10*, *Aristot. Met. 12.1-7.*

[169]Discussed *Aristot. Met. 3.4.24-34*; answered *Aristot. Met. 7.16.3-4*, *Aristot. Met. 10.2.*

[170]Actually Love was no more the universal substrate than was any other of Empedocles' elements; Aristotle appears to select it on account of its unifying function.

[171]Heraclitus.

[172]Thales.

[173]Anaximenes.

[174]Discussed *Aristot. Met. 3.6.7-9*; for the answer see *Aristot. Met. 7.13-15*, *Aristot. Met. 13.10.*

[175]Discussed *Aristot. Met. 3.6.5-6*; for the relation of potentiality to actuality see *Aristot. Met. 9.1-9*; for actuality and motion see *Aristot. Met. 12.6-7.*

[176]Discussed *Aristot. Met. 3.5*; answered *Aristot. Met. 13.1-3, 6-9*; *Aristot. Met. 14.1-3, 5, 6.*

[177]For another statement of the problems sketched in this chapter see *Aristot. Met. 9.1, 2.*

the province of one science or of more than one to study all the kinds of causes. How can *one* science comprehend the first principles unless they are contraries? Again, in many things they are not all present. How can a principle of motion be in immovable things? or the "nature of the Good"? for everything which is good in itself and of its own nature is an *end* and thus a cause, because for its sake other things come to be and exist; and the *end* and *purpose* is the end of some action, and all actions involve motion; thus it would be impossible either for this principle to exist in motionless things or for there to be any *absolute* Good.

Hence in mathematics too nothing is proved by means of this cause, nor is there any demonstration of the kind "because it is better or worse"; indeed no one takes any such consideration into account.

And so for this reason some of the sophists, e.g. Aristippus,[178] spurned mathematics, on the ground that in the other arts, even the mechanical ones such as carpentry and cobbling, all explanation is of the kind "because it is better or worse," while mathematics takes no account of good and bad.[179]

On the other hand if there are several sciences of the causes, and a different one for each different principle, which of them shall we consider to be the one which we are seeking, or whom of the masters of these sciences shall we consider to be most learned in the subject which we are investigating?

For it is possible for all the kinds of cause to apply to the same object; e.g. in the case of a house the source of motion is the art and the architect; the final cause is the function; the matter is earth and stones, and the form is the definition. Now to judge from our discussion some time ago[180] as to which of the sciences should be called Wisdom, there is some case for applying the name to each of them.

Inasmuch as Wisdom is the most sovereign and authoritative kind of knowledge, which the other sciences, like slaves, may not contradict, the knowledge of the *end* and of the *Good* resembles Wisdom (since everything else is for the sake of the *end*); but inasmuch as it has been defined as knowledge of the first principles and of the most knowable, the knowledge of the essence will resemble Wisdom.

For while there are many ways of understanding the same thing, we say that the man who recognizes a thing by its being something knows

[178] Founder of the Cyrenaic school in the early fourth century.

[179] For a defense of mathematics see *Aristot. Met. 13.3.10-12.*

[180] Cf. *Aristot. Met. 1.2.5-6.*

more than he who recognizes it by its not being something; and even in the former case one knows more than another, and most of all he who knows *what* it is, and not he who knows its size or quality or natural capacity for acting or being acted upon.
Further, in all other cases too, even in such as admit of demonstration, we consider that we know a particular thing when we know *what* it is (e.g. what is the squaring of a rectangle? answer, the finding of a mean proportional to its sides; and similarly in other instances); but in the case of generations and actions and all kinds of change, when we know the source of motion.
This is distinct from and opposite to the *end* . Hence it might be supposed that the study of each of these causes pertained to a different science.[181]

(2.) Again, with respect to the demonstrative principles as well, it may be disputed whether they too are the objects of one science[182] or of several.[183]
By demonstrative I mean the axioms from which all demonstration proceeds, e.g. "everything must be either affirmed or denied," and "it is impossible at once to be and not to be," and all other such premisses. Is there one science both of these principles and of substance, or two distinct sciences? and if there is not one, which of the two should we consider to be the one which we are now seeking?
It is not probable that both subjects belong to one science; for why should the claim to understand these principles be peculiar to geometry rather than to any other science? Then if it pertains equally to any science, and yet cannot pertain to all, comprehension of these principles is no more peculiar to the science which investigates substances than to any other science.
Besides, in what sense can there in be a science of these principles? We know already just what each of them is; at any rate other sciences employ them as being known to us.[184] If, however there is a demonstrative science of them, there will have to be some underlying genus, and some of the principles will be derived from axioms, and others will be unproved
(for there cannot be demonstration of everything), since demonstration must proceed from something, and have some subject matter, and prove something. Thus it follows that there is some one genus of

[181] See *Aristot. Met. 4.1*
[182] sc. the science which studies the four causes.
[183] Cf. *Aristot. Met. 3.1.5.*
[184] sc. and so there can be no science which defines them.

demonstrable things; for all the demonstrative sciences employ axioms.

On the other hand, if the science of substance is distinct from the science of these principles, which is of its own nature the more authoritative and ultimate?

The axioms are most universal, and are the first principles of everything. And whose province will it be, if not the philosopher's, to study truth and error with respect to them?[185]

(3.) And in general, is there one science of all substances, or more than one?[186] if there is not one, with what sort of substance must we assume that this science is concerned?

On the other hand, it is not probable that there is one science of all substances; for then there would be one demonstrative of all attributes —assuming that every demonstrative science proceeds from accepted beliefs and studies the essential attributes concerned with some definite subject matter.

Thus to study the essential attributes connected with the same genus is the province of the same science proceeding from the same beliefs. For the subject matter belongs to one science, and so do the axioms, whether to the same science or to a different one; hence so do the attributes, whether they are studied by these sciences themselves or by one derived from them.[187]

(v.) Further, is this study concerned only with substances, or with their attributes as well?[188] I mean, e.g., if the solid is a kind of substance, and so too lines and planes, is it the province of the same science to investigate both these and their attributes, in every class of objects about which mathematics demonstrates anything, or of a different science?

If of the same, then the science of substance too would be in some sense demonstrative; but it does not seem that there is any demonstration of the "what is it?" And if of a different science, what will be the science which studies the attributes of substance? This is a very difficult question to answer.[189]

(iv.) Further, are we to say that only sensible substances exist, or that others do as well? and is there really only one kind of substance, or more than one (as they hold who speak of the Forms and the Inter-

[185]For the answer see *Aristot. Met. 4.3.*

[186]Cf. *Aristot. Met. 3.1.6.*

[187]For the answer see *Aristot. Met. 4.2.9-10*, *Aristot. Met. 6.1.*

[188]Cf. *Aristot. Met. 3.1.8-10.*

[189]This problem, together with the appendix to it stated in *Aristot. Met. 3.1.9-10*, is answered in *Aristot. Met. 4.2.8-25.*

mediates, which they maintain to be the objects of the mathematical sciences)?
In what sense we Platonists hold the Forms to be both causes and independent substances has been stated[190] in our original discussion on this subject. But while they involve difficulty in many respects, not the least absurdity is the doctrine that there are certain entities apart from those in the sensible universe, and that these are the same as sensible things except in that the former are eternal and the latter perishable.[191]
For Platonists say nothing more or less than that there is an absolute Man, and Horse, and Health; in which they closely resemble those who state that there are Gods, but of human form; for as the latter invented nothing more or less than eternal men, so the former simply make the Forms eternal sensibles.

Again, if anyone posits Intermediates distinct from Forms and sensible things, he will have many difficulties;
because obviously not only will there be lines apart from both Ideal and sensible lines, but it will be the same with each of the other classes.[192]
Thus since astronomy is one of the mathematical sciences, there will have to be a heaven besides the sensible heaven, and a sun and moon, and all the other heavenly bodies.
But how are we to believe this? Nor is it reasonable that the heaven should be immovable; but that it should move is utterly impossible.[193]
It is the same with the objects of optics and the mathematical theory of harmony; these too, for the same reasons, cannot exist apart from sensible objects. Because if there are intermediate objects of sense and sensations, clearly there will also be animals intermediate between the Ideal animals and the perishable animals.[194]
One might also raise the question with respect to what kind of objects we are to look for these sciences. For if we are to take it that the only difference between mensuration and geometry is that the one is

[190] *Aristot. Met. 1.6.*

[191] As it stands this is a gross misrepresentation; but Aristotle's objection is probably directed against the conception of Ideas existing independently of their particulars. See Introduction.

[192] sc. of objects of mathematical sciences.

[193] The reference is to the supposed "intermediate" heaven. A "heaven" (including heavenly bodies) without motion is unthinkable; but a non-sensible heaven can have no motion.

[194] If there are "intermediate," i.e. non-sensible, sights and sounds, there must be "intermediate" faculties of sight and hearing, and "intermediate" animals to exercise these faculties; which is absurd.

concerned with things which we can perceive and the other with things which we cannot, clearly there will be a science parallel to medicine (and to each of the other sciences), intermediate between Ideal medicine and the medicine which we know.
Yet how is this possible? for then there would be a class of healthy things apart from those which are sensible and from the Ideally healthy. Nor, at the same time, is it true that mensuration is concerned with sensible and perishable magnitudes; for then it would perish as they do. Nor, again, can astronomy be concerned with sensible magnitudes or with this heaven of ours;
for as sensible lines are not like those of which the geometrician speaks (since there is nothing sensible which is straight or curved in that sense; the circle[195] touches the ruler not at a point, but ⟨along a line⟩ as Protagoras used to say in refuting the geometricians), so the paths and orbits of our heaven are not like those which astronomy discusses, nor have the symbols of the astronomer the same nature as the stars.
Some, however, say that these so-called Intermediates between Forms and sensibles do exist: not indeed separately from the sensibles, but in them. It would take too long to consider in detail all the impossible consequences of this theory, but it will be sufficient to observe the following.
On this view it is not logical that only this should be so; in clearly it would be possible for the Forms also to be in sensible things; for the same argument applies to both. Further, it follows necessarily that two solids must occupy the same space; and that the Forms cannot be immovable, being present in sensible things, which move.
And in general, what is the object of assuming that Intermediates exist, but only in sensible things? The same absurdities as before will result: there will be a heaven besides the sensible one, only not apart from it, but in the same place; which is still more impossible.[196]
Thus it is very difficult to say, not only what view we should adopt in the foregoing questions in order to arrive at the truth, but also in the case of the first principles (vi.) whether we should assume that the genera, or the simplest constituents of each particular thing, are more truly the elements and first principles of existing things. E.g., it is generally agreed that the elements and first principles of speech are

[195] i.e., the visible circle which we draw. Like the ruler, it is geometrically imperfect; thus they touch at more than one point.

[196] The problem is dealt with partly in *Aristot. Met. 12.6-10*, where Aristotle describes the eternal moving principles, and partly in Books 13 and 14, where he argues against the Platonic non-sensible substances.

those things of which, in their simplest form, all speech is composed; and not the common term "speech"; and in the case of geometrical propositions we call those the "elements"[197] whose proofs are embodied in the proofs of all or most of the rest.
Again, in the case of bodies, both those who hold that there are several elements and those who hold that there is one call the things of which bodies are composed and constituted first principles. E.g., Empedocles states that fire and water and the other things associated with them are the elements which are present in things and of which things are composed; he does not speak of them as genera of things.
Moreover in the case of other things too, if a man wishes to examine their nature he observes, e.g., of what parts a bed consists and how they are put together; and then he comprehends its nature. Thus to judge from these arguments the first principles will not be the genera of things.

But from the point of view that it is through definitions that we get to know each particular thing, and that the genera are the first principles of definitions, the genera must also be the first principles of the things defined.
And if to gain scientific knowledge of things is to gain it of the species after which things are named, the genera are first principles of the species. And apparently some even of those[198] who call Unity or Being or the Great and Small elements of things treat them as genera.

Nor again is it possible to speak of the first principles in both senses. The formula of substance is one; but the definition by genera will be different from that which tells us of what *parts* a thing is composed.

Moreover, assuming that the genera are first principles in the truest sense, are we to consider the *primary* genera to be first principles, or the final terms predicated of individuals? This question too involves some dispute.
For if universals are always more truly first principles, clearly the answer will be "the highest genera," since these are predicated of everything. Then there will be as many first principles of things as there are primary genera, and so both Unity and Being will be first principles and substances, since they are in the highest degree predicated of all things.
But it is impossible for either Unity or Being to be one genus of existing things. For there must *be* differentiae of each genus, and each differentia

[197] Cf. *Aristot. Met. 5.3.3.*
[198] The Pythagoreans and Plato.

must be *one*[199]; but it is impossible either for the species of the genus to be predicated of the specific differentiae, or for the genus to be predicated without its species.[200] Hence if Unity or Being is a genus, there will be no differentia Being or Unity.

But if they are not genera, neither will they be first principles, assuming that it is the genera that are first principles. And further, the intermediate terms, taken together with the differentiae, will be genera, down to the individuals; but in point of fact, although some are thought to be such, others are not. Moreover the differentiae are more truly principles than are the genera; and if they also are principles, we get an almost infinite number of principles, especially if one makes the ultimate genus a principle.

Moreover, if Unity is really more of the nature of a principle, and the indivisible is a unity, and every thing indivisible is such either in quantity or in kind, and the indivisible in kind is prior to the divisible, and the genera are divisible into species, then it is rather the lowest predicate that will be a unity (for "man" is not the genus[201] of individual men).

Further, in the case of things which admit of priority and posteriority, that which is predicated of the things cannot exist apart from them. E.g., if 2 is the first number, there will be no Number apart from the species of number; and similarly there will be no Figure apart from the species of figures. But if the genera do not exist apart from the species in these cases, they will scarcely do so in others; because it is assumed that genera are most likely to exist in these cases.

In individuals, however, there is no priority and posteriority. Further, where there is a question of better or worse, the better is always prior; so there will be no genus in these cases either.

From these considerations it seems that it is the terms predicated of individuals, rather than the genera, that are the first principles. But again on the other hand it is not easy to say in what sense we are to understand these to be principles;

for the first principle and cause must be apart from the things of which it is a principle, and must be able to exist when separated from them. But why should we assume that such a thing exists alongside of the individual, except in that it is predicated universally and of all the terms? And indeed if this is a sufficient reason, it is the more universal

[199] i.e., each differentia must have Being and Unity predicated of it.

[200] The reasons are given in *Aristot. Topica, 144a 36-b11.*

[201] sc. but the species.

concepts that should rather be considered to be principles; and so the primary genera will be the principles.[202]

In this connection there is a difficulty which is the hardest and yet the most necessary of all to investigate, and with which our inquiry is now concerned. (7.) If nothing exists apart from individual things, and these are infinite in number, how is it possible to obtain knowledge of the numerically infinite? For we acquire our knowledge of all things only in so far as they contain something universal, some one and identical characteristic.

But if this is essential, and there must be something apart from individual things, it must be the genera; either the lowest or the highest; but we have just concluded that this is impossible.[203]

Further, assuming that when something is predicated of matter there is in the fullest sense something apart from the concrete whole, if there is something, must it exist apart from *all* concrete wholes, or apart from some but not others, or apart from none?

If nothing exists apart from individual things, nothing will be intelligible; everything will be sensible, and there will be no knowledge of anything—unless it be maintained that sense-perception is knowledge. Nor again will anything be eternal or immovable, since sensible things are all perishable and in motion.

Again, if nothing is eternal, even generation is impossible; for there must be something which becomes something, i.e. out of which something is generated, and of this series the ultimate term must be ungenerated; that is if there is any end to the series and generation cannot take place out of nothing.

Further, if there is generation and motion, there must be limit too. For (a) no motion is infinite, but every one has an end; (b) that which cannot be completely generated cannot begin to be generated, and that which has been generated must *be* as soon as it has been generated.

Further, if matter exists apart in virtue of being ungenerated, it is still more probable that the substance, i.e. that which the matter is at any given time becoming, should exist. And if neither one nor the other exists, nothing will exist at all. But if this is impossible, there must be something, the shape or form, apart from the concrete whole.

But again, if we assume this, there is a difficulty: in what cases shall we, and in what shall we not, assume it? Clearly it cannot be done in all cases; for we should not assume that a particular house exists

[202] For partial solutions to the problem see *Aristot. Met. 7.10, 12-13.*

[203] In *Aristot. Met. 3.3.*

apart from particular houses. Moreover, are we to regard the essence of all things, e.g. of men, as one? This is absurd; for all things whose essence is one are one.
Then is it many and diverse? This too is illogical. And besides, how does the matter become each individual one of these things, and how is the concrete whole both matter and form?[204]

(8.) Further, the following difficulty might be raised about the first principles. If they are one in kind, none of them will be one in number, not even the Idea of Unity or of Being. And how can there be knowledge unless there is some universal term?[205]
On the other hand if they are numerically one, and each of the principles is one, and not, as in the case of sensible things, different in different instances (e.g. since a given syllable is always the same in kind, its first principles are always the same in kind, but only in kind, since they are essentially different in number)—if the first principles are one, not in this sense, but numerically, there will be nothing else apart from the elements; for "numerically one" and "individual" are identical in meaning. This is what we mean by "individual": the numerically one; but by "universal" we mean what is predicable of individuals.
Hence just as, if the elements of language[206] were limited in number, the whole of literature would be no more than those elements—that is, if there were not two nor more than two of the same ⟨so it would be in the case of existing things and their principles⟩.[207]
(ix.) There is a difficulty, as serious as any, which has been left out of account both by present thinkers and by their predecessors: whether the first principles of perishable and imperishable things are the same or different. For if they are the same, how is it that some things are perishable and others imperishable, and for what cause?
The school of Hesiod, and all the cosmologists, considered only what was convincing to themselves, and gave no consideration to us. For they make the first principles Gods or generated from Gods, and say that whatever did not taste of the nectar and ambrosia became mortal —clearly using these terms in a sense significant to themselves;
but as regards the actual applications of these causes their statements

[204]For answers to these questions see *Aristot. Met. 7.8, 13-14*; *Aristot. Met. 12.6-10*; *Aristot. Met. 13.10*.

[205]If the principles are one in *kind* only, particular things cannot be referred to the same principle but only to like principles; i.e., there will be no universal terms, without which there can be no knowledge.

[206]Or "letters of the alphabet." Cf. *Aristot. Met. 1.9.36n*.

[207]For the answer to the problem see *Aristot. Met. 12.4-5*, *Aristot. Met. 13.10*.

are beyond our comprehension. For if it is for pleasure that the Gods partake of them, the nectar and ambrosia are in no sense causes of their existence; but if it is to support life, how can Gods who require nourishment be eternal?

However, it is not worth while to consider seriously the subtleties of mythologists; we must ascertain by cross-examining those who offer demonstration of their statements why exactly things which are derived from the same principles are some of an eternal nature and some perishable. And since these thinkers state no reason for this view, and it is unreasonable that things should be so, obviously the causes and principles of things cannot be the same.

Even the thinker who might be supposed to speak most consistently, Empedocles, is in the same case; for he posits Strife as a kind of principle which is the cause of destruction, but none the less Strife would seem to produce everything except the One; for everything except God[208] proceeds from it.

At any rate he says

> From which grew all that was and is and shall be
> In time to come: the trees, and men and women,
> The beasts and birds and water-nurtured fish,
> And the long-living Gods.[209]

And it is obvious even apart from this; for if there had not been Strife in things, all things would have been one, he says; for when they came together "then Strife came to stand outermost." [210] Hence it follows on his theory that God, the most blessed being, is less wise than the others, since He does not know all the elements; for He has no Strife in Him, and knowledge is of like by like:

By earth (he says) we earth perceive, by water water,
> By air bright air, by fire consuming fire,
> Love too by love, and strife by grievous strife.[211]

But—and this is the point from which we started—thus much is clear: that it follows on his theory that Strife is no more the cause of destruction than it is of Being. Nor, similarly, is Love the cause of Being; for in combining things into one it destroys everything else.[212] Moreover, of the actual process of change he gives no explanation,

[208] The expressions "the One" and "God" refer to Empedocles' Sphere: the universe as ordered and united by Love. Cf. *Empedocles, Fr. 26-29 (Diels).*

[209] *Empedocles, Fr. 21. 9-12.*

[210] *Empedocles, Fr. 36. 7.*

[211] *Empedocles, Fr. 109.*

[212] Cf. *Aristot. Met. 1.4.6.*

except that it is so by nature:

But when Strife waxing great among the members[213]
Sprang up to honor as the time came round
Appointed them in turn by a mighty oath,[214]

as though change were a necessity; but he exhibits no cause for the necessity.

However, thus much of his theory is consistent: he does not represent some things to be perishable and others imperishable, but makes everything perishable except the elements. But the difficulty now being stated is why some things are perishable and others not, assuming that they are derived from the same principles.

The foregoing remarks may suffice to show that the principles cannot be the same.

If however they are different, one difficulty is whether they too are to be regarded as imperishable or as perishable. For if they are perishable, it is clearly necessary that they too must be derived from something else, since everything passes upon dissolution into that from which it is derived. Hence it follows that there are other principles prior to the first principles;

but this is impossible, whether the series stops or proceeds to infinity. And further, how can perishable things exist if their principles are abolished? On the other hand if the principles are imperishable, why should some imperishable principles produce perishable things, and others imperishable things? This is not reasonable; either it is impossible or it requires much explanation.

Further, no one has so much as attempted to maintain different principles; they maintain the same principles for everything. But they swallow down the difficulty which we raised first[215] as though they took it to be trifling.[216]

But the hardest question of all to investigate and also the most important with a view to the discovery of the truth, is whether after all Being and Unity are substances of existing things, and each of them is nothing else than Being and Unity respectively, or whether we should inquire what exactly Being and Unity are, there being some other nature underlying them.

Some take the former, others the latter view of the nature of Being

[213] i.e., of the Sphere.

[214] *Empedocles, Fr. 30.*

[215] i.e., whether all things have the same principles.

[216] For Aristotle's views about the principles of perishable and imperishable things see *Aristot. Met. 7.7-10*, *Aristot. Met. 12.1-7.*

and Unity. Plato and the Pythagoreans hold that neither Being nor Unity is anything else than itself, and that this is their nature, their essence being simply Being and Unity.

But the physicists, e.g. Empedocles, explain what Unity is by reducing it to something, as it were, more intelligible—or it would seem that by Love Empedocles means Unity; at any rate Love is the cause of Unity in all things. Others identify fire and others air with this Unity and Being of which things consist and from which they have been generated.

Those who posit more numerous elements also hold the same view; for they too must identify Unity and Being with all the principles which they recognize. And it follows that unless one assumes Unity and Being to be substance in some sense, no other universal term can be substance; for Unity and Being are the most universal of all terms, and if there is no absolute Unity or absolute Being, no other concept can well exist apart from the so-called particulars. Further, if Unity is not substance, clearly number cannot be a separate characteristic of things; for number is units, and the unit is simply a particular kind of one.

On the other hand, if there is absolute Unity and Being, their substance must be Unity and Being; for no other term is predicated universally of Unity and Being, but only these terms themselves. Again, if there is to be absolute Being and absolute Unity, it is very hard to see how there can be anything else besides these; I mean, how things can be more than one.

For that which is other than what is, is not; and so by Parmenides' argument[217] it must follow that all things are one, i.e. Being. In either case there is a difficulty; for whether Unity is not a substance or whether there is absolute Unity, number cannot be a substance.

It has already been stated why this is so if Unity is not a substance; and if it is, there is the same difficulty as about Being. For whence, if not from the absolute One or Unity, can there be another one? It must be not-one; but all things are either one, or many of which each is one. Further, if absolute Unity is indivisible, by Zeno's axiom it will be nothing.

For that which neither when added makes a thing greater nor when subtracted makes it smaller is not an existent thing, he says[218]; clearly assuming that what exists is spatial magnitude. And if it is a spatial

[217]By *τὸ ὄν* Parmenides meant "what is," i.e. the real universe, which he proved to be one thing because anything else must be "what is not," or non-existent. The Platonists meant by it "being" in the abstract. Aristotle ignores this distinction.

[218]Cf. *Zeno, Fr. 2*, and see Burnet, E.G.P. sects. 157 ff.

magnitude it is corporeal, since the corporeal exists in all dimensions, whereas the other magnitudes, the plane or line, when added to a thing in one way will increase it, but when added in another will not; and the point or unit will not increase a thing in any way whatever.

But since Zeno's view is unsound, and it is possible for a thing to be indivisible in such a way that it can be defended even against his argument (for such a thing[219] when added will increase a thing in number though not in size)—still how can a *magnitude* be composed of one or more such indivisible things? It is like saying that the line is composed of points.

Moreover, even if one supposes the case to be such that number is generated, as some say, from the One itself and from something else which is not one, we must none the less inquire why and how it is that the thing generated will be at one time number and at another magnitude, if the not-one was inequality and the same principle in both cases.[220] For it is not clear how magnitude can be generated either from One and this principle, or from a number and this principle.[221]

(13.) Out of this arises the question whether numbers, bodies, planes and points are substances or not. If not, the question of what Being is, what the substances of things are, baffles us; for modifications and motions and relations and dispositions and ratios do not seem to indicate the substance of anything; they are all predicated of a substrate, and none of them is a definite thing.

As for those things which might be especially supposed to indicate substance—water, earth, fire and air, of which composite bodies are composed—their heat and cold and the like are modifications, not substances; and it is only the body which undergoes these modifications that persists as something real and a kind of substance.

Again, the body is less truly substance than the plane, and the plane than the line, and the line than the unit or point; for it is by these that the body is defined, and it seems that they are possible without the body, but that the body cannot exist without them.

This is why the vulgar and the earlier thinkers supposed that substance and Being are Body, and everything else the modifications of Body; and hence also that the first principles of bodies are the first principles of

[219] e.g., a point is indivisible and has no magnitude, yet added to other points it increases their number.

[220] The reference is to the Platonists. Cf. *Aristot. Met. 14.1.5, 6*; *Aristot. Met. 14.2.13, 14*.

[221] For the answer to this problem see *Aristot. Met. 7.16.3, 4*; *Aristot. Met. 10.2*; and cf. *Aristot. Met. 13.8*.

existing things; whereas later thinkers with a greater reputation for wisdom supposed that substance and Being are numbers.

As we have said, then, if these things are not substance, there is no substance or Being at all; for the attributes of these things surely have no right to be called existent things. On the other hand, if it be agreed that lines and points are more truly substance than bodies are, yet unless we can see to what *kind* of bodies they belong (for they cannot be in sensible bodies) there will still be no substance.

Further, it is apparent that all these lines are divisions of Body, either in breadth or in depth or in length. Moreover every kind of shape is equally present in a solid, so that if "Hermes is not in the stone,"[222] neither is the half-cube in the cube as a determinate shape.

Hence neither is the plane; for if any kind of plane were in it, so would that plane be which defines the half-cube. The same argument applies to the line and to the point or unit. Hence however true it may be that body is substance, if planes, lines and points are more truly substance than Body is, and these are not substance in any sense, the question of what Being is and what is the substance of things baffles us.

Because, in addition to the above arguments, absurd results follow from a consideration of generation and destruction; for it seems that if substance, not having existed before, now exists, or having existed before, subsequently does not exist it suffers these changes in the process of generation and destruction. But points, lines and planes, although they exist at one time and at another do not, cannot be in process of being either generated or destroyed;

for whenever bodies are joined or divided, at one time, when they are joined one surface is instantaneously produced, and at another, when they are divided, two. Thus when the bodies are combined the surface does not exist but has perished; and when they are divided, surfaces exist which did not exist before. (The indivisible point is of course never divided into two.) And if they *are* generated and destroyed, from what are they generated?

It is very much the same with "the present moment" in time. This too cannot be generated and destroyed; but nevertheless it seems always to be different, not being a substance. And obviously it is the same with points, lines and planes, for the argument is the same; they are all similarly either limits or divisions.[223]

[222] Apparently a proverbial expression.

[223] For arguments against the substantiality of numbers and mathematical objects see *Aristot. Met. 13.1-3, 6-9*; *Aristot. Met. 14.1-3, 5, 6.*

In general one might wonder why we should seek for other entities apart from sensible things and the Intermediates:[224] e.g., for the Forms which we Platonists assume.
If it is for the reason that the objects of mathematics, while differing from the things in our world in another respect, resemble them in being a plurality of objects similar in form, so that their principles cannot be numerically determined (just as the principles of all language in this world of ours are determinate not in number but in kind—unless one takes such and such a particular syllable or sound, for the principles of these are determinate in number too—
and similarly with the Intermediates, for in their case too there is an infinity of objects similar in form), then if there is not another set of objects apart from sensible and mathematical objects, such as the Forms are said to be, there will be no substance which is one both in kind and in number, nor will the principles of things be determinate in number, but in kind only.
Thus if this is necessarily so, it is necessary for this reason to posit the Forms also. For even if their exponents do not articulate their theory properly, still this is what they are trying to express, and it must be that they maintain the Forms on the ground that each of them is a substance, and none of them exists by accident.
On the other hand, if we are to assume that the Forms exist, and that the first principles are one in number but not in kind, we have already stated[225] the impossible consequences which must follow.[226]

(12.) Closely connected with these questions is the problem whether the elements exist potentially or in some other sense.
If in some other sense, there will be something else prior to the first principles. For the potentiality is prior to the actual cause, and the potential need not necessarily always become actual. On the other hand, if the elements exist potentially, it is possible for nothing to exist; for even that which does not yet exist is capable of existing. That which does not exist may come to be, but nothing which cannot exist comes to be.[227]
(xi.) Besides the foregoing problems about the first principles we must

[224] Cf. *Aristot. Met. 3.2.20ff.*.

[225] *Aristot. Met. 3.4.9, 10.*

[226] This problem is not stated in ch. 1., but is akin to problems 5. and 8., which see.

[227] For the relation of potentiality to actuality see *Aristot. Met. 9.1-9.* The second point raised in this connection in ch. 1 is not discussed here; for actuality and motion see *Aristot. Met. 12.6, 7.*

also raise the question whether they are universal or such as we describe the particulars to be. For if they are universal, there will be no substances; for no common term denotes an individual thing, but a type; and substance is an individual thing.
But if the common predicate be hypostatized as an individual thing, Socrates will be several beings: himself, and Man, and Animal—that is, if each predicate denotes one particular thing.
These then are the consequences if the principles are universal. If on the other hand they are not universal but like particulars, they will not be knowable; for the knowledge of everything is universal. Hence there will have to be other universally predicated principles prior to the first principles, if there is to be any knowledge of them.[228]

[228]For the answer to this problem see *Aristot. Met. 7.13-15*, *Aristot. Met. 13.10.*

Book 4

There is a science which studies Being *qua* Being, and the properties inherent in it in virtue of its own nature. This science is not the same as any of the so-called particular sciences, for none of the others contemplates Being generally *qua* Being; they divide off some portion of it and study the attribute of this portion, as do for example the mathematical sciences.

But since it is for the first principles and the most ultimate causes that we are searching, clearly they must belong to something in virtue of its own nature. Hence if these principles were investigated by those also who investigated the elements of existing things, the elements must be elements of Being not incidentally, but *qua* Being. Therefore it is of Being *qua* Being that we too must grasp the first causes.

The term "being" is used in various senses, but with reference to one central idea and one definite characteristic, and not as merely a common epithet. Thus as the term "healthy" always relates to health (either as preserving it or as producing it or as indicating it or as receptive of it),

and as "medical" relates to the art of medicine (either as possessing it or as naturally adapted for it or as being a function of medicine)—and we shall find other terms used similarly to these—

so "being" is used in various senses, but always with reference to one principle. For some things are said to "be" because they are substances; others because they are modifications of substance; others because they are a process towards substance, or destructions or privations or qualities of substance, or productive or generative of substance or of terms relating to substance, or negations of certain of these terms or of substance. (Hence we even say that not-being *is* not-being.)

And so, just as there is one science of all healthy things, so it is true of

everything else. For it is not only in the case of terms which express one common notion that the investigation belongs to one science, but also in the case of terms which relate to one particular characteristic; for the latter too, in a sense, express one common notion. Clearly then the study of things which *are, qua* being, also belongs to one science. Now in every case knowledge is principally concerned with that which is primary, i.e. that upon which all other things depend, and from which they get their names. If, then, substance is this primary thing, it is of substances that the philosopher must grasp the first principles and causes.

Now of every single class of things, as there is one perception, so there is one science: e.g., grammar, which is one science, studies all articulate sounds.
Hence the study of all the species of Being *qua* Being belongs to a science which is generically one, and the study of the several species of Being belongs to the specific parts of that science.

Now if Being and Unity are the same, i.e. a single nature, in the sense that they are associated as principle and cause are, and not as being denoted by the same definition (although it makes no difference but rather helps our argument if we understand them in the same sense),
since "one man" and "man" and "existent man" and "man" are the same thing, i.e. the duplication in the statement "he is a man and an *existent* man" gives no fresh meaning (clearly the concepts of humanity and existence are not dissociated in respect of either coming to be or ceasing to be), and similarly in the case of the term "one," so that obviously the additional term in these phrases has the same significance, and Unity is nothing distinct from Being;
and further if the substance of each thing is one in no accidental sense, and similarly is of its very nature something which is—then there are just as many species of Being as of Unity. And to study the essence of these species (I mean, e.g., the study of Same and Other and all the other similar concepts—
roughly speaking all the "contraries" are reducible to this first principle; but we may consider that they have been sufficiently studied in the "Selection of Contraries"[229]) is the province of a science which is generically one.

And there are just as many divisions of philosophy as there are kinds of substance; so that there must be among them a First Philos-

[229]It is uncertain to what treatise Aristotle refers; in any case it is not extant.

ophy and one which follows upon it.
For Being and Unity at once entail genera, and so the sciences will correspond to these genera. The term "philosopher" is like the term "mathematician" in its uses; for mathematics too has divisions—there is a primary and a secondary science, and others successively, in the realm of mathematics.
Now since it is the province of one science to study opposites, and the opposite of unity is plurality, and it is the province of one science to study the negation and privation of Unity, because in both cases we are studying Unity, to which the negation (or privation) refers, stated either in the simple form that Unity is not present, or in the form that it is not present in a particular class; in the latter case Unity is modified by the differentia, apart from the content of the negation (for the negation of Unity is its absence); but in privation there is a substrate of which the privation is predicated.—
The opposite of Unity, then, is Plurality; and so the opposites of the above-mentioned concepts—Otherness, Dissimilarity, Inequality and everything else which is derived from these or from Plurality or Unity —fall under the cognizance of the aforesaid science. And one of them is Oppositeness; for this is a form of Difference, and Difference is a form of Otherness.
Hence since the term "one" is used in various senses, so too will these terms be used; yet it pertains to one science to take cognizance of them all. For terms fall under different sciences, not if they are used in various senses, but if their definitions are neither identical nor referable to a common notion.
And since everything is referred to that which is primary, e.g. all things which are called "one" are referred to the primary "One," we must admit that this is also true of Identity and Otherness and the Contraries. Thus we must first distinguish all the senses in which each term is used, and then attribute them to the primary in the case of each predicate, and see how they are related to it; for some will derive their name from possessing and others from producing it, and others for similar reasons.
Thus clearly it pertains to one science to give an account both of these concepts and of substance (this was one of the questions raised in the "Difficulties"[230]), and it is the function of the philosopher to be able to study all subjects.
If this is not so, who is it who in will investigate whether " Socrates"

[230]See *Aristot. Met. 3.1.8-10*, *Aristot. Met. 3.2.18, 19.*

and " Socrates seated" are the same thing; or whether one thing has one contrary, or what the contrary is, or how many meanings it has?[231] and similarly with all other such questions.

Thus since these are the essential modifications of Unity *qua* Unity and of Being *qua* Being, and not *qua* numbers or lines or fire, clearly it a pertains to that science[232] to discover both the essence and the attributes of these concepts.

And those who investigate them err, not in being unphilosophical, but because the substance, of which they have no real knowledge, is prior. For just as number *qua* number has its peculiar modifications, e.g. oddness and evenness, commensurability and equality, excess and defect, and these things are inherent in numbers both considered independently and in relation to other numbers; and as similarly other peculiar modifications are inherent in the solid and the immovable and the moving and the weightless and that which has weight; so Being *qua* Being has certain peculiar modifications, and it is about these that it is the philosopher's function to discover the truth. And here is evidence of this fact.

Dialecticians and sophists wear the same appearance as the philosopher, for sophistry is Wisdom in appearance only, and dialecticians discuss all subjects, and Being is a subject common to them all; but clearly they discuss these concepts because they appertain to philosophy.

For sophistry and dialectic are concerned with the same class of subjects as philosophy, but philosophy differs from the former in the nature of its capability and from the latter in its outlook on life. Dialectic treats as an exercise what philosophy tries to understand, and sophistry seems to be philosophy; but is not.

Further, the second column of contraries is privative, and everything is reducible to Being and Not being, and Unity and Plurality; e.g. Rest falls under Unity and Motion under Plurality. And nearly everyone agrees that substance and existing things are composed of contraries; at any rate all speak of the first principles as contraries—

some as Odd and Even,[233] some as Hot and Cold,[234] some as Limit and Unlimited,[235] some as Love and Strife.[236] And it is apparent that

[231] Cf. *Aristot. Met. 10.4.*

[232] i.e., Philosophy or Metaphysics.

[233] The Pythagoreans.

[234] Perhaps Parmenides.

[235] The Platonists.

[236] Empedocles.

all other things also are reducible to Unity and Plurality (we may assume this reduction); and the principles adduced by other thinkers fall entirely under these as genera.

It is clear, then, from these considerations also, that it pertains to a single science to study Being *qua* Being; for all things are either contraries or derived from contraries, and the first principles of the contraries are Unity and Plurality. And these belong to one science, whether they have reference to one common notion or not. Probably the truth is that they have not; but nevertheless even if the term "one" is used in various senses, the others will be related to the primary sense (and similarly with the contraries)—

even if Being or Unity is not a universal and the same in all cases, or is not separable from particulars (as it presumably is not; the unity is in some cases one of reference and in others one of succession). For this very reason it is not the function of the geometrician to inquire what is Contrariety or Completeness or Being or Unity or Identity or Otherness, but to proceed from the assumption of them.

Clearly, then, it pertains to one science to study Being *qua* Being, and the attributes inherent in it *qua* Being; and the same science investigates, besides the concepts mentioned above, Priority and Posteriority, Genus and Species, Whole and Part, and all other such concepts.

We must pronounce whether it pertains to the same science to study both the so-called axioms in mathematics and substance, or to different sciences. It is obvious that the investigation of these axioms too pertains to one science, namely the science of the philosopher; for they apply to all existing things, and not to a particular class separate and distinct from the rest. Moreover all thinkers employ them—because they are axioms of Being *qua* Being, and every genus possesses Being —

but employ them only in so far as their purposes require; i.e., so far as the genus extends about which they are carrying out their proofs. Hence since these axioms apply to all things *qua* Being (for this is what is common to them), it is the function of him who studies Being *qua* Being to investigate them as well.

For this reason no one who is pursuing a particular inquiry—neither a geometrician nor an arithmetician—attempts to state whether they are true or false; but some of the physicists did so, quite naturally; for they alone professed to investigate nature as a whole, and Being.

But inasmuch as there is a more ultimate type of thinker than the natural philosopher (for nature is only a genus of Being), the investigation of these axioms too will belong to the universal thinker who studies

the primary reality. Natural philosophy is a kind of Wisdom, but not the primary kind.
As for the attempts of some of those who discuss how the truth should be received, they are due to lack of training in logic; for they should understand these things before they approach their task, and not investigate while they are still learning.
Clearly then it is the function of the philosopher, i.e. the student of the whole of reality in its essential nature, to investigate also the principles of syllogistic reasoning. And it is proper for him who best understands each class of subject to be able to state the most certain principles of that subject; so that he who understands the modes of Being *qua* Being should be able to state the most certain principles of all things. Now this person is the philosopher, and the most certain principle of all is that about which one cannot be mistaken; for such a principle must be both the most familiar (for it is about the unfamiliar that errors are always made), and not based on hypothesis.
For the principle which the student of any form of Being must grasp is no hypothesis; and that which a man must know if he knows anything he must bring with him to his task.

Clearly, then, it is a principle of this kind that is the most certain of all principles. Let us next state *what* this principle is.
"It is impossible for the same attribute at once to belong and not to belong to the same thing and in the same relation"; and we must add any further qualifications that may be necessary to meet logical objections. This is the most certain of all principles, since it possesses the required definition;
for it is impossible for anyone to suppose that the same thing is and is not, as some imagine that Heraclitus says[237]—for what a man says does not necessarily represent what he believes.
And if it is impossible for contrary attributes to belong at the same time to the same subject (the usual qualifications must be added to this premiss also), and an opinion which contradicts another is contrary to it, then clearly it is impossible for the same man to suppose at the same time that the same thing is and is not; for the man who made this error would entertain two contrary opinions at the same time.
Hence all men who are demonstrating anything refer back to this as an ultimate belief; for it is by nature the starting-point of all the other axioms as well.

[237]For examples of Heraclitus's paradoxes cf. *Heraclitus Fr. 36, 57, 59 (Bywater)*; and for their meaning see Burnet, E.G.P. 80.

There are some, however, as we have said, who both state themselves that the same thing can be and not be, and say that it is possible to hold this view. Many even of the physicists adopt this theory. But we have just assumed that it is impossible at once to be and not to be, and by this means we have proved that this is the most certain of all principles.

Some, indeed, demand to have the law proved, but this is because they lack education[238]; for it shows lack of education not to know of what we should require proof, and of what we should not. For it is quite impossible that everything should have a proof; the process would go on to infinity, so that even so there would be no proof.[239]

If on the other hand there are some things of which no proof need be sought, they cannot say what principle they think to be more self-evident. Even in the case of this law, however, we can demonstrate the impossibility by refutation, if only our opponent makes some statement. If he makes none, it is absurd to seek for an argument against one who has no arguments of his own about anything, in so far as he has none; for such a person, in so far as he is such, is really no better than a vegetable.

And I say that proof by refutation differs from simple proof in that he who attempts to prove might seem to beg the fundamental question, whereas if the discussion is provoked thus by someone else, refutation and not proof will result.

The starting-point for all such discussions is not the claim that he should state that something is or is not so (because this might be supposed to be a begging of the question), but that he should say something significant both to himself and to another (this is essential if any argument is to follow; for otherwise such a person cannot reason either with himself or with another);

and if this is granted, demonstration will be possible, for there will be something already defined. But the person responsible is not he who demonstrates but he who acquiesces; for though he disowns reason he acquiesces to reason. Moreover, he who makes such an admission as this has admitted the truth of something apart from demonstration [so that not everything will be "so and not so"].

Thus in the first place it is obvious that this at any rate is true: that the term "to be" or "not to be" has a definite meaning; so that not

[238] sc., in logic.

[239] Every proof is based upon some hypothesis, to prove which another hypothesis must be assumed, and so on ad infinitum.

everything can be "so and not so." Again, if "man" has one meaning, let this be "two-footed animal."
By "has one meaning" I mean this: if X means "man," then if anything is a man, its humanity will consist in being X. And it makes no difference even if it be said that "man" has several meanings, provided that they are limited in number; for one could assign a different name to each formula.
For instance, it might be said that "man" has not one meaning but several, one of which has the formula "two-footed animal," and there might be many other formulae as well, if they were limited in number; for a particular name could be assigned to each for formula.
If on the other hand it be said that "man" has an infinite number of meanings, obviously there can be no discourse; for not to have one meaning is to have no meaning, and if words have no meaning there is an end of discourse with others, and even, strictly speaking, with oneself; because it is impossible to think of anything if we do not think of one thing; and even if this were possible, one name might be assigned to that of which we think.
Now let this name, as we said at the beginning, have a meaning; and let it have one meaning. Now it is impossible that "being man" should have the same meaning as "not being man," that is, if "man" is not merely predicable of one subject but has one meaning
(for we do not identify "having one meaning" with "being predicable of one subject," since in this case "cultured" and "white" and "man" would have one meaning, and so all things would be one; for they would all have the same meaning). And it will be impossible for the same thing to be and not to be, except by equivocation, as e.g. one whom we call "man" others might call "not-man";
but the problem is whether the same thing can at once be and not be "man," not in *name* , but in *fact* . If "man" and "not-man" have not different meanings, clearly "not being a man" will mean nothing different from "being a man"; and so "being a man" will be "not being a man"; they will be one.
For "to be one" means, as in the case of "garment" and "coat," that the formula is one. And if "being man" and "being not-man" are to be one, they will have the same meaning; but it has been proved above that they have different meanings. If then anything can be truly said to be "man," it must be "two-footed animal"; for this is what "man" was intended to mean.
And if this is necessarily so, it is impossible that at the same time the same thing should not be "two-footed animal." For "to be necessarily

so" means this: that it is impossible not to be so. Thus it cannot be true to say at the same time that the same thing is and is not man.
And the same argument holds also in the case of not being man; because "being man" and "being not-man" have different meanings if "being white" and "being man" have different meanings (for the opposition is much stronger in the former case so as to produce different meanings).
And if we are told that "white" too means one and the same thing,[240] we shall say again just what we said before,[241] that in that case all things, and not merely the opposites, will be one. But if this is impossible, what we have stated follows; that is, if our opponent answers our question; but if when asked the simple question he includes in his answer the negations, he is not answering our question.
There is nothing to prevent the same thing from being "man" and "white" and a multitude of other things; but nevertheless when asked whether it is true to say that X is man, or not, one should return an answer that means one thing, and not add that X is white and large. It is indeed impossible to enumerate all the infinity of accidents; and so let him enumerate either all or none.
Similarly therefore, even if the same thing is ten thousand times "man" and "not-man," one should not include in one's answer to the question whether it is "man" that it is at the same time also "not-man," unless one is also bound to include in one's answer all the other accidental things that the subject is or is not. And if one does this, he is not arguing properly.

In general those who talk like this do away with substance and essence,
for they are compelled to assert that all things are accidents, and that there is no such thing as "being essentially man" or "animal." For if there is to be such a thing as "being essentially man," this will not be "being not-man" nor "not-being man" (and yet these are negations of it); for it was intended to have one meaning, i.e. the substance of something.
But to denote a substance means that the essence is that and nothing else; and if for it "being essentially man" is the same as either "being essentially not-man" or "essentially not-being man," the essence will be something else.
Thus they are compelled to say that nothing can have such a definition

[240] i.e. the same as "man."
[241] *Aristot. Met. 4.4.12.*

as this, but that all things are accidental; for this is the distinction between substance and accident: "white" is an accident of "man," because although he is white, he is not white in essence.
And since the accidental always implies a predication about some subject, if all statements are accidental, there will be nothing primary about which they are made; so the predication must proceed to infinity. But this is impossible, for not even more than two accidents can be combined in predication. An accident cannot be an accident of an accident unless both are accidents of the same thing.
I mean, e.g., that "white" is "cultured" and "cultured" "white" merely because both are accidents of a man. But it is not in this sense—that both terms are accidents of something else—that Socrates is cultured.
Therefore since some accidents are predicated in the latter and some in the former sense, such as are predicated in the way that "white" is of Socrates cannot be an infinite series in the upper direction; e.g. there cannot be another accident of "white Socrates," for the sum of these predications does not make a single statement.
Nor can "white" have a further accident, such as "cultured"; for the former is no more an accident of the latter than vice versa; and besides we have distinguished that although some predicates are accidental in this sense, others are accidental in the sense that "cultured" is to Socrates; and whereas in the former case the accident is an accident of an accident, it is not so in the latter; and thus not all predications will be of accidents.
Therefore even so there will be something which denotes substance. And if this is so, we have proved that contradictory statements cannot be predicated at the same time.

Again, if all contradictory predications of the same subject at the same time are true, clearly all things will be one.
For if it is equally possible either to affirm or deny anything of anything, the same thing will be a trireme and a wall and a man; which is what necessarily follows for those who hold the theory of Protagoras.[242] For if anyone thinks that a man is not a trireme, he is clearly not a trireme; and so he also is a trireme if the contradictory statement is true.
And the result is the dictum of Anaxagoras, "all things mixed together"[243]; so that nothing truly exists. It seems, then, that they are speaking of the Indeterminate; and while they think that they are speaking of what exists, they are really speaking of what does not; for

[242] i.e., that all appearances and opinions are true.
[243] *Fr. 1 (Diels).*

the Indeterminate is that which exists potentially but not actually.
But indeed they must admit the affirmation or negation of any predicate of any subject, for it is absurd that in the case of each term its own negation should be true, and the negation of some other term which is not true of it should not be true. I mean, e.g., that if it is true to say that a man is not a man, it is obviously also true to say that he is or is not a trireme.
Then if the affirmation is true, so must the negation be true; but if the affirmation is not true the negation will be even truer than the negation of the original term itself. Therefore if the latter negation is true, the negation of "trireme" will also be true; and if this is true, the affirmation will be true too.

And not only does this follow for those who hold this theory, but also that it is not necessary either to affirm or to deny a statement.
For if it is true that X is both man and not-man, clearly he will be neither man nor not-man; for to the two statements there correspond two negations, and if the former is taken as a single statement compounded out of two, the latter is also a single statement and opposite to it.
Again, either this applies to all terms, and the same thing is both white and not-white, and existent and non-existent, and similarly with all other assertions and negations; or it does not apply to all, but only to some and not to others.
And if it does not apply to all, the exceptions will be admitted[244]; but if it does apply to all, again either (a) the negation will be true wherever the affirmation is true, and the affirmation will be true wherever the negation is true, or (d) the negation will be true wherever the assertion is true, but the assertion will not always be true where the negation is true.
And in the latter case there will be something which definitely is not, and this will be a certain belief; and if that it is not is certain and knowable, the opposite assertion will be still more knowable. But if what is denied can be equally truly asserted, it must be either true or false to state the predicates separately and say, e.g., that a thing is white, and again that it is not-white.
And if it is not-true to state them separately, our opponent does not say what he professes to say, and nothing exists; and how can that which does not exist speak or walk?[245] And again all things will be one, as

[244]i.e., it will be admitted that in certain cases where an attribute is true of a subject, the negation is not true; and therefore some propositions are indisputable.

we said before,[246] and the same thing will be "man" and "God" and "trireme" and the negations of these terms.
For if it is equally possible to assert or deny anything of anything, one thing will not differ from another; for if anything does differ, it will be true and unique. And similarly even if it is possible to make a true statement while separating the predicates, what we have stated follows. Moreover it follows that all statements would be true and all false; and that our opponent himself admits that what he says is false. Besides, it is obvious that discussion with him is pointless, because he makes no real statement.
For he says neither "yes" nor "no," but "yes and no"; and again he denies both of these and says "neither yes nor no"; otherwise there would be already some definite statement.

Again, if when the assertion is true the negation is false, and when the latter is true the affirmation is false, it will be impossible to assert and deny with truth the same thing at the same time.
But perhaps it will be said that this is the point at issue.

Again, is the man wrong who supposes that a thing is so or not so, and he who supposes both right? If he is right, what is the meaning of saying that "such is the nature of reality"?[247] And if he is not right, but is more right than the holder of the first view, reality will at once have a definite nature, and this will be true, and not at the same time not-true.
And if all men are equally right and wrong, an exponent of this view can neither speak nor mean anything, since at the same time he says both "yes" and "no." And if he forms no judgement, but "thinks" and "thinks not" indifferently, what difference will there be between him and the vegetables?

Hence it is quite evident that no one, either of those who profess this theory or of any other school, is really in this position.
Otherwise, why does a man walk to Megara and not stay at home, when he thinks he ought to make the journey? Why does he not walk early one morning into a well or ravine, if he comes to it, instead of clearly guarding against doing so, thus showing that he does *not* think that it is equally good and not good to fall in? Obviously then he

[245] If our opponent holds that you can only say "A is B and not B," (1) he contradicts every statement that he makes; (2) he must say that what exists does not exist. Therefore nothing exists, and so he himself does not exist; but how can he speak or walk if he does not exist?

[246] *Aristot. Met. 4.4.27.*

[247] If everything is both so and not so, nothing has any definite nature.

judges that the one course is better and the other worse.
And if this is so, he must judge that one thing is man and another not man, and that one thing is sweet and another not sweet. For when, thinking that it is desirable to drink water and see a man, he goes to look for them, he does not look for and judge all things indifferently; and yet he should, if the same thing were equally man and not-man.
But as we have said, there is no one who does not evidently avoid some things and not others. Hence, as it seems, all men form unqualified judgements, if not about all things, at least about what is better or worse.
And if they do this by guesswork and without knowledge, they should be all the more eager for truth; just as a sick man should be more eager for health than a healthy man; for indeed the man who guesses, as contrasted with him who knows, is not in a healthy relation to the truth.
Again, however much things may be "so and not so," yet differences of degree are inherent in the nature of things. For we should not say that 2 and 3 are equally even; nor are he who thinks that 4 is 5, and he who thinks it is 1000, equally wrong: hence if they are not equally wrong, the one is clearly less wrong, and so more right.
If then that which has more the nature of something is nearer to that something, there will be some truth to which the more true is nearer. And even if there is not, still there is now something more certain and true, and we shall be freed from the undiluted doctrine which precludes any mental determination.
From the same view proceeds the theory of Protagoras, and both alike must be either true or false. For if all opinions and appearances are true, everything must be at once true and false; for many people form judgements which are opposite to those of others, and imagine that those who do not think the same as themselves are wrong: hence the same thing must both be and not be.
And if this is so, all opinions must be true; for those who are wrong and those who are right think contrarily to each other. So if reality is of this nature, everyone will be right.

Clearly then both these theories proceed from the same mental outlook. But the method of approach is not the same for all cases; for some require persuasion and others compulsion.
The ignorance of those who have formed this judgement through perplexity is easily remedied, because we are dealing not with the theory but with their mental outlook; but those who hold the theory for its own sake can only be cured by refuting the theory as expressed in their

own speech and words.
This view comes to those who are perplexed from their observation of sensible things. (1.) The belief that contradictions and contraries can be true at the same time comes to them from seeing the contraries generated from the same thing.
Then if what is not cannot be generated, the thing must have existed before as both contraries equally—just as Anaxagoras says[248] that everything is mixed in everything; and also Democritus, for he too says[249] that Void and Plenum are present equally in any part, and yet the latter *is* , and the former *is not*.
To those, then, who base their judgement on these considerations, we shall say that although in one sense their theory is correct, in another they are mistaken. For "being" has two meanings, so that there is a sense in which something can be generated from "not-being," and a sense in which it cannot; and a sense in which the same thing can at once be and not be; but not in the same respect. For the same thing can "be" contraries at the same time potentially, but not actually.
And further, we shall request them to conceive another kind also of substance of existing things, in which there is absolutely no motion or destruction or generation. And (2.) similarly the theory that there is truth in appearances has come to some people from an observation of sensible things.
They think that the truth should not be judged by the number or fewness of its upholders; and they say that the same thing seems sweet to some who taste it, and bitter to others; so that if all men were diseased or all insane, except two or three who were healthy or sane, the latter would seem to be diseased or insane, and not the others.
And further they say that many of the animals as well get from the same things impressions which are contrary to ours, and that the individual himself does not always think the same in matters of sense-perception. Thus it is uncertain which of these impressions are true or false; for one kind is no more true than another, but equally so. And hence Democritus says[250] that either there is no truth or we cannot discover it.
And in general it is because they suppose that thought is sense-perception, and sense-perception physical alteration, that they say that the impression given through sense-perception is necessarily true;

[248] Cf. *Aristot. Met. 4.4.28.*
[249] Cf. *Aristot. Met. 1.4.9.*
[250] Cf. Ritter and Preller, 204.

for it is on these grounds that both Empedocles and Democritus and practically all the rest have become obsessed by such opinions as these.

For Empedocles says that those who change their bodily condition change their thought:

> For according to that which is present to them doth thought increase in men.[251]

And in another passage he says:

> And as they change into a different nature, so it ever comes to them to think differently.[252]

And Parmenides too declares in the same way:

> For as each at any time hath the temperament of his many-jointed limbs, so thought comes to men. For for each and every man the substance of his limbs is that very thing which thinks; for thought is that which preponderates.[253]

There is also recorded a saying of Anaxagoras to some of his disciples, that things would be for them as they judged them to be.

And they say that in Homer too clearly held this view, because he made Hector,[254] when he was stunned by the blow, lie with thoughts deranged—thus implying that even those who are "out of their minds" still think, although not the same thoughts. Clearly then, if both are kinds of thought, reality also will be "both so and not so."

It is along this path that the consequences are most difficult; for if those who have the clearest vision of such truth as is possible (and these are they who seek and love it most) hold such opinions and make these pronouncements about the truth, surely those who are trying to be philosophers may well despair; for the pursuit of truth will be "chasing birds in the air." [255]

But the reason why these men hold this view is that although they studied the truth about reality, they supposed that reality is confined to sensible things, in which the nature of the Indeterminate, i.e. of Being in the sense which we have explained,[256] is abundantly present. (Thus their statements, though plausible, are not true;

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[251] *Empedocles Fr. 106.*

[252] *Empedocles Fr. 108.*

[253] *Empedocles Fr. 16*; quoted also (in a slightly different form; see critical notes) by *Theophrastus, De Sensu 3.*

[254] The only passage in our text of Homer to which this reference could apply is *Hom. Il. 23.698*; but there the subject is Euryalus, not Hector.

[255] Cf. Leutsch and Schneidewin, *Paroemiographi Graeci*, 2.677.

[256] *Aristot. Met. 4.4.28.*

this form of the criticism is more suitable than that which Epicharmus[257] applied to Xenophanes.) And further, observing that all this indeterminate substance is in motion, and that no true predication can be made of that which changes, they supposed that it is impossible to make any true statement about that which is in all ways and entirely changeable.

For it was from this supposition that there blossomed forth the most extreme view of those which we have mentioned, that of the professed followers of Heraclitus, and such as Cratylus held, who ended by thinking that one need not say anything, and only moved his finger; and who criticized Heraclitus for saying that one cannot enter the same river twice,[258] for he himself held that it cannot be done even once.

But we shall reply to this theory also that although that which is changeable supplies them, when it changes, with some real ground for supposing that it "is not," yet there is something debatable in this; for that which is shedding any quality retains something of that which is being shed, and something of that which is coming to be must already exist.

And in general if a thing is ceasing to be, there will be something there which *is* ; and if a thing is coming to be, that from which it comes and by which it is generated must *be* ; and this cannot go on to infinity.

But let us leave this line of argument and remark that quantitative and qualitative change are not the same.

Let it be granted that there is nothing permanent in respect of quantity; but it is by the *form* that we recognize everything. And again those who hold the theory that we are attacking deserve censure in that they have maintained about the whole material universe what they have observed in the case of a mere minority of sensible things.

For it is only the realm of sense around us which continues subject to destruction and generation, but this is a practically negligible part of the whole; so that it would have been fairer for them to acquit the former on the ground of the latter than to condemn the latter on account of the former.

Further, we shall obviously say to these thinkers too the same as we said some time ago[259]; for we must prove to them and convince them that there is a kind of nature that is not moved

(and yet those who claim that things can at once be and not be are

[257] Fl. early 5th century; held views partly Pythagorean, partly Heraclitean.

[258] *Heraclitus Fr. 41 (Bywater).*

[259] *Aristot. Met. 4.5.7.*

logically compelled to admit rather that all things are at rest than that they are in motion; for there is nothing for them to change into, since everything exists in everything). And as concerning reality, that not every appearance is real, we shall say, first, that indeed the perception, at least of the proper object of a sense, is not false, but the impression we get of it is not the same as the perception.

And then we may fairly express surprise if our opponents raise the question whether magnitudes and colors are really such as they appear at a distance or close at hand, as they appear to the healthy or to the diseased; and whether heavy things are as they appear to the weak or to the strong; and whether truth is as it appears to the waking or to the sleeping.

For clearly they do not really believe the latter alternative—at any rate no one, if in the night he thinks that he is at Athens whereas he is really in Africa, starts off to the Odeum.[260] And again concerning the future (as indeed Plato says[261]) the opinion of the doctor and that of the layman are presumably not equally reliable, e.g. as to whether a man will get well or not.

And again in the case of the senses themselves, our perception of a foreign object and of an object proper to a given sense, or of a kindred object and of an actual object of that sense itself, is not equally reliable[262]; but in the case of colors sight, and not taste, is authoritative, and in the case of flavor taste, and not sight. But not one of the senses ever asserts at the same time of the same object that it is "so and not so."

Nor even at another time does it make a conflicting statement about the quality, but only about that to which the quality belongs. I mean, e.g., that the same wine may seem, as the result of its own change or of that of one's body, at one time sweet and at another not; but sweetness, such as it is when it exists, has never yet changed, and there is no mistake about it, and that which is to be sweet is necessarily of such a nature.

Yet all these theories destroy the possibility of anything's existing by necessity, inasmuch as they destroy the existence of its essence; for "the

[260] A concert-hall (used also for other purposes) built by Pericles. It lay to the south-east of the Acropolis.

[261] *Plat. Theaet. 171e, 178cff.*.

[262] An object of taste is foreign to the sense of sight; a thing may look sweet without tasting sweet. Similarly although the senses of taste and smell (and therefore their objects) are kindred (*Aristot. De Sensu 440b 29*), in judging tastes the sense of taste is the more reliable.

necessary" cannot be in one way and in another; and so if anything exists of necessity, it cannot be "both so and not so."

And in general, if only the sensible exists, without animate things there would be nothing; for there would be no sense-faculty.

That there would be neither sensible qualities nor sensations is probably true[263](for these depend upon an effect produced in the percipient), but that the substrates which cause the sensation should not exist even apart from the sensation is impossible.

For sensation is not of itself, but there is something else too besides the sensation, which must be prior to the sensation; because that which moves is by nature prior to that which is moved, and this is no less true if the terms are correlative.

But there are some, both of those who really hold these convictions and of those who merely profess these views, who raise a difficulty; they inquire who is to judge of the healthy man, and in general who is to judge rightly in each particular case. But such questions are like wondering whether we are at any given moment asleep or awake;

and all problems of this kind amount to the same thing. These people demand a reason for everything. They want a starting-point, and want to grasp it by demonstration; while it is obvious from their actions that they have no conviction. But their case is just what we have stated before[264]; for they require a reason for things which have no reason, since the starting-point of a demonstration is not a matter of demonstration.

The first class, then, may be readily convinced of this, because it is not hard to grasp. But those who look only for cogency in argument look for an impossibility, for they claim the right to contradict themselves, and lose no time in doing so.

Yet if not everything is relative, but some things are self-existent, not every appearance will be true; for an appearance is an appearance to someone. And so he who says that all appearances are true makes everything relative.

Hence those who demand something cogent in argument, and at the same time claim to make out a case, must guard themselves by saying that the appearance is true; not in itself, but *for him to whom* it appears, and at, the time when it appears, and in the *way* and *manner in which it appears*. And if they make out a case without this qualification, as a result they will soon contradict themselves;

[263]Cf. *Aristot. De Anima 425b 25-426b 8.*

[264]*Aristot. Met. 4.4.2.*

for it is possible in the case of the same man for a thing to appear honey to the sight, but not to the taste, and for things to appear different to the sight of each of his two eyes, if their sight is unequal. For to those who assert (for the reasons previously stated[265]) that appearances are true, and that all things are therefore equally false and true, because they do not appear the same to all, nor always the same to the same person, but often have contrary appearances at the same time
(since if one crosses the fingers touch says that an object is two, while sight says that it is only one[266]), we shall say "but not to the same sense or to the same part of it in the same way and at the same time"; so that with this qualification the appearance will be true. But perhaps it is for this reason that those who argue not from a sense of difficulty but for argument's sake are compelled to say that the appearance is not true in itself, but true to the percipient;
and, as we have said before, are compelled also to make everything relative and dependent upon opinion and sensation, so that nothing has happened or will happen unless someone has first formed an opinion about it; otherwise clearly all things would not be relative to opinion.

Further, if a thing is one, it is relative to one thing or to something determinate. And if the same thing is both a half and an equal, yet the equal is not relative to the double.
If to the thinking subject "man" and the object of thought are the same, "man" will be not the thinking subject but the object of thought; and if each thing is to be regarded as relative to the thinking subject, the thinking subject will be relative to an infinity of specifically different things.
That the most certain of all beliefs is that opposite statements are not both true at the same time, and what follows for those who maintain that they are true, and why these thinkers maintain this, may be regarded as adequately stated. And since the contradiction of a statement cannot be true at the same time of the same thing, it is obvious that contraries cannot apply at the same time to the same thing.
For in each pair of contraries one is a privation no less than it is a contrary—a privation of substance. And privation is the negation of a predicate to some defined genus. Therefore if it is impossible at the same time to affirm and deny a thing truly, it is also impossible for contraries to apply to a thing at the same time; either both must apply in a modified sense, or one in a modified sense and the other absolutely.

[265] *Aristot. Met. 4.5.7-17.*
[266] Cf. *Aristot. Problemata 958b 14, 959a 5, 965a 36.*

Nor indeed can there be any intermediate between contrary statements, but of one thing we must either assert or deny one thing, whatever it may be. This will be plain if we first define truth and falsehood. To say that what is is not, or that what is not is, is false; but to say that what is is, and what is not is not, is true; and therefore also he who says that a thing is or is not will say either what is true or what is false.

But neither what is nor what is not is said not to be *or* to be. Further, an intermediate between contraries will be intermediate either as grey is between black and white, or as "neither man nor horse" is between man and horse. If in the latter sense, it cannot change (for change is from not-good to good, or from good to not-good);

but in fact it is clearly always changing; for change can only be into the opposite and the intermediate. And if it is a true intermediate, in this case too there would be a kind of change into white not from not-white; but in fact this is not seen.[267] Further, the understanding either affirms or denies every object of understanding or thought (as is clear from the definition[268])

whenever it is right or wrong. When, in asserting or denying, it combines the predicates in one way, it is right; when in the other, it is wrong.

Again, unless it is maintained merely for argument's sake, the intermediate must exist beside all contrary terms; so that one will say what is neither true nor false. And it will exist beside what is and what is not; so that there will be a form of change beside generation and destruction.

Again, there will also be an intermediate in all classes in which the negation of a term implies the contrary assertion; e.g., among numbers there will be a number which is neither odd nor not-odd. But this is impossible, as is clear from the definition.[269]

Again, there will be an infinite progression, and existing things will be not only half as many again, but even more.

For again it will be possible to deny the intermediate in reference both to its assertion and to its negation, and the result will be something[270];

[267] It is not *qua* grey (i.e. intermediate between white and black) that grey changes to white, but *qua* not-white (i.e. containing a certain proportion of black).

[268] *Aristot. Met. 4.7.1.*

[269] What definition Aristotle had in mind we cannot tell; but it must have stated that every number is either even or odd.

[270] If besides A and not-A there is an intermediate B, besides B and not-B there will be an intermediate C which is neither B nor not-B; and so on.

for its essence is something distinct.

Again, when a man is asked whether a thing is white and says "no," he has denied nothing except that it is ⟨white⟩, and its not-being ⟨white⟩ is a negation.

Now this view has occurred to certain people in just the same way as other paradoxes have also occurred; for when they cannot find a way out from eristic arguments, they submit to the argument and admit that the conclusion is true. Some, then, hold the theory for this kind of reason, and others because they require an explanation for everything. In dealing with all such persons the starting-point is from definition; and definition results from the necessity of their meaning something; because the formula, which their term implies, will be a definition.[271]

The doctrine of Heraclitus, which says that everything is and is not,[272] seems to make all things true; and that of Anaxagoras[273] seems to imply an intermediate in contradiction, so that all things are false; for when things are mixed, the mixture is neither good nor not-good; and so no statement is true.

It is obvious from this analysis that the one-sided and sweeping statements which some people make cannot be substantially true—some maintaining that nothing is true (for they say that there is no reason why the same rule should not apply to everything as applies to the commensurability of the diagonal of a square[274]), and some that everything is true.

These theories are almost the same as that of Heraclitus. For the theory which says that all things are true and all false also makes each of these statements separately; so that if they are impossible in combination they are also impossible individually. And again obviously there are contrary statements, which cannot be true at the same time. Nor can they all be false, although from what we have said, this might seem more possible.

But in opposing all such theories we must demand, as was said in our discussion above,[275] not that something should be or not be, but some significant statement; and so we must argue from a definition, having first grasped what "falsehood" or "truth" means. And if to assert what is true is nothing else than to deny what is false, everything cannot be false; for one part of the contradiction must be true.

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[271] Cf. *Aristot. Met. 4.4.5, 6.*

[272] Cf. *Aristot. Met. 4.3.10.*

[273] Cf. *Aristot. Met. 4.4.28.*

[274] A stock example of impossibility and falsity; see Index.

[275] *Aristot. Met. 4.4.5.*

Further, if everything must be either asserted or denied, both parts cannot be false; for one and only one part of the contradiction is false. Indeed, the consequence follows which is notorious in the case of all such theories, that they destroy themselves;
for he who says that everything is true makes the opposite theory true too, and therefore his own untrue (for the opposite theory says that his is not true); and he who says that everything is false makes himself a liar.
And if they make exceptions, the one that the opposite theory alone is not true, and the other that his own theory alone is not false, it follows none the less that they postulate an infinite number of true and false statements. For the statement that the true statement is true is also true; and this will go on to infinity.
Nor, as is obvious, are those right who say that all things are at rest; nor those who say that all things are in motion. For if all things are at rest, the same things will always be true and false, whereas this state of affairs is obviously subject to change; for the speaker himself once did not exist, and again he will not exist. And if all things are in motion, nothing will be true, so everything will be false; but this has been proved to be impossible.
Again, it must be that which *is* that changes, for change is from something into something. And further, neither is it true that all things are at rest or in motion sometimes, but nothing continuously; for there is something [276] which always moves that which is moved, and the "prime mover" is itself unmoved.[277]

[276] The sphere of the fixed stars; cf. *Aristot. Met. 12.6*, *12.7.1*, *12.8.18*.
[277] Cf. *Aristot. Met. 12.7*.

Book 5

"Beginning"[278] means: (a) That part of a thing from which one may first move; eg., a line or a journey has one beginning *here* , and another at the opposite extremity. (b) The point from which each thing may best come into being; e.g., a course of study should sometimes be begun not from what is primary or from the starting-point of the subject, but from the point from which it is easiest to learn. (c) That thing as a result of whose presence something first comes into being; e.g., as the keel is the beginning of a ship, and the foundation that of a house, and as in the case of animals some thinkers suppose the heart[279] to be the "beginning," others the brain,[280] and others something similar, whatever it may be. (d) That from which, although not present in it, a thing first comes into being, and that from which motion and change naturally first begin, as the child comes from the father and mother, and fighting from abuse. (e) That in accordance with whose deliberate choice that which is moved is moved, and that which is changed is changed; such as magistracies, authorities, monarchies and despotisms.

(f) Arts are also called "beginnings,"[281] especially the architectonic arts. (g) Again, "beginning" means the point from which a thing is first comprehensible, this too is called the "beginning" of the thing; e.g. the hypotheses of demonstrations. ("Cause" can have a similar number of different senses, for all causes are "beginnings.")

It is a common property, then, of all "beginnings" to be the first thing from which something either exists or comes into being or becomes

[278] *ἀρχή* means "starting-point," "principle," "rule" or "ruler."

[279] This was Aristotle's own view, *Aristot. De Gen. An. 738b 16.*

[280] So Plato held, *Plat. Tim. 44 d.*

[281] As directing principles.

known; and some beginnings are originally inherent in things, while others are not. Hence "nature" is a beginning, and so is "element" and "understanding" and "choice" and "essence" and "final cause"—for in many cases the Good and the Beautiful are the beginning both of knowledge and of motion.

"Cause" means: (a) in one sense, that as the result of whose presence something comes into being—e.g. the bronze of a statue and the silver of a cup, and the classes[282] which contain these; (b) in another sense, the *form* or pattern; that is, the essential formula and the classes which contain it—e.g. the ratio 2:1 and number in general is the cause of the octave—and the parts of the formula.

(c) The source of the first beginning of change or rest; e.g. the man who plans is a cause, and the father is the cause of the child, and in general that which produces is the cause of that which is produced, and that which changes of that which is changed. (d) The same as "end"; i.e. the final cause; e.g., as the "end" of walking is health.

For why does a man walk? "To be healthy," we say, and by saying this we consider that we have supplied the cause. (e) All those means towards the end which arise at the instigation of something else, as, e.g. fat-reducing, purging, drugs and instruments are causes of health; for they all have the *end* as their object, although they differ from each other as being some instruments, others actions.

These are roughly all the meanings of "cause," but since causes are spoken of with various meanings, it follows that there are several causes (and that not in an accidental sense) of the same thing. E.g., both *statuary* and *bronze* are causes of the statue; not in different connections, but *qua* statue. However, they are not causes in the same way, but the one as *material* and the other as the *source of motion.* And things are causes of each other; as e.g. labor of vigor, and vigor of labor—but not in the same way; the one as an *end* , and the other as *source* of *motion* .

And again the same thing is sometimes the cause of contrary results; because that which by its presence is the cause of so-and-so we sometimes accuse of being, by its absence, the cause of the contrary—as, e.g., we say that the absence of the pilot is the cause of a capsize, whereas his presence was the cause of safety.

And both, presence and privation, are *moving* causes.

Now there are four senses which are most obvious under which all the causes just described may be classed.

[282] sc. of material—metal, wood, etc.

The components of syllables; the material of manufactured articles; fire, earth and all such bodies; the parts of a whole; and the premisses of a syllogistic conclusion; are causes in the *material* sense. Of these some are causes as substrate: e.g. the parts; and others as *essence* : the whole, and the composition, and the form.
The seed and the physician and the contriver and in general that which produces, all these are the source of change or stationariness. The remainder represent the *end* and *good* of the others; for the final cause tends to be the greatest good and *end* of the rest.
Let it be assumed that it makes no difference whether we call it "good" or "apparent good." In *kind* , then, there are these four classes of cause.

The *modes* of cause are numerically many, although these too are fewer when summarized.
For causes are spoken of in many senses, and even of those which are of the same kind, some are causes in a prior and some in a posterior sense; e.g., the physician and the expert are both causes of health; and the ratio 2:1 and number are both causes of the octave; and the universals which include a given cause are causes of its particular effects.
Again, a thing may be a cause in the sense of an accident, and the classes which contain accidents; e.g., the cause of a statue is in one sense Polyclitus and in another a sculptor, because it is an accident of the sculptor to be Polyclitus. And the universal terms which include accidents are causes; e.g., the cause of a statue is a man, or even, generally, an animal; because Polyclitus is a man, and man is an animal.
And even of accidental causes some are remoter or more proximate than others; e.g., the cause of the statue might be said to be "white man" or "cultured man," and not merely "Polyclitus" or "man."

And besides the distinction of causes as *proper* and *accidental* , some are termed causes in a *potential* and others in an *actual* sense; e.g., the cause of building is either the builder or the builder who builds.
And the same distinctions in meaning as we have already described will apply to the *effects* of the causes; e.g. to *this* statue, or *a* statue, or generally an image; and to *this* bronze, or bronze, or generally material.[283]
And it is the same with accidental effects. Again, the proper and accidental senses will be combined; e.g., the cause is neither "Polyclitus" nor "a sculptor" but "the sculptor Polyclitus."

[283]Effects, just like causes (10), may be particular or general. The metal-worker produces (a) the bronze for a particular statue by the sculptor, (b) bronze for a statue, (c) metal for an image.

However, these classes of cause are in all six in number, each used in two senses. Causes are (1.) particular, (2.) generic, (3.) accidental, (4.) generically accidental; and these may be either stated singly or (5, 6) in combination[284]; and further they are all either actual or potential. And there is this difference between them, that actual and particular causes coexist or do not coexist with their effects (e.g. *this* man giving medical treatment with *this* man recovering his health, and *this* builder with *this* building in course of erection); but potential causes do not always do so; for the house and the builder do not perish together.

"Element" means (a) the primary immanent thing, formally indivisible into another form, of which something is composed. E.g., the elements of a sound are the parts of which that sound is composed and into which it is ultimately divisible, and which are not further divisible into other sounds formally different from themselves. If an element be divided, the parts are formally the same as the whole: e.g., a part of water is water; but it is not so with the syllable.

(b) Those who speak of the elements of *bodies* similarly mean the parts into which bodies are ultimately divisible, and which are not further divisible into other parts different in form. And whether they speak of one such element or of more than one, this is what they mean.

(c) The term is applied with a very similar meaning to the "elements" of geometrical figures, and generally to the "elements" of demonstrations; for the primary demonstrations which are contained in a number of other demonstrations are called "elements" of demonstrations.[285] Such are the primary syllogisms consisting of three terms and with one middle term.

(d) The term "element" is also applied metaphorically to any small unity which is useful for various purposes; and so that which is small or simple or indivisible is called an "element."

(e) Hence it comes that the most universal things are elements; because each of them, being a simple unity, is present in many things—either in all or in as many as possible. Some too think that unity and the point are first principles.

(f) Therefore since what are called genera[286] are universal and indivisible (because they have no formula), some people call the genera

[284]The cause of a statue may be said to be (1) a sculptor, (2) an artist, (3) Polyclitus, (4) a man, (5) the sculptor Polyclitus (combination of (1) and (3)), (6) an artistic man (combination of (2) and (4)).

[285]Cf. *Aristot. Met. 3.3.1.*

[286]This must refer to the highest genera, which have no definition because they cannot be analyzed into genus and differentia (Ross).

elements, and these rather than the differentia, because the genus is more universal. For where the differentia is present, the genus also follows; but the differentia is not always present where the genus is. And it is common to all cases that the element of each thing is that which is primarily inherent in each thing.

"Nature"[287] means: (a) in one sense, the genesis of growing things—as would be suggested by pronouncing the υ of φύσις long—and (b) in another, that immanent thing[288] from which a growing thing first begins to grow. (c) The source from which the primary motion in every natural object is induced in that object as such. All things are said to grow which gain increase through something else by contact and organic unity (or adhesion, as in the case of embryos).

Organic unity differs from contact; for in the latter case there need be nothing except contact, but in both the things which form an organic unity there is some one and the same thing which produces, instead of mere contact, a unity which is organic, continuous and quantitative (but not qualitative).

Again, "nature" means (d) the primary stuff, shapeless and unchangeable from its own potency, of which any natural object consists or from which it is produced; e.g., bronze is called the "nature" of a statue and of bronze articles, and wood that of wooden ones, and similarly in all other cases.

For each article consists of these "natures," the primary material persisting. It is in this sense that men call the elements of natural objects the "nature," some calling it fire, others earth or air or water, others something else similar, others some of these, and others all of them.

Again in another sense "nature" means (e) the substance of natural objects; as in the case of those who say that the "nature" is the primary composition of a thing, or as Empedocles says: Of nothing that exists is there nature, but only mixture and separation of what has been mixed; nature is but a name given to these by men.[289]

Hence as regards those things which exist or are produced by nature, although that from which they naturally are produced or exist is already present, we say that they have not their nature yet unless they have their form and shape.

That which comprises both of these exists by nature; e.g. animals and their parts. And nature is both the primary matter (and this

[287] On the meaning of φύσις cf. Burnet, E.G.P. pp. 10-12, 363-364.

[288] Probably the seed (Bonitz).

[289] *Empedocles Fr. 8 (Diels).*

in two senses: either primary in relation to the thing, or primary in general; e.g., in bronze articles the primary matter in relation to those articles is bronze, but in general it is perhaps water—that is if all things which can be melted are water) and the form or essence, i.e. the end of the process, of generation. Indeed from this sense of "nature," by an extension of meaning, every essence in general is called "nature," because the nature of anything is a kind of essence.

From what has been said, then, the primary and proper sense of "nature" is the essence of those things which contain in themselves as such a source of motion; for the matter is called "nature" because it is capable of receiving the nature, and the processes of generation and growth are called "nature" because they are motions derived from it. And nature in this sense is the source of motion in natural objects, which is somehow inherent in them, either potentially or actually.

"Necessary" means: (a) That without which, as a concomitant condition, life is impossible; e.g. respiration and food are necessary for an animal, because it cannot exist without them. (b) The conditions without which good cannot be or come to be, or without which one cannot get rid or keep free of evil—e.g., drinking medicine is necessary to escape from ill-health, and sailing to Aegina is necessary to recover one's money.

(c) The compulsory and compulsion; i.e. that which hinders and prevents, in opposition to impulse and purpose. For the compulsory is called necessary, and hence the necessary is disagreeable; as indeed Evenus[290] says: "For every necessary thing is by nature grievous." [291] And compulsion is a kind of necessity, as Sophocles says: "Compulsion makes me do this of necessity." [292]

And necessity is held, rightly, to be something inexorable; for it is opposed to motion which is in accordance with purpose and calculation.

(d) Again, what cannot be otherwise we say is necessarily so.

It is from this sense of "necessary" that all others are somehow derived; for the term "compulsory" is used of something which it is necessary for one to do or suffer only when it is impossible to act according to impulse, because of the compulsion: which shows that necessity is that because of which a thing cannot be otherwise; and the same is true of the concomitant conditions of living and of the good. For when in the one case good, and in the other life or existence, is impossible without

[290] Of Poros; sophist and poet, contemporary with Socrates.

[291] *Evenus Fr. 8 (Hiller).*

[292] *Soph. El. 256* (the quotation is slightly inaccurate).

certain conditions, these conditions are necessary, and the cause is a kind of necessity.
(e) Again, demonstration is a "necessary" thing, because a thing cannot be otherwise if the demonstration has been absolute. And this is the result of the first premisses, when it is impossible for the assumptions upon which the syllogism depends to be otherwise.

Thus of necessary things, some have an external cause of their necessity, and others have not, but it is through them that other things are of necessity what they are.
Hence the "necessary" in the primary and proper sense is the *simple* , for it cannot be in more than one condition. Hence it cannot be in one state and in another; for if so it would ipso facto be in more than one condition. Therefore if there are certain things which are eternal and immutable, there is nothing in them which is compulsory or which violates their nature.
The term "one" is used (1.) in an accidental, (2.) in an absolute sense.
(1.) In the accidental sense it is used as in the case of "Coriscus"[293] and "cultured" and "cultured Coriscus" (for "Coriscus" and "cultured" and "cultured Coriscus" mean the same);
and "cultured" and "upright" and "cultured upright Coriscus." For all these terms refer accidentally to one thing; "upright" and "cultured" because they are accidental to one substance, and "cultured" and "Coriscus" because the one is accidental to the other.
And similarly in one sense "cultured Coriscus" is one with "Coriscus," because one part of the expression is accidental to the other, e.g. "cultured" to "Coriscus"; and "cultured Coriscus" is one with "upright Coriscus,"
because one part of each expression is one accident of one and the same thing. It is the same even if the accident is applied to a genus or a general term; e.g., "man" and "cultured man" are the same, either because "cultured" is an accident of "man," which is one substance, or because both are accidents of some individual, e.g. Coriscus.
But they do not both belong to it in the same way; the one belongs presumably as *genus* in the substance, and the other as *condition* or *affection* of the substance. Thus all things which are said to be "one" in an accidental sense are said to be so in this way.
(2.) Of those things which are said to be in themselves one, (a) some are said to be so in virtue of their continuity; e.g., a faggot is made

[293] Coriscus of Scepsis was a Platonist with whom Aristotle was probably acquainted; but the name is of course chosen quite arbitrarily.

continuous by its string, and pieces of wood by glue; and a continuous line, even if it is bent, is said to be one, just like each of the limbs; e.g. the leg or arm. And of these things themselves those which are naturally continuous are one in a truer sense than those which are artificially continuous.

"Continuous" means that whose motion is essentially one, and cannot be otherwise; and motion is one when it is indivisible, i.e. indivisible in *time* . Things are essentially continuous which are one not by contact only; for if you put pieces of wood touching one another you will not say that they are *one* piece of wood, or body, or any other continuous thing.

And things which are completely continuous are said to be "one" even if they contain a joint, and still more those things which contain no joint; e.g., the shin or the thigh is more truly one than the leg, because the motion of the leg may not be one.

And the straight line is more truly one than the bent. We call the line which is bent and contains an angle both one and not one, because it may or may not move all at once; but the straight line always moves all at once, and no part of it which has magnitude is at rest while another moves, as in the bent line.

(b) Another sense of "one" is that the substrate is uniform in kind. Things are uniform whose form is indistinguishable to sensation; and the substrate is either that which is primary, or that which is final in relation to the end. For wine is said to be one, and water one, as being something formally indistinguishable. And all liquids are said to be one (e.g. oil and wine), and melted things; because the ultimate substrate of all of them is the same, for all these things are water or vapor.

(c) Things are said to be "one" whose genus is one and differs in its opposite differentiae. All these things too are said to be "one" because the genus, which is the substrate of the differentiae, is one (e.g., "horse," "man" and "dog" are in a sense one, because they are all animals); and that in a way very similar to that in which the matter is one.

Sometimes these things are said to be "one" in this sense, and sometimes their higher genus is said to be one and the same (if they are final species of their genus)—the genus, that is, which is above the genera of which their proximate genus is one; e.g., the isosceles and equilateral triangles are one and the same figure (because they are both triangles), but not the same triangles.

(d) Again, things are said to be "one" when the definition stating

the essence of one is indistinguishable from a definition explaining the other; for in itself every definition is distinguishable ⟨into genus and differentiae⟩. In this way that which increases and decreases is one, because its definition is one; just as in the case of planes the definition of the form is one.

And in general those things whose concept, which conceives the essence, is indistinguishable and cannot be separated either in time or in place or in definition, are in the truest sense one; and of these such as are substances are most truly one. For universally such things as do not admit of distinction are called "one" in so far as they do not admit of it; e.g., if "man" *qua* "man" does not admit of distinction, he is one man; and similarly if *qua* animal, he is one animal; and if *qua* magnitude, he is one magnitude.

Most things, then, are said to be "one" because they produce, or possess, or are affected by, or are related to, some other one thing; but some are called "one" in a primary sense, and one of these is substance. It is one either in continuity or in form or in definition; for we reckon as more than one things which are not continuous, or whose form is not one, or whose definition is not one.

Again, in one sense we call anything whatever "one" if it is quantitative and continuous; and in another sense we say that it is not "one" unless it is a *whole* of some kind, i.e. unless it is one in form (e.g., if we saw the parts of a shoe put together anyhow, we should not say that they were one —except in virtue of their continuity; but only if they were so put together as to be a shoe, and to possess already some one form). Hence the circumference of a circle is of all lines the most truly one, because it is whole and complete.

The essence of "one" is to be a kind of starting point of number; for the first measure is a starting point, because that by which first we gain knowledge of a thing is the first measure of each class of objects. "The one," then, is the starting-point of what is knowable in respect of each particular thing. But the unit is not the same in all classes, for in one it is the quarter-tone, and in another the vowel or consonant; gravity has another unit, and motion another. But in all cases the unit is indivisible, either quantitatively or formally.

Thus that which is quantitatively and *qua* quantitative wholly indivisible and has no position is called a unit; and that which is wholly indivisible and has position, a point; that which is divisible in one sense, a line; in two senses, a plane; and that which is quantitatively divisible in all three senses, a body.

And reversely that which is divisible in two senses is a plane, and in

one sense a line; and that which is in no sense quantitatively divisible is a point or a unit; if it has no position, a unit, and if it has position, a point.

Again, some things are one numerically, others formally, others generically, and others analogically; numerically, those whose matter is one; formally, those whose definition is one; generically, those which belong to the same category; and analogically, those which have the same relation as something else to some third object.

In every case the latter types of unity are implied in the former: e.g., all things which are one numerically are also one formally, but not all which are one formally are one numerically; and all are one generically which are one formally, but such as are one generically are not all one formally, although they are one analogically; and such as are one analogically are not all one generically.

It is obvious also that "many" will have the opposite meanings to "one." Some things are called "many" because they are not continuous; others because their matter (either primary or ultimate) is formally divisible; others because the definitions of their essence are more than one.

"Being" means (1.) accidental being, (2.) absolute being. (1.) E.g., we say that the upright person "is" cultured, and that the man "is" cultured, and that the cultured person "is" a man; very much as we say that the cultured person builds, because the builder happens to be cultured, or the cultured person a builder; for in this sense "X is Y" means that Y is an accident of X.

And so it is with the examples cited above; for when we say that "the man is cultured" and "the cultured person is a man" or "the white is cultured" or "the cultured is white," in the last two cases it is because both predicates are accidental to the same subject, and in the first case because the predicate is accidental to what *is* ; and we say that "the cultured is a man" because "the cultured" is accidental to a man.

(Similarly "not-white" is said to "be," because the subject of which "not-white" is an accident, *is* .) These, then, are the senses in which things are said to "be" accidentally: either because both predicates belong to the same subject, which *is* ; or because the predicate belongs to the subject, which *is* ; or because the subject to which belongs that of which it is itself predicated itself *is* .

(2.) The senses of essential being are those which are indicated by the figures of predication[294]; for "being" has as many senses as there are ways of predication. Now since some predicates indicate (a) what

[294]The categories. For the full list of these see *Aristot. Categories 1b 25-27.*

a thing is, and others its (b) quality, (c) quantity, (d) relation, (e) activity or passivity, (f) place, (g) time, to each of these corresponds a sense of "being."

There is no difference between "the man is recovering" and "the man recovers"; or between "the man is walking" or "cutting" and "the man walks" or "cuts"; and similarly in the other cases.

(3.) Again, "to be" and "is" mean that a thing is true, and "not to be" that it is false.

Similarly too in affirmation and negation; e.g., in " Socrates is cultured" "is" means that this is true; or in "Socrates is not-white" that this is true; but in "the diagonal is not commensurable"[295]"is not" means that the statement is false. (4.) Again, "to be" ⟨or "is"⟩ means that some of these statements can be made in virtue of a potentiality and others in virtue of an actuality.

For we say that both that which sees potentially and that which sees actually *is* "a seeing thing." And in the same way we call "understanding" both that which *can* use the understanding, and that which *does* ; and we call "tranquil" both that in which tranquillity is already present, and that which is potentially tranquil.

Similarly too in the case of substances. For we say that Hermes is in the stone,[296] and the half of the line in the whole; and we call "corn" what is not yet ripe. But when a thing is potentially existent and when not, must be defined elsewhere.[297]

"Substance" means (a) simple bodies, e.g. earth, fire, water and the like; and in general bodies, and the things, animal or divine, including their parts, which are composed of bodies. All these are called substances because they are not predicated of any substrate, but other things are predicated of them.

(b) In another sense, whatever, being immanent in such things as are not predicated of a substrate, is the cause of their being; as, e.g., the soul is the cause of being for the animal.

(c) All parts immanent in things which define and indicate their individuality, and whose destruction causes the destruction of the whole; as, e.g., the plane is essential to the body (as some[298] hold) and the line to the plane. And number in general is thought by some[299] to be of this nature, on the ground that if it is abolished nothing exists, and

[295] Cf. *Aristot. Met. 1.2.15.*

[296] Cf. *Aristot. Met. 3.5.6.*

[297] *Aristot. Met. 9.9.*

[298] The Pythagoreans and Platonists.

[299] The Pythagoreans and Platonists.

that it determines everything.
(d) Again, the *essence* , whose formula is the definition, is also called the substance of each particular thing.

Thus it follows that "substance" has two senses: the ultimate subject, which cannot be further predicated of something else; and whatever has an individual and separate existence. The shape and form of each particular thing is of this nature.
"The same" means (a) accidentally the same. E.g., "white" and "cultured" are the same because they are accidents of the same subject; and "man" is the same as "cultured," because one is an accident of the other; and "cultured" is the same as "man" because it is an accident of "man"; and "cultured man" is the same as each of the terms "cultured" and "man," and vice versa; for both "man" and "cultured" are used in the same way as "cultured man," and the latter in the same way as the former.
Hence none of these predications can be made universally. For it is not true to say that every man is the same as "the cultured"; because universal predications are essential to things, but accidental predications are not so, but are made of individuals and with a single application. " Socrates" and "cultured Socrates" seem to be the same; but " Socrates" is not a class-name, and hence we do not say "every Socrates" as we say "every man."
Some things are said to be "the same" in this sense, but (b) others in an essential sense, in the same number of senses as "the one" is essentially one; for things whose matter is formally or numerically one, and things whose substance is one, are said to be the same. Thus "sameness" is clearly a kind of unity in the being, either of two or more things, or of one thing treated as more than one; as, e.g., when a thing is consistent with itself; for it is then treated as two.
Things are called "other" of which either the forms or the matter or the definition of essence is more than one; and in general "other" is used in the opposite senses to "same."

Things are called "different" which, while being in a sense the same, are "other" not only numerically, but formally or generically or analogically; also things whose genus is not the same; and contraries; and all things which contain "otherness" in their essence.
Things are called "like" which have the same attributes in all respects; or more of those attributes the same than different; or whose quality is one. Also that which has a majority or the more important of those attributes of something else in respect of which change is possible (i.e. the contraries) is like that thing. And "unlike" is used in the opposite

senses to "like."

The term "opposite" is applied to (a) contradiction; (b) contraries; (c) relative terms; (d) privation; (e) state; (f) extremes; e.g. in the process of generation and destruction. And (g) all things which cannot be present at the same time in that which admits of them both are called opposites; either themselves or their constituents. "Grey" and "white" do not apply at the same time to the same thing, and hence their constituents are opposite.

"Contrary" means: (a) attributes, generically different, which cannot apply at the same time to the same thing. (b) The most different attributes in the same genus; or (c) in the same subject; or (d) falling under the same faculty. (e) Things whose difference is greatest absolutely, or in genus, or in species.

Other things are called "contrary" either because they possess attributes of this kind, or because they are receptive of them, or because they are productive of or liable to them, or actually produce or incur them, or are rejections or acquisitions or possessions or privations of such attributes.

And since "one" and "being" have various meanings, all other terms which are used in relation to "one" and "being" must vary in meaning with them; and so "same," "other" and "contrary" must so vary, and so must have a separate meaning in accordance with each category.

Things are called "other in species" (a) which belong to the same genus and are not subordinate one to the other; or (b) which are in the same genus and contain a differentia; or (c) which contain a contrariety in their essence.

(d) Contraries, too (either all of them or those which are called so in a primary sense), are "other in species" than one another; and (e) so are all things of which the formulae are different in the final species of the genus (e.g., "man" and "horse" are generically indivisible, but their formulae are different); and (f) attributes of the same substance which contain a difference. "The same in species" has the opposite meanings to these.

"Prior" and "posterior" mean: (1.) (a) In one sense (assuming that there is in each genus some primary thing or starting-point) that which is nearer to some starting-point, determined either absolutely and naturally, or relatively, or locally, or by some agency; e.g., things are prior in space because they are nearer either to some place naturally determined, such as the middle or the extreme, or to some chance relation; and that which is further is posterior.

(b) In another sense, prior or posterior in *time* . Some things are prior

as being further from the present, as in the case of past events (for the Trojan is prior to the Persian war, because it is further distant from the present); and others as being nearer the present, as in the case of future events (for the Nemean are prior to the Pythian games because they are nearer to the present, regarded as a starting-point and as primary).
(c) In another sense, in respect of motion (for that which is nearer to the prime mover is prior; e.g., the boy is prior to the man). This too is a kind of starting point in an absolute sense. (d) In respect of potency; for that which is superior in potency, or more potent, is prior. Such is that in accordance with whose will the other, or posterior, thing must follow, so that according as the former moves or does not move, the latter is or is not moved. And the *will* is a "starting-point."
(e) In respect of order; such are all things which are systematically arranged in relation to some one determinate object. E.g., he who is next to the leader of the chorus is prior to him who is next but one, and the seventh string is prior to the eighth[300]; for in one case the leader is the starting-point, and in the other the middle[301] string.
In these examples "prior" has this sense; but (2.) in another sense that which is prior in knowledge is treated as absolutely prior; and of things which are prior in this sense the prior in *formula* are different from the prior in *perception* . Universals are prior in formula, but particulars in perception. And in formula the attribute is prior to the concrete whole: e.g. "cultured" to "the cultured man"; for the formula will not be a whole without the part.
Yet "cultured" cannot exist apart from some cultured person.

Again, (3.) attributes of prior subjects are called prior; e.g., straightness is prior to smoothness, because the former is an attribute of the line in itself, and the latter of a surface.
Some things, then, are called prior and posterior in this sense; but others (iv.) in virtue of their nature and substance, namely all things which can exist apart from other things, whereas other things cannot exist without them. This distinction was used by Plato.[302](And since

[300]The octachord to which Aristotle refers was composed of the following notes: E (*ὑπάτη*) F (*παρυπάτη*) G (*λιχανός*) A (*μέση*) B (*παραμέση*) C (*τρίτη*) D (*παρανήτη*) E (*νήτη*).

[301]Strictly speaking there was no middle string in the octachord; the name was taken over from the earlier heptachord EFGABbCD, in which there was no *παραμέση*. The *μέση* was apparently what we should call the tonic. Cf. *Aristot. Met. 14.6.5*; *Aristot. Problemata 919b 20.*

[302]Not, apparently, in his writings.

"being" has various meanings, (a) the substrate, and therefore substance, is prior; (b) potential priority is different from actual priority. Some things are prior potentially, and some actually; e.g., potentially the half-line is prior to the whole, or the part to the whole, or the matter to the substance; but actually it is posterior, because it is only upon dissolution that it will actually exist.)

Indeed, in a sense all things which are called "prior" or "posterior" are so called in this connection; for some things can exist apart from others in generation (e.g. the whole without the parts), and others in destruction (e.g. the parts without the whole). And similarly with the other examples.

"Potency"[303] means: (a) the source of motion or change which is in something other than the thing changed, or in it *qua* other. E.g., the science of building is a potency which is not present in the thing built; but the science of medicine, which is a potency, may be present in the patient, although not *qua* patient.

Thus "potency" means the source in general of change or motion in another thing, or in the same thing *qua* other; or the source of a thing's being moved or changed by another thing, or by itself *qua* other (for in virtue of that principle by which the passive thing is affected in any way we call it capable of being affected; sometimes if it is affected at all, and sometimes not in respect of every affection, but only if it is changed for the better).

(b) The power of performing this well or according to intention; because sometimes we say that those who can merely take a walk, or speak, without doing it as well as they intended, cannot speak or walk. And similarly in the case of passivity.

(c) All states in virtue of which things are unaffected generally, or are unchangeable, or cannot readily deteriorate, are called "potencies." For things are broken and worn out and bent and in general destroyed not through potency but through impotence and deficiency of some sort; and things are unaffected by such processes which are scarcely or slightly affected because they have a potency and are potent and are in a definite state.

Since "potency" has all these meanings, "potent" (or "capable") will mean (a) that which contains a source of motion or change (for even what is static is "potent" in a sense) which takes place in another thing, or in itself *qua* other. (b) That over which something else has a potency of this kind. (c) That which has the potency of changing things, either

[303] Or "capacity" or "potentiality."

for the worse or for the better (for it seems that even that which perishes is "capable" of perishing; otherwise, if it had been incapable, it would not have perished. As it is, it has a kind of disposition or cause or principle which induces such an affection.
Sometimes it seems to be such as it is because it *has* something, and sometimes because it is *deprived* of something; but if privation is in a sense a state or "habit," everything will be "potent" through *having* something; and so a thing is "potent" in virtue of having a certain "habit" or principle, and also in virtue of having the privation of that "habit," if it can *have* privation; and if privation is not in a sense "habit," the term "potent" is equivocal).
(d) A thing is "potent" if neither any other thing nor itself *qua* other contains a potency or principle destructive of it. (e) All these things are "potent" either because they merely might chance to happen or not to happen, or because they might do so *well* . Even in inanimate things this kind of potency is found; e.g. in instruments; for they say that one lyre "can" be played, and another not at all, if it has not a good tone.
"Impotence" is a privation of potency—a kind of abolition of the principle which has been described—either in general or in something which would naturally possess that principle, or even at a time when it would naturally already possess it (for we should not use "impotence"—in respect of begetting—in the same sense of a boy, a man and a eunuch). Again, there is an "impotence" corresponding to each kind of potency; both to the kinetic and to the successfully kinetic.
Some things are said to be "impotent" in accordance with this meaning of "impotence," but others in a different sense, namely "possible" and "impossible." "Impossible" means: (a) that whose contrary is necessarily true; e.g., it is impossible that the diagonal of a square should be commensurable with the sides, because such a thing is a lie, whose contrary is not only true but inevitable. Hence that it is commensurable is not only a lie but necessarily a lie.
And the contrary of the impossible, i.e. the possible, is when the contrary is not necessarily a lie; e.g., it is possible that a man should be seated, for it is not necessarily a lie that he should not be seated. "Possible," then, means in one sense, as we have said, that which is not necessarily a lie; in another, that which is true; and in another, that which may be true.
(The "power" in geometry[304] is so called by an extension of meaning.)

[304] A square was called a *δύναμις*. *Plat. Rep 587d*; *Plat. Tim. 31c.*

These are the senses of "potent" which do not correspond to "potency." Those which do correspond to it all refer to the first meaning, i.e. "a source of change which exists in something other than that in which the change takes place, or in the same thing *qua* other."
Other things are said to be "potent"[305] because something else has such a potency over them; others because it does not possess it; others because it possesses it in a particular way. The term "impotent" is similarly used. Thus the authoritative definition of "potency" in the primary sense will be "a principle producing change, which is in something other than that in which the change takes place, or in the same thing *qua* other."
"Quantity" means that which is divisible into constituent parts, each[306] or every one of which is by nature some one individual thing. Thus plurality, if it is numerically calculable, is a kind of quantity; and so is magnitude, if it is measurable. "Plurality" means that which is potentially divisible into non-continuous parts; and "magnitude" that which is potentially divisible into continuous parts. Of kinds of magnitude, that which is continuous in one direction is length; in two directions, breadth; in three, depth.
And of these, plurality, when limited, is a number; length, a line; breadth, a plane; depth, a body. Again, some things are essentially quantitative, but others only accidentally; e.g. the line is essentially, but "cultured" accidentally quantitative.
And of the former class some are quantitative in virtue of their substance, e.g. the fine (because the definition which describes it is quantitative in some form); and others are attributes and conditions of a substance of this kind—e.g., "much" and "little," "long" and "short," "broad" and "narrow," "deep" and "shallow," "heavy" and "light," etc. Moreover, "great" and "small," and "greater" and "smaller," whether used absolutely or relatively to one another, are essential attributes of quantity; by an extension of meaning, however, these terms are also applied to other things.
Of things called quantitative in an accidental sense, one kind is so called in the sense in which we said above that "cultured" or "white" is quantitative—because the subject to which they belong is quantitative; and others in the sense that motion and time are so called—for these too are said in a sense to be quantitative and continuous, since the subjects of which they are attributes are divisible. I mean, not the

[305] sc. in a *passive* sense, which the English word "potent" cannot bear.
[306] i.e., if there are only two.

thing moved, but that through or along which the motion has taken place; for it is because the latter is quantitative that the motion is quantitative, and because the motion is quantitative that the time is also.

"Quality" means (a) in one sense, the differentia of essence; e.g., a man is an animal of a certain quality because he is two-footed; and so is a horse, because it is four-footed. Also a circle is a geometrical figure of a certain quality, because it has no angles; which shows that the essential differentia is quality.

In this one sense, then, "quality" means differentia of essence; but (b) in another it is used as of immovable and mathematical objects, in the sense that numbers are in a way qualitative—e.g. such as are composite and are represented geometrically not by a line but by a plane or solid (these are products respectively of two and of three factors)—and in general means that which is present besides quantity in the essence. For the essence of each number is that which goes into it once; e.g. that of 6 is not what goes twice or three times, but what goes once; for 6 is once 6.

(c) All affections of substance in motion in respect of which bodies become different when they (the affections) change—e.g. heat and cold, whiteness and blackness, heaviness and lightness, etc. (d) The term is used with reference to goodness and badness, and in general to good and bad.

Thus there are, roughly speaking, two meanings which the term "quality" can bear, and of these one is more fundamental than the other. Quality in the primary sense is the differentia of the essence; and quality in numbers falls under this sense, because it is a kind of differentia of essences, but of things either not in motion or not *qua* in motion. Secondly, there are the affections of things in motion *qua* in motion, and the differentiae of motions.

Goodness and badness fall under these affections, because they denote differentiae of the motion or functioning in respect of which things in motion act or are acted upon well or badly. For that which can function or be moved in such-and-such a way is good, and that which can function in such-and-such a way and in the contrary way is bad. Quality refers especially to "good" and "bad" in the case of living things, and of these especially in the case of such as possess choice.

Things are called "relative" (a) In the sense that "the double" is relative to the half, and "the triple" to the third; and in general the "many times greater" to the "many times smaller," and that which exceeds to the thing exceeded. (b) In the sense that the thing which heats or cuts

is relative to the thing heated or cut; and in general the active to the passive. (c) In the sense that the measurable is relative to the measure, and the knowable to knowledge, and the sensible to sensation.

(a) In the first sense they are said to be numerically relative; either simply, or in a definite relation to numbers or to 1. E.g., "the double" in relation to 1 is a definite number; the "many times as great" is in a numerical relation to 1, but not in a definite relation such as *this* or *that*;

the relation of that which is 1.5 times something else to that something is a definite numerical relation to a number; and that which is (n+1)/n times something else is in an indefinite relation to a number, just as "the many times as great" is in an indefinite relation to 1.

The relation of that which exceeds to that which is exceeded is numerically quite indefinite, for number is commensurate, and is not predicated of the incommensurate; whereas that which exceeds, in relation to that which is exceeded, is "so much" plus something more; and this something more is indefinite, for it is indifferently equal or not equal to the "so much."

Thus not only are all these things said to be relative in respect of number, but also the "equal" and "like" and "same," though in another way: for all these terms are used in respect of "one". Things are "the same" whose essence is one; "like" whose quality is one; "equal" whose quantity is one. Now "one" is the starting-point and standard of number; and so all these relations involve number, though not all in the same way.

(b) Active and passive things are called relative in virtue of an active or passive potentiality or actualization of the potentialities; e.g., that which can heat is called relative to that which can be heated, because it can heat; and again the thing heating is called relative to the thing heated, and the thing cutting to the thing cut, because their potentialities are actualized. Numerical relations, on the other hand, are not actualized (except as has been described elsewhere)[307]; they have no actualizations in respect of motion.

Of things potentially relative, some are further relative in respect of particular times; as, e.g., that which has made or will make is relative to that which has been or will be made. It is in this way that a father is called father of a son; the one has acted, and the other has been

[307]The reference is quite uncertain, but cf. *Aristot. Met. 9.9.4, 5.* The point is that the actualization of a numerical (or geometrical) relation does not imply an active functioning, as in the case of the potentialities just described.

acted upon, in a particular way. Again, some things are relative in virtue of a privation of their potentiality; such is "the impossible" and all similar terms, e.g. "the invisible."

Thus relative terms which involve number and potentiality are all relative because their very essence contains a reference to something else; but not because something else is related to their essence. But (c) that which is measurable or knowable or thinkable is called relative because something else is related to its essence.

For "thinkable" signifies that there is a thought which thinks it; but thought is not relative to that of which it is the thought (for then the same thing would have been said twice). And similarly sight is the sight of something; not of that of which it is the sight, although this is of course true—it is relative to some color or other similar thing.

To describe it in the other way—"the sight of the object of sight"—would be to say the same thing twice. Things, then, which are called relative of their own nature are so called, some in these senses, and others because the classes which contain them are of this kind. E.g., medicine is reckoned as relative because its genus, science, is thought to be a relative thing.

Further, there are the properties in virtue of which the things which possess them are called relative; e.g., "equality" is relative because "the equal" is relative, and "similarity" because "the similar" is relative. Other things are accidentally relative; e.g., a man is relative because he happens to be "double" something else, and "double" is a relative term; or "white" is relative if the same thing happens to be white as well as double.

"Perfect" ⟨or "complete"⟩ means: (a) That outside which it is impossible to find even a single one of its parts; e.g., the complete time of each thing is that outside which it is impossible to find any time which is a part of it. (b) That which, in respect of goodness or excellence, cannot be surpassed in its kind; e.g., a doctor and a musician are "perfect" when they have no deficiency in respect of the form of their peculiar excellence.

And thus by an extension of the meaning we use the term in a bad connection, and speak of a "perfect" humbug and a "perfect" thief; since indeed we call them "good"—e.g. a "good" thief and a "good" humbug.

(c) And goodness is a kind of perfection. For each thing, and every substance, is perfect when, and only when, in respect of the form of its peculiar excellence, it lacks no particle of its natural magnitude. (d) Things which have attained their end, if their end is good, are called

"perfect"; for they are perfect in virtue of having attained the end. Hence, since the end is an ultimate thing, we extend the meaning of the term to bad senses, and speak of perishing "perfectly" or being "perfectly" destroyed, when the destruction or calamity falls short in no respect but reaches its extremity. Hence, by an extension of the meaning, death is called an "end," because they are both ultimate things. And the ultimate object of action is also an end.

Things, then, which are called "perfect" in themselves are so called in all these senses; either because in respect of excellence they have no deficiency and cannot be surpassed, and because no part of them can be found outside them; or because, in general, they are unsurpassed in each particular class, and have no part outside. All other things are so called in virtue of these, because they either produce or possess something of this kind, or conform to it, or are referred in some way or other to things which are perfect in the primary sense.

"Limit" means: (a) The furthest part of each thing, and the first point outside which no part of a thing can be found, and the first point within which all parts are contained. (b) Any form of magnitude or of something possessing magnitude.

(c) The end of each thing. (This end is that *to* which motion and action proceed, and not the end *from* which. But sometimes it is both the end from which and the end to which, i.e. the final cause.) (d) The reality or essence of each thing; for this is the limit of our knowledge of it, and if it is a limit of the knowledge, it is also a limit of the thing. Thus it is obvious that "limit" has not only as many senses as "beginning" but even more; because the beginning is a kind of limit, but not every limit is a beginning.

"That in virtue of which" has various meanings. (a) The form or essence of each individual thing; e.g., that in virtue of which a man is good is "goodness itself." (b) The immediate substrate in which a thing is naturally produced; as, e.g., color is produced in the surface of things. Thus "that in virtue of which" in the primary sense is the *form* , and in the secondary sense, as it were, the *matter* of each thing, and the immediate substrate.

And in general "that in virtue of which" will exist in the same number of senses as "cause." For we say indifferently "in virtue of what has he come?" or "for what reason has he come?" and "in virtue of what has he inferred or inferred falsely?" or "what is the cause of his inference or false inference?" (And further, there is the positional sense of *καθ' ὅ*, "in which he stands," or "in which he walks"; all these examples denote place or position.)

Hence "in virtue of itself" must also have various meanings. It denotes (a) The essence of each particular; e.g., Callias is in virtue of himself Callias and the essence of Callias. (b) Everything contained in the definition; e.g., Callias is in virtue of himself an animal, because "animal" is present in the definition, since Callias is a kind of animal.
(c) Any attribute which a thing has received directly in itself or in any of its parts; e.g., the surface is white in virtue of itself; and man lives in virtue of himself, because the soul is a part of the man, and life is directly contained in it. (d) That which has no other cause. Man has many causes: "animal," "twofooted," etc.; but nevertheless man is in virtue of himself man. (e) All things which belong to a thing alone and *qua* alone; and hence that which is separate is "in virtue of itself." [308]
"Disposition" means arrangement of that which has parts, either in space or in potentiality or in form. It must be a kind of position, as indeed is clear from the word, "disposition."
"Having"[309] means (a) In one sense an activity, as it were, of the haver and the thing had, or as in the case of an action or motion; for when one thing makes and another is made, there is between them an act of making. In this way between the man who has a garment and the garment which is had, there is a "having." Clearly, then, it is impossible to *have* a "having" in this sense; for there will be an infinite series if we can have the having of what we have.
But (b) there is another sense of "having" which means a disposition, in virtue of which the thing which is disposed is disposed well or badly, and either independently or in relation to something else. E.g., health is a state, since it is a disposition of the kind described. Further, any part of such a disposition is called a state; and hence the excellence of the parts is a kind of state.
"Affection" means (a) In one sense, a quality in virtue of which alteration is possible; e.g., whiteness and blackness, sweetness and bitterness, heaviness and lightness, etc. (b) The actualizations of these qualities; i.e. the alterations already realized. (c) More particularly, hurtful alterations and motions, and especially hurts which cause suffering. (d) Extreme cases of misfortune and suffering are called "affections." [310]
We speak of "privation": (a) In one sense, if a thing does not possess an attribute which is a natural possession, even if the thing itself would not naturally possess it[311]; e.g., we say that a vegetable is "deprived"

[308] This seems to be a slightly irrelevant reference to *καθ' ἁυτό* in the sense of "independent"; but corruption in the text has made the true reading uncertain.

[309] *ἕξις* means not only "having" but "habit" or "state." Cf. Latin, habitus.

[310] The English equivalent for *πάθος* in this sense would be "calamity" or "disaster."

of eyes. (b) If a thing does not possess an attribute which it or its genus would naturally possess. E.g., a blind man is not "deprived" of sight in the same sense that a mole is; the latter is "deprived" in virtue of its genus, but the former in virtue of himself.[312]
(c) If a thing has not an attribute which it would naturally possess, and when it would naturally possess it (for blindness is a form of privation; but a man is not blind at *any* age, but only if he lacks sight at the age when he would naturally possess it[313]), and similarly if it[314] lacks an attribute in the medium and organ and relation and manner in which it would naturally possess it.
(d) The forcible removal of anything is called privation. (e) Privation has as many senses as there are senses of negation derived from the negative affix (*ἀ-*). For we call a thing "unequal" because it does not possess equality (though it would naturally do so); and "invisible" either because it has no color at all or because it has only a faint one; and "footless" either because it has no feet at all or because it has rudimentary feet.
Again, a negative affix may mean "having something in a small degree"—e.g. "stoneless"—that is, having it in some rudimentary manner. Again, it may mean having it "not easily" or "not well"; e.g., "uncutable" means not only that which cannot be cut, but that which cannot be cut easily or well. And again, it may mean not having a thing at all; for it is not the one-eyed man, but the man who lacks sight in both eyes, who is called blind. Hence not every man is good or bad, moral or immoral; there is also the intermediate state.
"To have" ⟨or "possess"⟩ is used in various senses. (a) To direct in accordance with one's own nature or impulse; whence we say that fever "possesses" a man, and despots "possess" cities, and people who wear clothes "possess" them. (b) We speak of anything as "having" in which, as receptive material, something is present. E.g., the bronze "has" the shape of the statue, and the body "has" the disease.

[311] This is not a proper sense of privation, as Aristotle implies by choosing an example from everyday speech.

[312] i.e., a mole is blind as being a member of a blind genus, whereas a man is blind only as an individual. Of course moles are not really blind, but we still speak as though they were.

[313] The qualification refers, I suppose, to the fact that an embryo does not naturally possess sight.

[314] The subject seems to be indefinite, but no doubt Aristotle is thinking primarily of the particular example which he has just given. A man "is not called blind if he does not see in the dark, or if he does not see with his ears, or if he does not see sound, or if he does not see what is behind him or too far away" (Ross).

(c) In the sense that the container holds the contained; for when A is contained in B, we say that A is held by B. E.g., we say that the vessel holds the liquid, and the city holds men, and the ship holds sailors, and so too that the whole "holds" the parts.
(d) The same term is applied to that which prevents anything from moving or acting in accordance with its own impulse; as pillars hold ⟨up⟩ the weights which are imposed upon them, and as the poets make Atlas[315] hold up the heaven, because otherwise it would fall upon the earth (as some of the physicists[316] maintain also).
It is in this sense that we say that "that which holds together" holds what it holds together; because otherwise the latter would disperse, each part in accordance with its own impulse.

"To be in a thing" is used similarly in senses corresponding to those of "to have."
"To come from something" means: (a) In one sense, to come from something as matter, and this in two ways: in respect either of the primary genus or of the ultimate species. E.g., in the one sense everything liquefiable comes from water, and in the other the statue comes from bronze.
(b) To come from something as the first moving principle; e.g., "from what comes fighting?" From abuse; because this is the beginning of a fight. (c) To come from the combination of matter and form (as the parts come from the whole, and the verse from the *Iliad* , and the stones from the house); for the shape is an end, and that is a complete thing which has attained its end.
(d) In the sense that the form is made out of the part of its definition; as, e.g., "man" is made out of "two-footed" and the syllable out of its element[317](this is a different way from that in which the statue is made out of the bronze; for the composite entity is made out of perceptible material, but the form is also made out of the material of the form).
These, then, are some of the meanings of "from" ⟨or "out of"⟩, but (e) sometimes one of these senses only partially applies; e.g., the child comes from the father and mother, and plants from the earth, because they come from some part of those things. (f) It means "after" in time; e.g., we say that night comes from day, and storm from fine weather, because one comes after the other.
And we speak thus of some of these things in view of their alternation

[315]Cf. *Hes. Th. 517.*

[316]e.g., Empedocles held that the heavens were kept in place by the velocity of their rotation;*Aristot. De Caelo 284a 24, 295a 16* (Ritter and Preller, 170 b).

[317]In the sense that *στοιχεῖον*("letter") forms part of the definition of "syllable."

with each other, as in the examples just mentioned, and of others in view merely of their succession in time; e.g., "the voyage was made from the equinox," meaning that it was made after it; and "the Thargelia are from the Dionysia," meaning after the Dionysia.[318]

"Part" means: (a) That into which a quantity can be in any way divided; for that which is taken from a quantity *qua* quantity is always called a part of that quantity—e.g., we call 2 part (in a sense) of 3. (b) In another sense the term is only applied to those "parts" in sense (a) which measure the whole; hence in one sense we call 2 part of 3, and in another not.

Again, (c) those divisions into which the form, apart from quantity, can be divided, are also called parts of the form. Hence species are called parts of their genus. (d) That into which the whole (either the form or that which contains the form) is divided, or of which it is composed. E.g., of a bronze sphere or cube not only is the bronze
(i.e. the material which contains the form) a part, but also the angle. (e) The elements in the definition of each thing are also called parts of the whole. Hence the genus is even called a part of the species, whereas in another sense the species is part of the genus.

"Whole" means: (a) That from which no part is lacking of those things as composed of which it is called a natural whole. (b) That which so contains its contents that they form a unity; and this in two ways, either in the sense that each of them is a unity, or in the sense that the unity is composed of them.

For (i) the universal, or term generally applied as being some whole thing, is universal in the sense that it contains many particulars; because it is predicated of each of them, and each and all of them (e.g. man, horse, god) are one; because they are all living things. And (2) that which is continuous and limited is a whole when it is a unity composed of several parts (especially if the parts are only potentially present in it; but otherwise even if they are present actually).

And of these things themselves, those which are so naturally are more truly wholes than those which are so artificially; just as we said of "the one," because "wholeness" is a kind of "oneness." Again, since a quantity has a beginning, middle and end, those to which position makes no difference we describe as "all," and those to which position makes a difference we describe as "whole," and those to which both descriptions can be applied, as both "all" and "whole."

[318]The (city) Dionysia were celebrated in March; the Thargelia (a festival in honor of Apollo and Artemis) at the end of May.

These are all things whose nature remains the same in transposition, but whose shape does not; e.g. wax or a coat. They are described as both "whole" and "all"; for they have both characteristics. Water, however, and all liquids, and number, are described as "all"; we do not speak of a "whole number" or "whole water" except by an extension of meaning. Things are described as "all" in the plural *qua* differentiated which are described as "all" in the singular *qua* one; all this number, all these units.

We do not describe any chance quantity as "mutilated"; it must have parts, and must be a whole. The number 2 is not mutilated if one of its 1's is taken away—because the part lost by mutilation is never equal to the remainder—nor in general is any number mutilated; because the essence must persist. If a cup is mutilated, it must still be a cup; but the number is no longer the same.

Moreover, not even all things which have dissimilar parts are mutilated; for a number has in a sense dissimilar as well as similar parts—e.g. 2, 3. But in general of things whose position makes no difference, e.g. water or fire, none is mutilated;—to be mutilated, things must be such as have their position according to their essence.

Further, they must be continuous; for a musical scale is composed of dissimilar parts, and has position; but it does not become mutilated.

Moreover, even things which are wholes are not mutilated by the removal of *any* of their parts; the parts removed must be neither proper to their essence nor in any chance location. E.g., a cup is not mutilated if a hole is made in it, but only if the handle or some projection is broken;

and a man is not mutilated if he loses flesh or his spleen, but if he loses some extremity; and not every extremity, but only such as cannot grow again when completely removed. Hence bald people are not mutilated.

The term "genus" ⟨or "race"⟩ is used: (a) When there is a continuous generation of things of the same type; e.g., "as long as the human *race* exists" means "as long as the generation of human beings is continuous." (b) Of anything from which things derive their being as the prime mover of them into being. Thus some are called Hellenes by race, and others Ionians, because some have Hellen and others Ion as their first ancestor.

(Races are called after the male ancestor rather than after the material.[319] Some derive their race from the female as well; e.g. "the

[319] Aristotle regards the mother as providing the material, and the father the formal element of the child. Cf. *Aristot. Met. 1.6.8*, *Aristot. Met. 8.4.5.*

descendants of Pyrrha[320].") (c) In the sense that the plane is the "genus" of plane figures, and the solid of solids (for each one of the figures is either a particular plane or a particular solid); i.e., that which underlies the differentiae.
(d) In the sense that in formulae the first component, which is stated as part of the essence, is the genus, and the qualities are said to be its differentiae. The term "genus," then, is used in all these senses—(a) in respect of continuous generation of the same type; (b) in respect of the first mover of the same type as the things which it moves; (c) in the sense of material. For that to which the differentia or quality belongs is the substrate, which we call material.
Things are called "generically different" whose immediate substrates are different and cannot be resolved one into the other or both into the same thing. E.g., form and matter are generically different, and all things which belong to different categories of being; for some of the things of which being is predicated denote the essence, others a quality, and others the various other things which have already been distinguished. For these also cannot be resolved either into each other or into any one thing.
"False" means: (i) false as a *thing* ; (a) because it is not or cannot be substantiated; such are the statements that the diagonal of a square is commensurable, or that you are sitting. Of these one is false always, and the other sometimes; it is in these senses that these things are not facts.
(b) Such things as really exist, but whose nature it is to seem either such as they are not, or like things which are unreal; e.g. chiaroscuro and dreams. For these are really something, but not that of which they create the impression. Things, then, are called false in these senses: either because they themselves are unreal, or because the impression derived from them is that of something unreal.
(2.) A false statement is the statement of *what is not*, in so far as the statement is false. Hence every definition is untrue of anything other than that of which it is true; e.g., the definition of a circle is untrue of a triangle. Now in one sense there is only one definition of each thing, namely that of its essence; but in another sense there are many definitions,[321] since the thing itself, and the thing itself qualified (e.g. "Socrates" and "cultured Socrates") are in a sense the same.

[320] Wife of Deucalion, the Greek Noah.

[321] Here Aristotle is using the word *λόγος* not in the strict sense of "definition" but in the looser sense of "a statement about something."

But the false definition is not strictly a definition of anything. Hence it was foolish of Antisthenes[322] to insist that nothing can be described except by its proper definition: one predicate for one subject; from which it followed that contradiction is impossible, and falsehood[323] nearly so. But it is possible to describe everything not only by its own definition but by that of something else; quite falsely, and yet also in a sense truly—e.g., 8 may be described as "double" by the definition of 2.

Such are the meanings of "false" in these cases. (3.) A false man is one who readily and deliberately makes such statements, for the sake of doing so and for no other reason; and one who induces such statements in others—just as we call things false which induce a false impression. Hence the proof in the *Hippias*[324] that the same man is false and true is misleading;

for it assumes (a) that the false man is he who is *able* to deceive, i.e. the man who knows and is intelligent; (b) that the man who is willingly bad is better. This false assumption is due to the induction; for when he says that the man who limps willingly is better than he who does so unwillingly, he means by limping *pretending* to limp. For if he is willingly lame, he is presumably worse in this case just as he is in the case of moral character.

"Accident" ⟨or "attribute"⟩ means that which applies to something and is truly stated, but neither necessarily nor usually; as if, for example, while digging a hole for a plant one found a treasure. Then the finding of treasure is an accident to the man who is digging the hole; for the one thing is not a necessary consequence or sequel of the other, nor does one usually find treasure while planting.

And a cultured man might be white; but since this does not happen necessarily or usually, we call it an accident. Thus since there are attributes and subjects, and some attributes apply to their subjects only at a certain place and time, any attribute which applies to a subject, but not because it was a particular subject or time or place, will be an accident.

Nor is there any definite cause for an accident, but only a chance, i.e.

[322] The Cynic; contemporary and renegade "disciple" of Socrates. He taught that definition, and even predication, are strictly speaking impossible. A simple entity can only be named; a complex entity can only be "defined" by naming its simple constituents. Cf. *Aristot. Met. 8.3.7, 8*; *Plat. Theaet. 201d-202c*, *Plat. Soph. 251b, c.*

[323] Cf. *Plat. Euthyd. 283e-284c, 286c, d.*

[324] *Plat. Hipp. Min 365-375.*

indefinite, cause. It was by accident that X went to Aegina if he arrived there, not because he intended to go there but because he was carried out of his course by a storm, or captured by pirates.
The accident has happened or exists, but in virtue not of itself but of something else; for it was the storm which was the cause of his coming to a place for which he was not sailing—i.e. Aegina.

"Accident" has also another sense,[325] namely, whatever belongs to each thing in virtue of itself, but is not in its essence; e.g. as having the sum of its angles equal to two right angles belongs to the triangle. Accidents of this kind may be eternal, but none of the former kind can be. There is an account of this elsewhere.[326]

[325] i.e. "property."

[326] The reference is probably to the *Aristot. Analytica Posteriora 75a 18, 39-41.*

Book 6

It is the principles and causes of the *things which are* that we are seeking; and clearly of the things which are *qua* being. There is a cause of health and physical fitness; and mathematics has principles and elements and causes; and in general every intellectual science or science which involves intellect deals with causes and principles, more or less exactly or simply considered.

But all these sciences single out some existent thing or class, and concern themselves with that; not with Being unqualified, nor *qua* Being, nor do they give any account of the essence; but starting from it, some making it clear to perception, and others assuming it as a hypothesis, they demonstrate, more or less cogently, the essential attributes of the class with which they are dealing.

Hence obviously there is no demonstration of substance or essence from this method of approach, but some other means of exhibiting it. And similarly they say nothing as to whether the class of objects with which they are concerned exists or not; because the demonstration of its essence and that of its existence belong to the same intellectual process.

And since physical science also happens to deal with a genus of Being (for it deals with the sort of substance which contains in itself the principle of motion and rest), obviously it is neither a practical nor a productive science.

For in the case of things produced the principle of motion (either mind or art or some kind of potency) is in the producer; and in the case of things done the will is the agent—for the thing done and the thing willed are the same. Thus if every intellectual activity is either practical or productive or speculative, physics will be a speculative science; but speculative about that kind of Being which can be moved, and

about formulated substance for the most part only *qua* inseparable from matter.
But we must not fail to observe *how* the essence and the formula exist, since without this our inquiry is ineffectual.

Now of things defined, i.e. of essences, some apply in the sense that "snub" does, and some in the sense that "concave" does. The difference is that "snub" is a combination of form with matter; because the "snub" is a concave *nose* , whereas concavity is independent of sensible matter. Now if all physical terms are used in the same sense as "snub"—e.g. nose, eye, face, flesh, bone, and in general animal; leaf, root, bark, and in general vegetable (for not one of these has a definition without motion; the definition invariably includes matter)—it is clear how we should look for and define the essence in physical things, and why it is the province of the physicist to study even some aspects of the soul, so far as it is not independent of matter.
It is obvious, then, from these considerations, that physics is a form of speculative science. And mathematics is also speculative; but it is not clear at present whether its objects are immutable and separable from matter; it is clear, however, that some branches of mathematics study their objects *qua* immutable and *qua* separable from matter. Obviously it is the province of a speculative science to discover whether a thing is eternal and immutable and separable from matter;
not, however, of physics (since physics deals with mutable objects) nor of mathematics, but of a science prior to both. For physics deals with things which exist separately but are not immutable; and some branches of mathematics deal with things which are immutable, but presumably not separable, but present in matter; but the primary science treats of things which are both separable and immutable.
Now all causes must be eternal, but these especially; since they are the causes of what is visible of things divine. Hence there will be three speculative philosophies: mathematics, physics, and theology—since it is obvious that if the divine is present anywhere, it is present in this kind of entity; and also the most honorable science must deal with the most honorable class of subject.
The speculative sciences, then, are to be preferred to the other sciences, and "theology" to the other speculative sciences. One might indeed raise the question whether the primary philosophy is universal or deals with some one genus or entity; because even the mathematical sciences differ in this respect—geometry and astronomy deal with a particular kind of entity, whereas universal mathematics applies to all kinds alike. Then if there is not some other substance besides those which are

naturally composed, physics will be the primary science; but if there is a substance which is immutable, the science which studies this will be prior to physics, and will be primary philosophy, and universal in this sense, that it is primary. And it will be the province of this science to study Being *qua* Being; what it is, and what the attributes are which belong to it *qua* Being.

But since the simple term "being" is used in various senses, of which we saw that one was *accidental* , and another *true* (not-being being used in the sense of "false"); and since besides these there are the categories, e.g. the "what," quality, quantity, place, time, and any other similar meanings; and further besides all these the *potential* and *actual* : since the term "being" has various senses, it must first be said of what "is" accidentally, that there can be no speculation about it.

This is shown by the fact that no science, whether practical, productive or speculative, concerns itself with it. The man who produces a house does not produce all the attributes which are accidental to the house in its construction; for they are infinite in number. There is no reason why the house so produced should not be agreeable to some, injurious to others, and beneficial to others, and different perhaps from every other existing thing; but the act of building is productive of none of these results.

In the same way the geometrician does not study the accidental attributes of his figures, nor whether a triangle is different from a triangle the sum of whose angles is equal to two right angles. And this accords with what we should reasonably expect, because "accident" is only, as it were, a sort of name. Hence in a way Plato[327] was not far wrong in making sophistry deal with what is nonexistent;

because the sophists discuss the accident more, perhaps, than any other people—whether "cultured" and "grammatical,"[328] and "cultured Coriscus" and "Coriscus,"[329] are the same or different; and whether everything that is, but has not always been, has come into being, so that if a man who is cultured has become grammatical, he has also, being grammatical, become cultured[330]; and all other such

[327]Cf. *Plat. Soph. 254a.*

[328]i.e. able to read and write. The sophistic argument is given by Alexander as follows: A is grammatical; therefore grammatical A=A. A is cultured; therefore cultured A=A. Therefore grammatical=cultured, and he who is grammatical must be cultured. But B, though grammatical, is not cultured. Therefore the grammatical is not the same as the cultured.

[329]If Coriscus is the same as cultured Coriscus, he is the same as cultured cultured Coriscus, and soad infinitum. Cf. *Soph. Elench. 173a 34.*

discussions. Indeed it seems that the accidental is something closely akin to the nonexistent.

This is clear too from such considerations as the following: of things which *are* in other senses there is generation and destruction, but of things which *are* accidentally there is not.[331] Nevertheless we must state further, so far as it is possible, with regard to the accidental, what its nature is and through what cause it exists. At the same time it will doubtless also appear why there is no science of it.

Since, then, there are among existing things some which are invariable and of necessity (not necessity in the sense of compulsion,[332] but that by which we mean that it cannot be otherwise[333]), and some which are not necessarily so, nor always, but usually: this is the principle and this the cause of the accidental. For whatever is neither always nor usually so, we call an accident.

E.g., if in the dog-days[334] we have storm and cold, we call it an accident; but not if we have stifling and intense heat, because the latter always or usually comes at this time, but not the former. It is accidental for a man to be white (since this is neither always nor usually so), but it is not accidental for him to be an animal.

It is by accident that a builder restores to health, because it is not a builder but a doctor who naturally does this; but the builder happened accidentally to be a doctor. A confectioner, aiming at producing enjoyment, may produce something health-giving; but not in virtue of his confectioner's art. Hence, we say, it was accidental; and he produces it in a sense, but not in an unqualified sense.

For there are potencies which produce other things, but there is no art or determinate potency of accidents, since the cause of things which exist or come to be by accident is also accidental.

Hence, since not everything is or comes to be of necessity and always,

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[330] If A, being cultured, has become grammatical, then being cultured he is grammatical. Then being grammatical he is cultured. But he has not always, being grammatical, been cultured. So if that which is but has not always been must have come to be, then being grammatical he has become cultured; i.e., he must have been both grammatical before he was cultured and cultured before he was grammatical; which is absurd (Ross).

[331] i.e., the process of becoming or change takes place in the subject—the *man* , who is accidentally cultured, becomes grammatical, and when the process is complete "the cultured" *is* accidentally grammatical; but it does not *become* so.

[332] Cf. *Aristot. Met. 5.5.2.*

[333] *Aristot. Met. 5.5.3*

[334] The period from July 3 to August 11, during which the dog-star Sirius rises and sets with the sun.

but most things happen usually, the accidental must exist. E.g., the white man is neither always nor usually cultured; but since this sometimes happens, it must be regarded as accidental. Otherwise, everything must be regarded as of necessity.
Therefore the cause of the accidental is the matter, which admits of variation from the usual.

We must take this as our starting-point: Is everything either "always" or "usually"? This is surely impossible. Then besides these alternatives there is something else: the fortuitous and accidental. But again, are things *usually* so, but nothing *always* , or are there things which are eternal? These questions must be inquired into later[335]; but it is clear that there is no science of the accidental—because all scientific knowledge is of that which is *always* or *usually* so. How else indeed can one learn it or teach it to another? For a fact must be defined by being so always or usually; e.g., honey-water is usually beneficial in case of fever.
But science will not be able to state the exception to the rule: when it is not beneficial—e.g. at the new moon; because that which happens at the new moon also happens either always or usually; but the accidental is contrary to this. We have now explained the nature and cause of the accidental, and that there is no science of it.
It is obvious that there are principles and causes which are generable and destructible apart from the actual processes of generation and destruction[336]; for if this is not true, everything will be of necessity: that is, if there must necessarily be some cause, other than accidental, of that which is generated and destroyed. Will A be, or not? Yes, if B happens; otherwise not. And B will happen if C does.
It is clear that in this way, as time is continually subtracted from a limited period, we shall come to the present. Accordingly So-and-so will die by disease or violence if he goes out; and this if he gets thirsty; and this if something else happens; and thus we shall come to what is the case now, or to something which has already happened. E.g. "if he is thirsty"; this will happen if he is eating pungent food, and this is either the case or not.
Thus of necessity he will either die or not die. And similarly if one jumps over to the past, the principle is the same; for this—I mean that which has just happened—is already present in something. Everything, then, which is to be, will be of necessity; e.g., he who is alive must die

[335] Cf. *Aristot. Met. 12.6-8.*
[336] On the analogy of accidental events; see 2. 5.

—for some stage of the process has been reached already; e.g., the contraries are present in the same body—but whether by disease or violence is not yet determined; it depends upon whether so-and-so happens.

Clearly, then, the series goes back to some starting-point, which does not go back to something else. This, therefore, will be the starting-point of the fortuitous, and nothing else is the cause of its generation. But to what sort of starting-point and cause this process of tracing back leads, whether to a material or final or moving cause, is a question for careful consideration.

So much, then, for the accidental sense of "being"; we have defined it sufficiently. As for "being" *qua* truth, and "not-being" *qua* falsity, since they depend upon combination and separation, and taken together are concerned with the arrangement of the parts of a contradiction (since the true has affirmation when the subject and predicate are combined, and negation where they are divided; but the false has the contrary arrangement.

How it happens that we combine or separate in thought is another question. By "combining or separating in thought" I mean thinking them not as a succession but as a unity[337]); for "falsity" and "truth" are not in *things* —the good, for example, being true, and the bad false—but in *thought* ; and with regard to simple concepts and essences there is no truth or falsity even in thought;

—what points we must study in connection with being and not-being in this sense, we must consider later. But since the combination and separation exists in thought and not in things, and this sense of "being" is different from the proper senses (since thought attaches or detaches essence or quality or quantity or some other category), we may dismiss the accidental and real senses[338] of "being."

For the cause of the one is indeterminate and of the other an affection of thought; and both are connected with the remaining genus of "being," and do not indicate any objective reality. Let us therefore dismiss them, and consider the causes and principles of Being itself *qua* Being. [We have made it clear in our distinction of the number of senses in which each term is used that "being" has several senses.][339]

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[337]sc., "or not as a unity but as a succession" (this is *separating* in thought).

[338]i.e., the senses in which the verb "to be" is used to express an accidental or a true relation.

[339]This sentence is almost certainly a later and clumsy addition to show the connection with the following book.

Book 7

The term "being" has several senses, which we have classified in our discussion[340] of the number of senses in which terms are used. It denotes first the " *what*" of a thing, i.e. the individuality; and then the quality or quantity or any other such category. Now of all these senses which "being" has, the primary sense is clearly the "what," which denotes the *substance*
(because when we describe the quality of a particular thing we say that it is "good or bad," and not "five feet high" or "a man"; but when we describe *what* it is, we say not that it is "white" or "hot" or "five feet high," but that it is "a man" or "a god"), and all other things are said to "be" because they are either quantities or qualities or affections or some other such thing.
Hence one might raise the question whether the terms "to walk" and "to be well" and "to sit" signify each of these things as "being," or not; and similarly in the case of any other such terms; for not one of them by nature has an independent existence or can be separated from its substance. Rather, if anything it is the *thing* which walks or sits or is well that is existent.
The reason why these things are more truly existent is because their subject is something definite; i.e. the substance and the individual, which is clearly implied in a designation of this kind, since apart from it we cannot speak of "the good" or "sitting." Clearly then it is by reason of the substance that each of the things referred to exists.
Hence that which *is* primarily, not in a qualified sense but absolutely, will be substance.

Now "primary" has several meanings; but nevertheless substance is

[340] *Aristot. Met. 5.7.*

primary in all senses, both in definition and in knowledge and in time. For none of the other categories can exist separately, but substance alone;
and it is primary also in definition, because in the formula of each thing the formula of substance must be inherent; and we assume that we know each particular thing most truly when we know *what* "man" or "fire" is—rather than its quality or quantity or position; because we know each of these points too when we know *what* the quantity or quality is.
Indeed, the question which was raised long ago, is still and always will be, and which always baffles us—"What is Being?"—is in other words "What is substance?" Some say that it is one[341]; others, more than one; some, finite[342]; others, infinite.[343] And so for us too our chief and primary and practically our only concern is to investigate the nature of "being" in the sense of substance.
Substance is thought to be present most obviously in bodies. Hence we call animals and plants and their parts substances, and also natural bodies, such as fire, water, earth, etc., and all things which are parts of these or composed of these, either of parts or them or of their totality; e.g. the visible universe and its parts, the stars and moon and sun.
We must consider whether (a) these are the only substances, or (b) these and some others, or (c) some of these, or (d) some of these and some others, or (e) none of these, but certain others. Some[344] hold that the bounds of body—i.e. the surface, line, point and unit—are substances, and in a truer sense than body or the solid.
Again, some[345] believe that there is nothing of this kind besides sensible things, while others believe in eternal entities more numerous and more real than sensible things. Thus Plato posited the Forms and the objects of mathematics as two kinds of substance, and as a third the substance of sensible bodies;
and Speusippus[346] assumed still more kinds of substances, starting with "the One," and positing principles for each kind: one for numbers, another for magnitudes, and then another for the soul. In this way he multiplies the kinds of substance. Some[347] again hold that the Forms

[341]The Milesians and Eleatics.
[342]The Pythagoreans and Empedocles.
[343]Anaxagoras and the Atomists.
[344]The Pythagoreans.
[345]The pre-Socratics.
[346]Plato's nephew and successor as the head of the Academy.
[347]The followers of Xenocrates, successor to Speusippus.

and numbers have the same nature, and that other things—lines and planes—are dependent upon them; and soon back to the substance of the visible universe and sensible things.

We must consider, then, with regard to these matters, which of the views expressed is right and which wrong; and what things are substances; and whether there are any substances besides the sensible substances, or not; and how sensible substances exist; and whether there is any separable substance (and if so, why and how) or no substance besides the sensible ones. We must first give a rough sketch of what substance is.

The term "substance" is used, if not in more, at least in four principal cases; for both the essence and the universal and the genus are held to be the substance of the particular, and fourthly the substrate. The substrate is that of which the rest are predicated, while it is not itself predicated of anything else. Hence we must first determine its nature, for the primary substrate is considered to be in the truest sense substance.

Now in one sense we call the *matter* the substrate; in another, the *shape* ; and in a third, the combination of the two. By matter I mean, for instance, bronze; by shape, the arrangement of the form; and by the combination of the two, the concrete thing: the statue. Thus if the form is prior to the matter and more truly existent, by the same argument it will also be prior to the combination.

We have now stated in outline the nature of substance—that it is not that which is predicated of a subject, but that of which the other things are predicated. But we must not merely define it so, for it is not enough. Not only is the statement itself obscure, but also it makes matter substance; for if matter is not substance, it is beyond our power to say what else is.

For when everything else is removed, clearly nothing but matter remains; because all the other things are affections, products and potencies of bodies, and length, breadth and depth are kinds of quantity, and not substances. For quantity is not a substance; rather the substance is that to which these affections primarily belong.

But when we take away length and breadth and depth we can see no thing remaining, unless it be the something bounded by them; so that on this view matter must appear to be the only substance. By matter I mean that which in itself is neither a particular thing nor a quantity nor designated by any of the categories which define Being.

For there is something of which each of these is predicated, whose being is different from that of each one of the categories; because all other

things are predicated of substance, but this is predicated of matter. Thus the ultimate substrate is in itself neither a particular thing nor a quantity nor anything else. Nor indeed is it the negations of these; for the negations too will only apply to it accidentally.
If we hold this view, it follows that matter is substance. But this is impossible; for it is accepted that separability and individuality belong especially to substance. Hence it would seem that the form and the combination of form and matter are more truly substance than matter is.
The substance, then, which consists of both—I mean of matter and form—may be dismissed, since it is posterior and obvious. Matter too is in a sense evident. We must consider the third type, for this is the most perplexing.

Now it is agreed that some sensible things are substances, and so we should begin our inquiry in connection with these.
It is convenient to advance to the more intelligible[348]; for learning is always acquired in this way, by advancing through what is less intelligible by nature to what is more so. And just as in actions it is our task to start from the good of the individual and make absolute good good for the individual,[349] so it is our task to start from what is more intelligible to oneself and make what is by nature intelligible intelligible to oneself.
Now that which is intelligible and primary to individuals is often but slightly intelligible, and contains but little reality; but nevertheless, starting from that which is imperfectly intelligible but intelligible to oneself, we must try to understand the absolutely intelligible; advancing, as we have said, by means of these very things which are intelligible to us.

Since we distinguished at the beginning[350] the number of ways in which substance is defined, and since one of these appeared to be essence, we must investigate this.
First, let us make certain linguistic statements about it.

The essence of each thing is that which it is said to be per se. "To be you" is not "to be cultured," because you are not of your own nature cultured. Your essence, then, is that which you are said to be

[348] sc. by nature. All learning proceeds by induction from that which is intelligible to *us* (i.e., the complex facts and objects of our experience, which are bound up with sensation and therefore less intelligible in themselves), to that which is intelligible in itself (i.e., the simple universal principles of scientific knowledge).

[349] Cf. *Aristot. Ethics 1129b 5.*

[350] *Aristot. Met. 7.3.1.*

of your own nature. But not even all of this is the essence; for the essence is not that which is said to be per se in the sense that whiteness is said to belong to a surface,[351] because "being a surface" is not "being white."

Nor is the essence the combination of both, "being a white surface." Why? Because the word itself is repeated. Hence the formula of the essence of each thing is that which defines the term but does not contain it. Thus if "being a white surface" is the same as "being a smooth surface," "white" and "smooth" are one and the same.[352]

But since in the other categories too there are compounds with substance (because there is a substrate for each category, e.g. quality, quantity, time, place and motion), we must inquire whether there is a formula of the essence of each one of them; whether these compounds, e.g. "white man," also have an essence.

Let the compound be denoted by X.[353] What is the essence of X?

"But this is not even a per se expression." We reply that there are two ways in which a definition can be not per se true of its subject: (a) by an addition, and (b) by an omission.

In one case the definition is not per se true because the term which is being defined is combined with something else; as if, e.g., in defining whiteness one were to state the definition of a white man. In the other, because something else (which is not in the definition) is combined with the subject; as if, e.g., X were to denote "white man," and X were defined as "white." "White man" is white, but its essence is not "to be white." But is "to be X" an essence at all?

Surely not. The essence is an individual type; but when a subject has something distinct from it predicated of it, it is not an individual type. E.g., "white man" is not an individual type; that is, assuming that individuality belongs only to substances. Hence essence belongs to all things the account of which is a definition.

We have a definition, not if the name and the account signify the same (for then all accounts would be definitions; because any account can have a name, so that even "the *Iliad*" will be a definition), but if the

[351] Cf. *Aristot. Met. 5.18.3, 4.*

[352] The statement that "to be a white surface" is the same as "to be a smooth surface" tells us nothing fresh about surface; it simply identifies "white" with "smooth." Aristotle has in mind Democritus's theory of color (that it is an impression conveyed to our eyes from the superficial texture of the object; *Theophrastus, De Sensu 73-75*); cf. *Aristot. De Sensu 442b 11*, *Aristot. De Gen. et Corr. 316a 1.*

[353] Literally "cloak," but the word is chosen quite arbitrarily. Cf. *Aristot. Met. 8.6.4.*

account is of something primary. Such are all statements which do not involve the predication of one thing of another.

Hence essence will belong to nothing except species of a genus, but to these only; for in these the predicate is not considered to be related to the subject by participation or affection, nor as an accident. But of everything else as well, if it has a name, there will be a formula of *what it means*—that X belongs to Y; or instead of a simple formula one more exact—but no definition, nor essence.

Or perhaps "definition," like the "what," has more than one sense. For the "what" in one sense means the substance and the individual, and in another each one of the categories: quantity, quality, etc.

Just as "is" applies to everything, although not in the same way, but primarily to one thing and secondarily to others; so "what it is" applies in an unqualified sense to substance, and to other things in a qualified sense. For we might ask also what quality "is," so that quality also is a "what it is"; not however without qualification, but just as in the case of not-being some say by a verbal quibble that not-being "is"—not in an unqualified sense, but "is" not-being—so too with quality.

Now although we must also consider how we should express ourselves in each particular case, it is still more important to consider what the facts are. Hence now, since the language which we are using is clear, similarly essence also will belong primarily and simply to substance, and secondarily to other things as well; just as the "what it is" is not essence simply, but the essence of a quality or quantity.

For it must be either by equivocation that we say that these things *are* , or by adding and subtracting qualifications, as we say that the unknowable is known[354]; since the truth is that we use the terms neither equivocally nor in the same sense, but just as we use the term "medical" in *relation* to one and the same thing; but not *of* one and the same thing, nor yet equivocally. The term "medical" is applied to a body and a function and an instrument, neither equivocally nor in one sense, but in relation to one thing.[355]

However, in whichever way one chooses to speak of these things, it matters nothing; but this point is clear: that the primary and unqualified definition, and the essence, belong to substances. It is true that they belong equally to other things too, but not *primarily* . For if we assume this, it does not necessarily follow that there is a definition of anything which means the same as any formula; it must mean the

[354]sc. to be unknowable.

[355]Cf. *Aristot. Met. 4.2.2.*

same as a particular kind of formula, i.e. the formula of one thing—one not by continuity like the *Iliad*, or things which are arbitrarily combined, but in one of the proper senses of "one." And "one" has the same variety of senses as "being." "Being" means sometimes the individual thing, sometimes the quantity, sometimes the quality. Hence even "white man" will have a formula and definition; but in a different sense from the definition of "whiteness" and "substance."

The question arises: If one denies that a formula involving an added determinant is a definition, how can there be a definition of terms which are not simple but coupled? Because they can only be explained by adding a determinant.

I mean, e.g., there is "nose" and "concavity" and "snubness," the term compounded of the two, because the one is present in the other. Neither "concavity" nor "snubness" is an accidental, but a per se affection of the nose.[356] Nor are they attributes in the sense that "white" is of Callias or a man, because Callias is white and is by accident a man; but in the sense that "male" is an attribute of animal, and equality of quantity, and all other attributes which we say belong per se.

That is, all things which involve the formula or name of the subject of the affection, and cannot be explained apart from it. Thus "white" can be explained apart from "man," but not "female" apart from "animal." Thus either these terms have no essence or definition, or else they have it in a different sense, as we have said.

But there is also another difficulty about them. If "snub nose" is the same as "concave nose," "snub" will be the same as "concave." But if not, since it is impossible to speak of "snub" apart from the thing of which it is a per se affection (because "snub" means a concavity in the nose), either it is impossible to call the nose snub, or it will be a tautology, "concave-nose nose" because "snub nose" will equal "concave-nose nose."

Hence it is absurd that such terms as these should have an essence. Otherwise there will be an infinite regression; for in "snub-nose nose" there will be yet another nose. Clearly, then, there is definition of substance alone. If there were definition of the other categories also, it would have to involve an added determinant, as in the case of the qualitative; and of the odd, for this cannot be defined apart from number; nor can "female" apart from "animal."

[356] Snubness is a per se affection of the nose, because it applies only to the nose and cannot be explained apart from it, but the same can hardly be said of concavity. Aristotle himself uses the word (*κοιλότης*) elsewhere in other connections.

By "involving an added determinant" I mean descriptions which involve a tautology, as in the above examples. Now if this is true, there will be no definition of compound expressions either; e.g., "odd number." We fail to realize this because our terms are not used accurately. If on the other hand there are definitions of these too, either they are defined in a different way, or, as we have said, "definition" and "essence" must be used in more than one sense;
thus in one sense there will be no definition of anything, and nothing will have an essence, except substances; and in another those other things will have a definition and essence. It is obvious, then, that the definition is the formula of the essence, and that the essence belongs either *only* to substances, or especially and primarily and simply.
We must inquire whether the essence is the same as the particular thing, or different. This is useful for our inquiry about substance; because a particular thing is considered to be nothing other than its own substance, and the essence is called the substance of the thing.
In accidental predications, indeed, the thing itself would seem to be different from its essence; e.g., "white man" is different from "essence of white man." If it were the same, "essence of man" and "essence of white man" would be the same. For "man" and "white man" are the same, they say, and therefore "essence of white man" is the same as "essence of man."
But perhaps it is not necessarily true that the essence of accidental combinations is the same as that of the simple terms; because the extremes of the syllogism are not identical with the middle term in the same way.[357] Perhaps it might be thought to follow that the accidental extremes are identical; e.g. "essence of white" and "essence of cultured"; but this is not admitted.[358]
But in per se expressions, is the thing necessarily the same as its essence, e.g., if there are substances which have no other substances or entities prior to them, such as some hold the Ideas to be?
For if the Ideal Good is to be different from the essence of good, and the Ideal Animal and Being from the essence of animal and being,

[357]The argument consists of two syllogisms: White=essence of white man. Man=white man. Therefore man=essence of white man. But essence of man=man. Therefore essence of man=essence of white man. The conclusion is faulty because whereas the first identity is assumed to be absolute, the second is accidental.

[358]Aristotle seems to mean that both "essence of white man" and "essence of cultured man" might be proved by the former syllogism to be identical in the same way with the middle term "man," in which case it would seem that "essence of white" and "essence of cultured" are the same. There is, however, the same fallacy as before.

there will be other substances and entities and Ideas besides the ones which they describe; and prior to them, if essence is substance. And if they are separate from each other, there will be no knowledge of the Ideas, and the essences will not exist
(by "being separate" I mean if neither the essence of good is present in the Ideal Good, nor "being good" in the essence of good); for it is when we know the essence of it that we have knowledge of a thing. And it is the same with other essences as with the essence of good; so that if the essence of good is not good, neither will the essence of being "be," nor the essence of one be one.
Either all essences exist alike, or none of them; and so if not even the essence of being "is," neither will any other essence exist. Again that to which "essentially good" does not apply cannot be good. Hence "the good" must be one with the essence of good, "the beautiful" with the essence of beauty, and so with all terms which are not dependent upon something else, but self-subsistent and primary.[359]
For it is enough if this is so, even if they are not Forms; or perhaps rather even if they are. (At the same time it is clear also that if the Ideas are such as some hold, the substrate will not be substance; for the Ideas must be substances, but not involving a substrate, because if they did involve one they would exist in virtue of its participation in them.)[360]
That each individual thing is one and the same with its essence, and not merely accidentally so, is apparent, not only from the foregoing considerations, but because to have knowledge of the individual is to have knowledge of its essence; so that by setting out examples it is evident that both must be identical.
But as for the accidental term, e.g. "cultured" or "white," since it has two meanings, it is not true to say that the term itself is the same as its essence; for both the accidental term and that of which it is an accident are "white," so that in one sense the essence and the term itself are the same, and in another they are not, because the essence is not the same as "the man" or "the white man," but it is the same as the affection.
The absurdity ⟨of separating a thing from its essence⟩ will be apparent also if one supplies a name for each essence; for then there will be

[359] The example of the Ideas as per se terms is used by Aristotle to show incidentally the fallacy of the Ideal theory: there can be no self-subsistent entity apart from the essence.

[360] This criticism is irrelevant to the point under discussion. It simply points out that the Ideal theory conflicts with received opinion (cf. *Aristot. Met. 7.3.1*).

another essence besides the original one, e.g. the essence of "horse" will have a further essence. Yet why should not some things be identified with their essence from the outset,[361] if essence is substance? Indeed not only are the thing and its essence one, but their formula is the same, as is clear from what we have just stated; for it is not by accident that the essence of "one," and "the one," are one.

Moreover, if they are different, there will be an infinite series; for the essence of "one" and "the one" will both exist; so that in that case too the same principle will apply.[362] Clearly, then, in the case of primary and self-subsistent terms, the individual thing and its essence are one and the same.

It is obvious that the sophistical objections to this thesis are met in the same way as the question whether Socrates is the same as the essence of Socrates; for there is no difference either in the grounds for asking the question or in the means of meeting it successfully. We have now explained in what sense the essence is, and in what sense it is not, the same as the individual thing.

Of things which are generated, some are generated naturally, others artificially, and others spontaneously; but everything which is generated is generated by something and from something and becomes something. When I say "becomes something" I mean in any of the categories; it may come to be either a particular thing or of some quantity or quality or in some place.

Natural generation is the generation of things whose generation is by nature.

That from which they are generated is what we call matter; that by which, is something which exists naturally; and that which they become is a man or a plant or something else of this kind, which we call substance in the highest degree. All things which are generated naturally or artificially have matter; for it is possible for each one of them both to be and not to be, and this possibility is the matter in each individual thing.

And in general both that from which and that in accordance with which they are generated, is nature; for the thing generated, e.g. plant or animal, has a nature. And that by which they are generated is the so-called "formal" nature, which has the same form as the thing generated (although it is in something else); for man begets man.

[361] i.e. to avoid the infinite series implied in the last sentence.

[362] i.e. since there is a distinct term "essence of one" besides "one," there will be a third distinct term "essence of essence of one"; and so on as in the case of "horse" above.

Such is the generation of things which are naturally generated; the other kinds of generation are called productions. All productions proceed from either art or potency or thought.

Some of them are also generated spontaneously and by chance in much the same way as things which are naturally generated; for sometimes even in the sphere of nature the same things are generated both from seed and without it.[363] We shall consider cases of this kind later.[364]

Things are generated artificially whose form is contained in the soul (by "form" I mean the essence of each thing, and its primary substance); for even contraries have in a sense the same form.[365] For the substance of the privation is the opposite substance; e.g., health is the substance of disease; for disease is the absence of health, and health is the formula and knowledge in the soul. Now the healthy subject is produced as the result of this reasoning: since health is so-and-so, if the subject is to be healthy, it must have such-and-such a quality, e.g. homogeneity; and if so, it must have heat.

And the physician continues reasoning until he arrives at what he himself finally can do; then the process from this point onwards, i.e. the process towards health, is called "production." Therefore it follows in a sense that health comes from health and a house from a house; that which has matter from that which has not (for the art of medicine or of building is the *form* of health or the house). By substance without matter I mean the essence.

In generations and motions part of the process is called cogitation, and part production—that which proceeds from the starting-point and the form is cogitation, and that which proceeds from the conclusion of the cogitation is production. Each of the other intermediate measures is carried out in the same way. I mean, e.g., that if A is to be healthy, his physical condition will have to be made uniform. What, then, does being made uniform entail? So-and-so; and this will be achieved if he is made hot. What does this entail? So-and-so; now this is potentially present, and the thing is now in his power.

The thing which produces, and from which the process of recovering health begins, is the form in the soul, if the process is artificial; if spontaneous, it is whatever is the starting-point of the production for

[363] e.g. fish (*Aristot. Hist. An. 569a 11*) and insects (*Aristot. Hist. An. 539a 24*).

[364] In *Aristot. Met. 7.9.*

[365] The logical connection is: It is sufficient to say that the form of objects which are artificially produced is contained in the soul; for although artificial production can produce contrary effects, the form of the positive effect is the absence of the form of the negative effect, so that in a sense they have the same form.

the artificial producer; as in medical treatment the starting-point is, perhaps, the heating of the patient; and this the doctor produces by friction. Heat in the body, then, is either a part of health, or is followed (directly or through several intermediaries) by something similar which is a part of health. This is the ultimate thing, namely that produces, and in this sense is a part of, health—or of the house
(in the form of stones)[366] or of other things. Therefore, as we say, generation would be impossible if nothing were already existent. It is clear, then, that some part must necessarily pre-exist; because the matter is a part, since it is matter which pre-exists in the product and becomes something. But then is matter part of the formula? Well, we define bronze circles in both ways; we describe the matter as bronze, and the form as such-and-such a shape; and this shape is the proximate genus in which the circle is placed.
The bronze circle, then, has its matter in its formula. Now as for that from which, as matter, things are generated, some things when they are generated are called not "so-and-so," but "made of so-and-so"; e.g., a statue is not called stone, but made of stone. But the man who becomes healthy is not called after that from which he becomes healthy. This is because the generation proceeds from the privation and the substrate, which we call matter (e.g., both "the man" and "the invalid" become healthy),
but it is more properly said to proceed from the privation; e.g., a man becomes healthy from being an invalid rather than from being a man. Hence a healthy person is not called an invalid, but a man, and a healthy man. But where the privation is obscure and has no name—e.g. in bronze the privation of any given shape, or in bricks and wood the privation of the shape of a house—the generation is considered to proceed from these materials, as in the former case from the invalid.
Hence just as in the former case the subject is not called that from which it is generated, so in this case the statue is not called wood, but is called by a verbal change not wood, but wooden; not bronze, but made of bronze; not stone, but made of stone; and the house is called not bricks, but made of bricks. For if we consider the matter carefully, we should not even say without qualification that a statue is generated from wood, or a house from bricks; because that from which a thing is generated should not persist, but be changed. This, then, is why we

[366]There is no real analogy between the casual relationship of heat to health and of stones to a house. The former is both material and efficient; the latter only material. Cf. *Aristot. Met. 7.9.1.*

speak in this way.
Now since that which is generated is generated *by* something (by which I mean the starting-point of the process of generation), and *from* something (by which let us understand not the privation but the matter; for we have already distinguished the meanings of these), and *becomes* something (i.e. a sphere or circle or whatever else it may be); just as the craftsman does not produce the substrate, i.e. the bronze, so neither does he produce the sphere; except accidentally, inasmuch as the bronze sphere is a sphere, and he makes the former.
For to make an individual thing is to make it out of the substrate in the fullest sense. I mean that to make the bronze round is not to make the round or the sphere, but something else; i.e. to produce this form in another medium. For if we make the form, we must make it out of something else; for this has been assumed. E.g., we make a bronze sphere; we do this in the sense that from A, i.e. bronze, we make B, i.e. a sphere.
If, then, we make the spherical form itself, clearly we shall have to make it in the same way; and the processes of generation will continue to infinity.

It is therefore obvious that the form (or whatever we should call the shape in the sensible thing) is not generated—generation does not apply to it—nor is the essence generated; for this is that which is induced in something else either by art or by nature or by potency.
But we do cause a bronze sphere to be, for we produce it from bronze and a sphere; we induce the form into this particular matter, and the result is a bronze sphere. But if the essence of sphere in general is generated, something must be generated from something; for that which is generated will always have to be divisible, and be partly one thing and partly another; I mean partly matter and partly form.
If then a sphere is the figure whose circumference is everywhere equidistant from the center, part of this will be the medium in which that which we produce will be contained, and part will be in that medium; and the whole will be the thing generated, as in the case of the bronze sphere. It is obvious, then, from what we have said, that the thing in the sense of form or essence is not generated, whereas the concrete whole which is called after it is generated; and that in everything that is generated matter is present, and one part is matter and the other form.
Is there then some sphere besides the particular spheres, or some house besides the bricks? Surely no individual thing would ever have been

generated if form had existed thus independently.[367] Form means "of such a kind"; it is not a definite individual, but we produce or generate from the individual something "of such a kind"; and when it is generated it is an individual "of such a kind."
The whole individual, Callias or Socrates, corresponds to "this bronze sphere," but "man" and "animal" correspond to bronze sphere in general.

Obviously therefore the cause which consists of the Forms (in the sense in which some speak of them, assuming that there are certain entities besides particulars), in respect at least of generation and destruction, is useless; nor, for this reason at any rate, should they be regarded as self-subsistent substances.
Indeed in some cases it is even obvious that that which generates is of the same kind as that which is generated—not however identical with it, nor numerically one with it, but formally one—e.g. in natural productions (for man begets man), unless something happens contrary to nature, as when a horse sires a mule. And even these cases are similar; for that which would be common to both horse and ass, the genus immediately above them, has no name; but it would probably be both, just as the mule is both.[368]
Thus obviously there is no need to set up a form as a pattern (for we should have looked for Forms in these cases especially, since living things are in a special sense substances); the thing which generates is sufficient to produce, and to be the cause of the form in the matter. The completed whole, such-and-such a form induced in this flesh and these bones, is Callias or Socrates. And it is different from that which generated it, because the matter is different but identical in form, because the form is indivisible.
The question might be raised why some things are generated both artificially and spontaneously—e.g. health—and others not; e.g. a house. The reason is that in some cases the matter—which is the starting-point of the process in the production and generation of artificial things, and in which some part of the result is already existent—is such that it can

[367] If forms are self-subsistent substances, individual substances cannot be generated from them; for the individual contains the form, but one substance cannot contain another actually existing substance (*Aristot. Met. 7.8.8*). Form, however, is not a substance but a characteristic.

[368] Normally the sire communicates his form to the offspring. In the case of a mule, the material element contributed by the dam, which is an ass, limits the effect of the formal element contributed bu the sire, which is a horse; but even so the form of the sire is generically the same as that of the offspring.

initiate its own motion, and in other cases it is not; and of the former kind some can initiate motion in a particular way, and some cannot. For many things can move themselves, but not in a particular way, e.g. so as to dance.

It is impossible, then, for any things whose matter is of this kind (e.g. stones) to be moved in *this* particular way except by something else; but in *that* particular way it is possible. And it is so with fire.[369] For this reason some things cannot exist apart from the possessor of the art, and others can; because the motion can be initiated by those things which do not indeed possess the art, but can themselves be moved either by other things which do not possess the art, or by the motion from the part of the product which pre-exists in them.[370]

It is clear also from what we have said that in a sense all artificial things are generated either from something which bears the same name (as is the case with natural objects) or from a part of themselves which bears the same name as themselves (e.g. a house from a house, inasmuch as it is generated by mind; for the art is the form), or from something which contains some part; that is if the generation is not accidental; for the direct and independent cause of the production is a part of the product.

Heat in the motion produces heat in the body; and either this is health or a part of health, or a part of health or health accompanies it. And this is why heat is said to produce health, because it produces that of which health is a concomitant and consequence. Therefore as essence is the starting-point of everything in syllogisms (because syllogisms start from the "what" of a thing), so too generation proceeds from it.

And it is the same with natural formations as it is with the products of art. For the seed produces just as do those things which function by art. It contains the form potentially, and that from which the seed comes has in some sense the same name as the product (for we must not expect that all should have the same name in the sense that "man" is produced by "man"—since woman is also produced by man); unless the product is a freak. This is why a mule is not produced by a mule.

Those natural objects which are produced, like artificial objects, spontaneously, are those whose matter can also initiate for itself that motion which the seed initiates. Those whose matter cannot do this cannot be generated otherwise than by their proper parents.

[369] Stones can fall by themselves, but cannot by themselves build a house; fire can rise by itself, but cannot boil a kettle.

[370] e.g., health can be produced as the result of the activity set up by heat in the body.

It is not only with reference to substance that our argument shows that the form is not generated; the same argument is common in its application to all the primary divisions, i.e. quantity, quality and the other categories.

For just as the bronze sphere is generated, but not the sphere nor the bronze; and as in the case of bronze, if it is generated the form and matter are not (because they must always pre-exist), so it is too with the "what" and the quality and quantity and the other categories similarly; for it is not the quality that is generated, but the wood of that quality; nor is it the size, but the wood or animal of that size.

But a peculiarity of substance may be gathered from this: that some other substance must pre-exist in actuality which produces it; e.g. an animal, if an animal is being generated; but a quality or quantity need not pre-exist otherwise than potentially.

Since a definition is a formula, and every formula has parts; and since the formula is related to the thing in the same way as the part of the formula to the part of the thing, the question[371] now arises: Must the formula of the parts be contained in the formula of the whole, or not? It seems clear that it is so in some cases, but not in others.

The formula of the circle does not include that of the segments, but the formula of the syllable includes that of the letters. And yet the circle is divisible into its segments in just the same way as the syllable into its letters.

Again, if the parts are prior to the whole, and the acute angle is part of the right angle, and the finger part of the animal, the acute angle will be prior to the right angle, and the finger to the man.

But it is considered that the latter are prior; for in the formula the parts are explained from them; and the wholes are prior also in virtue of their ability to exist independently. The truth probably is that "part" has several meanings, one of which is "that which measures in respect of quantity." However, let us dismiss this question and consider of what, in the sense of parts, substance consists.

If then matter, form, and the combination of the two are distinct, and if both matter and form and their combination are substance, there is one sense in which even matter may be called "part" of a thing; and another in which it is not, but the only parts are those elements of which the formula of the form consists. E.g., flesh is not a part of concavity, because flesh is the matter in which concavity is induced;

[371] The questions discussed in chs. 10-12 arise out of the consideration of essence as definition.

but it is a part of snubness. And bronze is part of the statue as a concrete whole, but not of the statue in the sense of form.

We may speak of the form (or the thing as having a form) as an individual thing, but we may never so speak of that which is material by itself. This is why the formula of the circle does not contain that of the segments, whereas the formula of the syllable does contain that of the letters; for the letters are parts of the formula of the form; they are not matter; but the segments are parts in the sense of matter in which the form is induced. They approximate, however, more closely to the form than does the bronze when roundness is engendered in bronze.

But there is a sense in which not even all the letters will be contained in the formula of the syllable; e.g. particular letters on wax[372] or sounds in the air; for these too are part of the syllable in the sense that they are its sensible matter.

For even if the line is divided and resolved into its halves, or if the man is resolved into bones and muscles and flesh, it does not follow that they are composed of these as parts of their essence, but as their matter; and these are parts of the concrete whole, but not of the form, or that to which the formula refers. Hence they are not in the formulae.

Accordingly in some cases the formula will include the formula of such parts as the above, but in others it need not necessarily contain their formula, unless it is the formula of the concrete object. It is for this reason that some things are composed of parts in the sense of principles into which they can be resolved, while others are not.

All things which are concrete combinations of form and matter (e.g. "the snub" or the bronze circle) can be resolved into form and matter, and the matter is a part of them; but such as are not concrete combinations with matter, but are without matter—whose formulae refer to the form only—cannot be resolved; either not at all, or at least not in this way.

Thus these material components are principles and parts of the concrete objects, but they are neither parts nor principles of the form. For this reason the clay statue can be resolved into clay, and the sphere into bronze, and Callias into flesh and bones, and the circle too into segments, because it is something which is combined with matter. For we use the same name for the absolute circle and for the particular circle, since there is no special name for the particular circles.

We have now stated the truth; nevertheless let us recapitulate and state it more clearly. All constituents which are parts of the formula,

[372] i.e. written on a waxed tablet.

and into which the formula can be divided, are prior to their wholes —either all or some of them. But the formula of the right angle is not divisible into the formula of an acute angle, but vice versa; since in defining the acute angle we use the right angle, because "the acute angle is less than a right angle."

It is the same with the circle and the semicircle; for the semicircle is defined by means of the circle. And the finger is defined by means of the whole body; for a finger is a particular kind of part of a man. Thus such parts as are material, and into which the whole is resolved as into matter, are posterior to the whole; but such as are parts in the sense of parts of the formula and of the essence as expressed in the formula, are prior; either all or some of them.

And since the soul of animals (which is the substance of the living creature) is their substance in accordance with the formula, and the form and essence of that particular kind of body (at least each part, if it is to be properly defined, will not be defined apart from its function; and this will not belong to it apart from perception[373]); therefore the parts of the soul are prior, either all or some of them, to the concrete animal; and similarly in other individual cases.

But the body and its parts are posterior to this substance, and it is not the substance, but the concrete whole, which is resolved into these parts as into matter. Therefore in one sense these parts are prior to the concrete whole, and in another not; for they cannot exist in separation. A finger cannot in every state be a part of a living animal; for the dead finger has only the name in common with the living one.

Some parts are contemporary with the whole: such as are indispensable and in which the formula and the essence are primarily present; e.g. the heart or perhaps the brain,[374] for it does not matter which of them is of this nature. But "man" and "horse" and terms which are applied in this way to individuals, but universally, are not substance, but a kind of concrete whole composed of *this* particular formula and *this* particular matter regarded as universal. But individually Socrates is already composed of ultimate matter; and similarly in all other cases.

A part, then, may be part of the form (by form I mean essence), or of the concrete whole composed of form and matter, or of the matter itself. But only the parts of the form are parts of the formula, and the formula refers to the universal; for "circle" is the same as "essence of circle," and "soul" the same as "essence of soul."

[373] Which implies soul.

[374] Cf. *Aristot. Met. 5.1.1.*

But when we come to the concrete thing, e.g. this circle—which is a particular individual, either sensible or intelligible (by intelligible circles I mean those of mathematics,[375] and by sensible those which are of bronze or wood)—of these individuals there is no definition; we apprehend them by intelligence or perception; and when they have passed from the sphere of actuality it is uncertain whether they exist or not, but they are always spoken of and apprehended by the universal formula. But the matter is in itself unknowable. Some matter is sensible and some intelligible; sensible, such as bronze and wood and all movable matter; intelligible, that which is present in sensible things not *qua* sensible, e.g. the objects of mathematics.[376]

We have now discussed the case of the whole and part, and of prior and posterior. But we must answer the question, when we are asked which is prior—the right angle and circle and animal, or that into which they are resolved and of which they are composed, i.e. their parts—by saying that neither is *absolutely* prior.

For if the soul also *is* the animal or living thing, or the soul of the individual *is* the individual, and "being a circle" *is* the circle, and "being a right angle" or the essence of the right angle *is* the right angle, then we must admit that the whole in one sense is posterior to the part in one sense: e.g. to the parts in the formula and the parts of a particular right angle

(since both the material right angle of bronze and the right angle included by individual lines are posterior to their parts), but the immaterial angle is posterior to the parts in the formula, but prior to the parts in the individual. We must not give an unqualified answer. And if the soul is not the animal but something else, even so we must say that some wholes are prior and some are not, as has been stated.

The question naturally presents itself, what sort of parts belong to the form and what sort belong not to it but to the concrete object. Yet if this is not plain it is impossible to define the particular; because the definition refers to the universal and the form. Therefore if it is not clear what kind of parts are material and what kind are not, the formula of the thing will not be clear either.

In the case of things which can be seen to be induced in specifically different materials, as, e.g., a circle is in bronze and stone and wood, it seems clear that these things, the bronze and the stone, are in no sense part of the essential substance of the circle, because it is separable from

[375] i.e., something very similar to the Platonic "intermediates." Cf. Introduction.

[376] See *Aristot. Met. 13.2, 3.*

them.
As for things which are not visibly separable, there is no reason why the same should not apply to them; e.g., if all the circles that had ever been seen were bronze; for the bronze would be none the less no part of the form, but it is difficult to separate it in thought.
For example, the form of "man" is always manifested in flesh and bones and elements of this kind; then are these actually parts of the form and formula, or are they not so, but matter, though since the form is not induced in other materials, we cannot separate it?
Now since this seems to be possible, but it is not clear *when*, some thinkers[377] are doubtful even in the case of the circle and the triangle, considering that it is not proper to define them by lines and continuous space, but that all these are to the circle or triangle as flesh or bone is to man, and bronze or stone to the statue; and they reduce everything to numbers, and say that the formula of "line" is the formula of 2.
And of the exponents of the Forms, some make 2 the Ideal line, and some the form of the line[378]; for they say that in some cases the form and that of which it is the form, e.g. 2 and the form of 2, are the same; but in the case of "line" this is no longer so.
It follows, then, that there is one form of many things whose form is clearly different (a consequence which confronted the Pythagoreans too[379]), and that it is possible to make one supreme Form of everything, and not to regard the rest as forms. In this way, however, all things would be one.
Now we have stated that the question of definitions involves some difficulty, and have shown why this is so. Hence to reduce everything in this way and to dispose of the matter is going too far; for some things are presumably a particular form in particular matter, or particular things in a particular state.
And the analogy in the case of the living thing which the younger Socrates[380] used to state is not a good one; for it leads one away from the truth, and makes one suppose that it is possible for a man to exist without his parts, as a circle does without the bronze. But the case is not similar; for the animal is sensible and cannot be defined without motion, and hence not unless its parts are in some definite condition;

[377]The Pythagoreans.

[378]The distinction seems to be that given in *Aristot. Met. 8.3.1.* Some held that the line, considered absolutely, is simply "twoness"; others that it is "twoness in length."

[379]Cf. *Aristot. Met. 1.5.17.*

[380]A "disciple" of the great Socrates; one of the speakers in the Politicus*Plat. Stat.* and referred to in *Plat. Theaet. 147c*, *Plat. Soph. 218b.*

for it is not the hand in *any* condition that is a part of a man, but only when it can perform its function, and so has life in it. Without life in it it is not a part.

And with respect to mathematical objects, why are the formulae of the parts not parts of the formulae of the whole; e.g., why are the formulae of the semicircles not parts of the formula of the circle? for they are not sensible.

Probably this makes no difference; because there will be matter even of some things which are not sensible. Indeed there will be matter in some sense in everything which is not essence or form considered independently, but a particular thing. Thus the semicircles will be parts not of the universal circle but of the particular circles, as we said before[381]—for some matter is sensible, and some intelligible.

It is clear also that the soul is the primary substance, and the body matter; and "man" or "animal" is the combination of both taken universally. And " Socrates" or "Coriscus" has a double sense, that is if the soul too can be called Socrates (for by Socrates some mean the soul and some the concrete person); but if Socrates means simply *this* soul and *this* body, the individual is composed similarly to the universal.

Whether there is some other material component of these substances besides their matter, and whether we should look for some further substance in them, such as numbers or something of that kind, must be considered later.[382] It is with a view to this that we are trying to determine the nature of sensible substances, since in a sense the study of sensible substances belongs to physics or secondary philosophy; for the physicist must know not only about the matter, but also about the substance according to the formula; this is even more essential.

And in the case of definitions, in what sense the elements in the formula are parts of the definition, and why the definition is one formula (for the thing is clearly one, but in virtue of what is it one, seeing that it has parts?); this must be considered later.[383]

We have stated, then, in a general account which covers all cases, what essence is, and how it is independent; and why the formula of the essence of some things contains the parts of the thing defined, while that of others does not; and we have shown that the material parts of a thing cannot be present in the formula of the substance (since they are not even parts of the substance in that sense, but of the concrete

[381] *Aristot. Met. 7.10.17.*

[382] In Books 13 and 14.

[383] *Aristot. Met. 8.6.*

substance; and of this in one sense there is a formula, and in another sense there is not.
There is no formula involving the matter, for this is indeterminate; but there is a formula in accordance with the primary substance, e.g., in the case of a man, the formula of the soul; because the substance is the indwelling form, of which and of the matter the so called concrete substance is composed. E.g., concavity is such a form, since from this and "nose" is derived "snub nose" and "snubness"—for "nose" will be present twice over in these expressions);
but in the concrete substance, e.g. snub nose or Callias, matter will be present too.[384] We have stated also that the essence and the individual are in some cases the same, as in the case of the primary substances; e.g. crookedness and "essence of crookedness," if this is primary.
By primary I mean that which does not imply the presence of something in something else as a material substrate. But such things as are material or are compounded with matter are not the same as their essence; not even if they are accidentally one, e.g. Socrates and "cultured"; for these are only accidentally the same.
Now let us first deal with definition, in so far as it has not been dealt with in the *Analytics*; for the problem stated there[385] has a bearing upon our discussion of substance. The problem I mean is this: what constitutes the unity of the thing of which we say that the formula is a definition? E.g., in the case of man, "two-footed animal"; for let us take this as the formula of "man."
Why, then, is this a unity and not a plurality, "animal" and "two-footed"? For in the case of "man" and "white" we have a plurality when the latter does not refer to the former, but a unity when it does refer to it, and the subject, "man," has an attribute; for then they become a unity and we have "the white man."
But in the case before us one term does not partake of the other; the genus is not considered to partake of its differentiae, for then the same thing would be partaking simultaneously of contraries, since the differentiae by which the genus is distinguished are contrary. And even if it does partake of them, the same argument applies, since the differentiae are many; e.g. terrestrial, two-footed, wingless.
Why is it that these are a unity and not a plurality? Not because they are present in one genus, for in that case all the differentiae of the genus will form a unity. But all the elements in the definition must

[384] Chapters. 10-11; and cf. *Aristot. Met. 7.4.*
[385] *Aristot. An. Post. 92a 29.*

form a unity, because the definition is a kind of formula which is one and defines substance, so that it must be a formula of one particular thing; because the substance denotes one thing and an individual, as we say.

We must first[386] examine definitions which are reached by the process of division.

For there is nothing else in the definition but the primary genus and the differentiae; the other genera consist of the primary genus together with the differentiae which are taken with it. E.g., the primary genus is "animal"; the next below it, "two-footed animal"; and again, "two-footed wingless animal"; and similarly also if the expression contains more terms still.

In general it does not matter whether it contains many or few terms, nor, therefore, whether it contains few or two. Of the two one is differentia and the other genus; e.g., in "two-footed animal" "animal" is genus, and the other term differentia.

If, then, the genus absolutely does not exist apart from the species which it includes, or if it exists, but only as matter (for speech is genus and matter, and the differentiae make the species, i.e. the letters, out of it), obviously the definition is the formula composed of the differentiae.

But further we must also divide by the differentia of the differentia. E.g., "having feet" is a differentia of "animal"; then in turn we must discover the differentia of "animal having feet" *qua* "having feet." Accordingly we should not say that of "that which has feet" one kind is winged and another wingless, (that is if we are to speak correctly; if we say this it will be through incapability), but only that one kind is cloven-footed and another not; because these are differentiae of "foot," since cloven-footedness is a kind of footedness.

And thus we tend always to progress until we come to the species which contain no differentiae. At this point there will be just as many species of foot as there are differentiae, and the kinds of animals having feet will be equal in number to the differentiae. Then, if this is so, obviously the ultimate differentia will be the substance and definition of the thing, since we need not state the same things more than once in definitions, because this is superfluous.

However, it does happen; for when we say "footed two-footed animal" we have simply said "animal having feet, having two feet." And if we divide this by its proper division, we shall be stating the same thing

[386]The other type of definition, that which states the constituent parts of a thing, is not discussed here.

several times, as many times as there are differentiae.
If, then, we keep on taking a differentia of a differentia, one of them, the last, will be the form and the substance. But if we proceed with reference to accidental qualities—e.g. if we divide "that which has feet" into white and black—there will be as many differentiae as there are divisions. It is therefore obvious that the definition is the formula derived from the differentiae, and strictly speaking from the last of them.
This will be clear if we change the order of such definitions, e.g. that of man, saying "two-footed footed animal"; for "footed" is superfluous when we have already said "two-footed." But there is no question of order in the substance; for how are we to think of one part as posterior and the other prior?

With regard, then, to definitions by division, let this suffice as a preliminary statement of their nature.
Since the subject of our inquiry is substance, let us return to it. Just as the substrate and the essence and the combination of these are called substance, so too is the universal. With two of these we have already dealt, i.e. with the essence[387] and the substrate[388]; of the latter we have said that it underlies in two senses—either being an individual thing (as the animal underlies its attributes), or as matter underlies the actuality.
The universal also is thought by some[389] to be in the truest sense a cause and a principle. Let us therefore proceed to discuss this question too; for it seems impossible that any universal term can be substance.

First, the substance of an individual is the substance which is peculiar to it and belongs to nothing else; whereas the universal is common; for by universal we mean that which by nature appertains to several things.
Of what particular, then, will the universal be the substance? Either of all or of none. But it cannot be the substance of all; while, if it is to be the substance of one, the rest also will be that one; because things whose substance is one have also one essence and are themselves one.

Again, substance means that which is not predicated of a subject, whereas the universal is always predicated of some subject.

But perhaps although the universal cannot be substance in the sense that essence is, it can be present in the essence, as "animal" can

[387] Chs. 4-5.,10-12.
[388] Ch. 3.
[389] The Platonists.

be present in "man" and "horse."
Then clearly there is in some sense a formula of the universal. It makes no difference even if there is not a formula of everything that is in the substance; for the universal will be none the less the substance of something; e.g., "man" will be the substance of the man in whom it is present. Thus the same thing will happen again[390]; e.g. "animal" will be the substance of that in which it is present as peculiar to it.
Again, it is impossible and absurd that the individual or substance, if it is composed of anything, should be composed not of substances nor of the individual, but of a quality; for then non-substance or quality will be prior to substance or the individual. Which is impossible; for neither in formula nor in time nor in generation can the affections of substance be prior to the substance, since then they would be separable.
Again, a substance will be present in "Socrates," who is a substance; so that it will be the substance of two things. And in general it follows that if "man" and all terms used in this way are substance, none of the elements in the formula is the substance of anything, nor can it exist apart from the species or in anything else; I mean, e.g., that neither "animal" nor any other element of the formula can exist apart from the particular species.
If we look at the question from this standpoint it is obvious that no universal attribute is substance; and it is also clear from the fact that none of the common predicates means "so-and-so," but "such and-such." Otherwise amongst many other awkward consequences we have the "third man." [391]
Again, it is clear in this way too. Substance can not consist of substances actually present in it; for that which is actually two can never be actually one, whereas if it is potentially two it can be one. E.g., the double consists of two halves—that is, potentially; for the actualization separates the halves.
Thus if substance is one, it cannot consist of substances present in it even in this sense, as Democritus rightly observes; he says that it is impossible for two to come from one, or one from two, because he identifies substance with the atoms.[392]
Clearly then the same will also hold good in the case of number (assuming that number is a composition of units, as it is said to be by some); because either 2 is not 1, or there is not *actually* a unit in it.

[390] i.e., the argument in ch. 3 will apply to this case also.
[391] See note on *Aristot. Met. 1.9.3.*
[392] Cf. *Aristot. De Caelo 303a 6*, *Aristot. De Gen. et Corr. 325a 35.*

The consequence involves a difficulty; for if no substance can consist of universals, because they mean "of such a kind," and not a particular thing; and if no substance can be actually composed of substances, every substance will be incomposite, and so there will be no formula of any substance.

But in point of fact it is universally held, and has been previously stated,[393] that substance is the only or chief subject of definition; but on this showing there is no definition even of substance. Then there can be no definition of anything; or rather in a sense there can, and in a sense cannot. What this means will be clearer from what follows later.[394]

From these same considerations it is clear also what consequence follows for those who maintain that the Forms are substances and separable, and who at the same time make the species consist of the genus and the differentiae. If there are Forms, and if "animal" is present in the man and the horse, it is either numerically one and the same with them, or not.

(In formula they are clearly one; for in each case the speaker will enunciate the same formula.) If, then, there is in some sense an Absolute Man, who is an individual and exists separately, then the constituents, e.g. "animal" and "two-footed," must have an individual meaning and be separable and substances. Hence there must be an Absolute Animal too.

(i) Then if the "animal" which is in the horse and the man is one and the same, as you are one and the same with yourself, how can the one which in things that exist separately be one, and why should not this "animal" also be separated from itself? Again, if it is to partake of "two-footed" and of "many-footed," an impossibility follows; for contrary attributes will belong to it although it is one and individual. But if it does not, in what sense is it that one calls an animal "two-footed" or "terrestrial"? Perhaps the terms are "combined" and "in contact" or "mixed." But all these expressions are absurd.

(2) "But there is a different "animal" in each species." Then there will be practically an infinity of things of which "animal" is the substance, since it is not in an accidental sense that "man" is derived from "animal."

Again, the Absolute Animal will be a plurality. For (a) the "animal" in each species will be the substance of that species, since the species is

[393] *Aristot. Met. 7.5.5-7.*

[394] *Aristot. Met. 7.15, Aristot. Met. 8.6.*

called after it and no other thing. Otherwise "man" would be derived from that other thing, which would be the genus of "man." (b) Further, all the constituents of "man" will be Ideas. Then, since nothing can be the Idea of one thing and the substance of another (for this is impossible),
each and every "animal" in the various species will be the Absolute Animal.

Further, from what will these Forms be derived, and how can they be derived from the Absolute Animal? Or how can "the animal," whose very essence is "animal," exist apart from the Absolute Animal? And further, in the case of sensible things both these and still more absurd consequences follow. If, then, these consequences are impossible, clearly there are not Forms of sensible things in the sense in which some hold that there are.

Since substance is of two kinds, the concrete thing and the formula (I mean that one kind of substance is the formula in combination with the matter, and the other is the formula in its full sense), substances in the former sense admit of destruction, for they also admit of generation. But the formula does not admit of destruction in the sense that it is ever *being* destroyed, since neither does it so admit of generation (for the essence of house is not generated, but only the essence of *this* house); formulae *are* , and *are not*, independently of generation and destruction; for it has been shown[395] that no one either generates or creates them.

For this reason also there is no definition or demonstration of particular sensible substances, because they contain matter whose nature is such that it can both exist and not exist. Hence all the individual instances of them are perishable.

If, then, the demonstration and definition of necessary truths requires scientific knowledge, and if, just as knowledge cannot be sometimes knowledge and sometimes ignorance (it is opinion that is of this nature), so too demonstration and definition cannot vary (it is opinion that is concerned with that which can be otherwise than it is)—then clearly there can be neither definition nor demonstration of individual sensible substances.

For (a) things which perish are obscure to those who have knowledge of them when they are removed from the sphere of their perception, and (b) even though their formulae are preserved in the soul, there will no longer be either definition or demonstration of them. Therefore in

[395] Cf. *Aristot. Met. 7.8.3.*

cases relating to definition, when we are trying to define any individual, we must not fail to realize that our definition may always be upset; because it is impossible to define these things.

Nor, indeed, can any Idea be defined; for the Idea is an individual, as they say, and separable; and the formula must consist of words, and the man who is defining must not coin a word, because it would not be comprehensible. But the words which are in use are common to all the things which they denote; and so they must necessarily apply to something else as well. E.g., if a man were to define you, he would say that you are an animal which is lean or white or has some other attribute, which will apply to something else as well.

And if it should be said that there is no reason why all the attributes separately should not belong to several things, and yet in combination belong to this alone, we must reply, (1.) that they also belong to both the elements; e.g., "two-footed animal" belongs both to "animal" and to "two-footed" (and in the case of eternal elements this is even necessarily so; since they are prior to the compound, and parts of it. Indeed they are also separable, if the term "man" is separable—for either neither can be separable, or both are so. If neither, the genus will not exist apart from the species, or if it is so to exist, so will the differentia); (2.) that "animal" and "two-footed" are prior in being to "two-footed animal," and that which is prior to something else is not destroyed together with it.

Again, if the Ideas are composed of Ideas (for constituents are less composite than that which they compose), still the elements of which the Idea is composed (e.g. "animal" and "two-footed") will have to be predicated of many particulars. Otherwise, how can they be known? For there would be an Idea which cannot be predicated of more than one thing. But this is not considered possible; every Idea is thought to admit of participation.

Thus, as we have said,[396] the impossibility of defining individuals is hard to realize when we are dealing with eternal entities, especially in the case of such as are unique, e.g. the sun and moon. For people go wrong not only by including in the definition attributes on whose removal it will still be sun—e.g., "that which goes round the earth," or "night-hidden" (for they suppose that if it stops or becomes visible[397] it will no longer be sun; but it is absurd that this should be so, since "the sun" denotes a definite substance)—they also mention attributes

[396] The statement has only been implied in the preceding arguments.

[397] sc. in the night.

which may apply to something else; e.g., if another thing with those attributes comes into being, clearly it will be a sun. The formula, then, is general; but the sun was supposed to be an individual, like Cleon or Socrates.

Why does not one of the exponents of the Ideas produce a definition of them? If they were to try, it would become obvious that what we have just said is true.

It is obvious that even of those things which are thought to be substances the majority are potentialities; both the parts of living things (for none of them has a separate substantial existence; and when they are separated, although they still exist, they exist as matter), and earth, fire and air; for none of these is one *thing* —they are a mere aggregate before they are digested and some one thing is generated from them.

It might be supposed very reasonably that the parts of living things and the corresponding parts of their vital principle are both, i.e. exist both actually and potentially, because they contain principles of motion derived from something in their joints; and hence some animals[398] live even when they are divided. Nevertheless it is only potentially that all of them will exist when they are one and continuous by nature and not by force or concretion; for this sort of thing is malformation.[399]

And since "unity" has the same variety of senses as "being," and the substance of Unity is one, and things whose substance is numerically one are numerically one, evidently neither Unity nor Being can be the substance of things, just as neither "being an element" or "principle" can be the substance; but we ask what the principle is so that we may refer to something more intelligible.[400]

Now of these concepts Being and Unity are more nearly substance than are principle, element and cause; but not even the former are quite substance, since nothing else that is common is substance; for substance belongs to nothing except itself and that which contains it and of which it is the substance.

Again, Unity cannot exist in many places at the same time, but that which is common is present in many things at the same time. Hence it is clear that no universal exists in separation apart from its particulars. The exponents of the Forms are partly right in their account when they

[398] e.g. wasps, bees, tortoises (*P. Nat. 467a 18, 468a 25*).

[399] i.e., it is only when they do not properly constitute a unity that parts can be said to exist actually.

[400] i.e., a thing is a principle in relation to something else which it explains; therefore a principle is less substantial than unity or being, which belong to a thing in itself.

make the Forms separate; that is, if the Forms are substances, but they are also partly wrong, since by "Form" they mean the "one-over-many."[401]

The reason for this is that they cannot explain what are the imperishable substances of this kind which exist besides particular sensible substances; so they make them the same in kind as perishable things (for these we know); i.e., they make "Ideal Man" and "Ideal Horse," adding the word "Ideal" to the names of sensible things.

However, I presume that even if we had never seen the stars, none the less there would be eternal substances besides those which we knew; and so in the present case even if we cannot apprehend what they are, still there must be eternal substances of some kind.

It is clear, then, both that no universal term is substance and that no substance is composed of substances.

As for what and what sort of thing we mean by substance, let us explain this by making, as it were, another fresh start. Perhaps in this way we shall also obtain some light upon that kind of substance which exists in separation from sensible substances. Since, then, substance is a kind of principle and cause, we had better pursue our inquiry from this point.

Now when we ask why a thing is, it is always in the sense "why does A belong to B?"

To ask why the cultured man is a cultured man is to ask either, as we have said, why the man is cultured, or something else. Now to ask why a thing is itself is no question; because when we ask the reason of a thing the fact must first be evident; e.g., that the moon suffers eclipse; and "because it is itself" is the one explanation and reason which applies to all questions such as "why is man man?" or "why is the cultured person cultured?" (unless one were to say that each thing is indivisible from itself, and that this is what "being one" really means); but this, besides being a general answer, is a summary one.[402] We may, however, ask why a man is an animal of such-and-such a kind.

It is clear, then, that we are not asking why he who is a man is a man;

[401] i.e. universal; cf. *Aristot. Met. 1.9.1.*

[402] The argument is: The question "Why is the cultured man a cultured man?" if it does *not* mean "Why is the man cultured?" can only mean "Why is a thing itself?" But when we ask a question the fact must be obvious; and since it is obvious that a thing is itself, "because it is itself" (or "because each thing is indivisible from itself") is the one and only complete answer to all questions of this type. Since this answer (in either form) is clearly unsatisfactory, the question which it answers cannot be a proper question.

therefore we are asking why A, which is predicated of B, belongs to B. (The fact that A does belong to B must be evident, for if this is not so, the question is pointless.) E.g., "Why does it thunder?" means "why is a noise produced in the clouds?" for the true form of the question is one thing predicated in this way of another.

Or again, "why are these things, e.g. bricks and stones, a house?" Clearly then we are inquiring for the cause (i.e., to speak abstractly, the essence); which is in the case of some things, e.g. house or bed, the *end* , and in others the prime mover—for this also is a cause. We look for the latter kind of cause in the case of generation and destruction, but for the former also in the case of existence.

What we are now looking for is most obscure when one term is not predicated of another; e.g. when we inquire what man is; because the expression is a simple one not analyzed into subject and attributes. We must make the question articulate before we ask it; otherwise we get something which shares the nature of a pointless and of a definite question.

Now since we must know that the fact actually exists, it is surely clear that the question is "why is the *matter* so-and-so?" e.g. "why are these materials a house?" Because the essence of house is present in them. And this matter, or the body containing this particular form, is man. Thus what we are seeking is the cause (i.e. the form) in virtue of which the matter is a definite thing; and this is the substance of the thing.

Clearly then in the case of simple entities[403] inquiry and explanation are impossible; in such cases there is a different mode of inquiry.

Now since that which is composed of something in such a way that the whole is a unity; not as an aggregate is a unity, but as a syllable is[404] —the syllable is not the letters, nor is BA the same as B and A; nor is flesh fire and earth; because after dissolution the compounds, e.g. flesh or the syllable, no longer exist; but the letters exist, and so do fire and earth.

Therefore the syllable is some particular thing; not merely the letters, vowel and consonant, but something else besides. And flesh is not merely fire and earth, or hot and cold, but something else besides.

Since then this something else must be either an element or composed

[403] Pure forms which contain no matter; in their case the method just described obviously will not apply. They can only be apprehended intuitively (cf. *Aristot. Met. 9.10.*).

[404] This sentence is not finished; the parenthesis which follows lasts until the end of the chapter.

of elements, (a) if it is an element, the same argument applies again; for flesh will be composed of *this* and fire and earth, and again of another element, so that there will be an infinite regression. And (b) if it is composed of elements, clearly it is composed not of one (otherwise it will itself be that element) but of several; so that we shall use the same argument in this case as about the flesh or the syllable.

It would seem, however, that this "something else" is something that is not an element, but is the cause that *this* matter is flesh and *that* matter a syllable, and similarly in other cases.

And this is the substance of each thing, for it is the primary cause of its existence. And since, although some things are not substances, all substances are constituted in accordance with and by nature, substance would seem to be this "nature," which is not an element but a principle.[405] An element is that which is present as matter in a thing, and into which the thing is divided; e.g., A and B are the elements of the syllable.

[405] i.e. the formal cause. Cf. *Aristot. Met. 5.4.4-6.*

Book 8

We must now draw our conclusions from what has been said, and after summing up the result, bring our inquiry to a close. We have said[406] that the objects of our inquiry are the causes and principles and elements of substances. Now some substances are agreed upon by all; but about others certain thinkers have stated individual theories. Those about which there is agreement are natural substances: e.g. fire, earth, water, air and all the other simple bodies; next, plants and their parts, and animals and the parts of animals; and finally the sensible universe and its parts; and certain thinkers individually include as substances the Forms and the objects of mathematics.[407]

And arguments show that there are yet other substances: the essence and the substrate.[408] Again, from another point of view, the genus is more nearly substance than the species, and the universal than the particulars[409]; and there is a close connection between the universal and genus and the Ideas, for they are thought to be substance on the same grounds.[410]

And since the essence is substance, and definition is the formula of the essence, we have therefore systematically examined definition and essential predication.[411] And since the definition is a formula, and the formula has parts, we have been compelled to investigate "parts," and to discover what things are parts of the substance, and what are not; and whether the parts of the substance are also parts of the definition.[412]

[406] Cf. *Aristot. Met. 7.1.*
[407] Cf. *Aristot. Met. 7.2.*
[408] Cf. *Aristot. Met. 7.3-4.*
[409] Cf. *Aristot. Met. 7.13.*
[410] Cf. *Aristot. Met. 7.14.*
[411] Cf. *Aristot. Met. 7.4-6, 12, 15.*

Further, then, neither the universal nor the genus is substance.[413]
As for the Ideas and the objects of mathematics (for some say that these exist apart from sensible substances) we must consider them later.[414] But now let us proceed to discuss those substances which are generally accepted as such.

Now these are the sensible substances, and all sensible substances contain matter.
And the substrate is substance; in one sense matter (by matter I mean that which is not actually, but is potentially, an individual thing); and in another the formula and the specific shape (which is an individual thing and is theoretically separable); and thirdly there is the combination of the two, which alone admits of generation and destruction,[415] and is separable in an unqualified sense—for of substances in the sense of formula some are separable[416] and some are not.
That matter is also substance is evident; for in all opposite processes of change there is something that underlies those processes; e.g., if the change is of *place* , that which is now in one place and subsequently in another; and if the change is of *magnitude* , that which is now of such-and-such a size, and subsequently smaller or greater; and if the change is of *quality* , that which is now healthy and subsequently diseased.
Similarly, if the change is in respect of *being* , there is something which is now in course of generation, and subsequently in course of destruction, and which is the underlying substrate, now as *this* individual thing, and subsequently as deprived of its individuality. In this last process of change the others are involved, but in either one or two[417] of the others it is not involved; for it does not necessarily follow that if a thing contains matter that admits of change of place, it also contains matter that is generable and destructible.[418] The difference between absolute and qualified generation has been explained in the *Physics.*[419]
Since substance in the sense of substrate or matter is admittedly sub-

[412]Cf. *Aristot. Met. 7.10, 11.*

[413]Cf. *Aristot. Met. 7.13, 16.*

[414]Books 13 and 14.

[415]Cf. *Aristot. Met. 7.8.*

[416]In point of fact the only form which is absolutely separable is Mind or Reason. Cf. *Aristot. Met. 12.7, 9.*

[417]i.e., locomotion does not involve substantial change; alteration may or may not involve it (in *Aristot. Met. 9.8.17* we find that it does not); increase or decrease does involve it.

[418]e.g., the heavenly bodies, though imperishable, can move in space (*Aristot. Met. 8.4.7*, *Aristot. Met. 12.2.4*).

[419]*Aristot. Phys. 225a 12-20*; cf. *Aristot. De Gen. et Corr. 317a 17-31.*

stance, and this is potential substance, it remains to explain the nature of the actual substance of sensible things. Now Democritus[420] apparently assumes three differences in substance; for he says that the underlying body is one and the same in material, but differs in figure, i.e. shape; or inclination, i.e. position; or intercontact, i.e. arrangement.
But evidently there are many differences; e.g. some things are defined by the way in which their materials are combined, as, for example, things which are unified by mixture, as honey-water; or by ligature, as a faggot; or by glue, as a book; or by clamping, as a chest; or by more than one of these methods. Other things are defined by their position, e.g. threshold and lintel (for these differ in being situated in a particular way); and others by place ⟨or direction⟩, e.g. the winds; others by time, e.g. dinner and breakfast; and others by the attributes peculiar to sensible things, e.g. hardness and softness, density and rarity, dryness and humidity. Some are distinguished by some of these differences, and others by all of them; and in general some by excess and some by defect.
Hence it is clear that "is" has the same number of senses; for a thing "is" a threshold because it is situated in a particular way, and "to be a threshold" means to be situated in this particular way, and "to be ice" means to be condensed in this particular way. Some things have their being defined in all these ways: by being partly mixed, partly blended, partly bound, partly condensed, and partly subjected to all the other different processes; as, for example, a hand or a foot.
We must therefore comprehend the various kinds of differences—for these will be principles of being—i.e. the differences in degree, or in density and rarity, and in other such modifications, for they are all instances of excess and defect.
And if anything differs in shape or in smoothness or roughness, all these are differences in straightness and curvature. For some things mixture will constitute being, and the opposite state not-being.

From this it is evident that if substance is the cause of the existence of each thing, we must look among these "differences" for the cause of the being of each thing.
No one of them, nor the combination of any two of them, is substance, but nevertheless each one of them contains something analogous to substance. And just as in the case of substances that which is predicated of the matter is the actuality itself, so in the other kinds of definition it is the nearest approximation to actuality. E.g., if we have

[420] Cf. *Aristot. Met. 1.4.11.*

to define a threshold, we shall call it "a piece of wood or stone placed in such-and-such a way"; and we should define a house as "bricks and timber arranged in such-and-such a way";
or again in some cases there is the final cause as well. And if we are defining ice, we shall describe it as "water congealed or condensed in such-and-such a way"; and a harmony is "such-and-such a combination of high and low"; and similarly in the other cases.

From this it is evident that the actuality or formula is different in the case of different matter; for in some cases it is a combination, in others a mixture, and in others some other of the modes which we have described.
Hence in defining the nature of a house, those who describe it as stones, bricks and wood, describe the potential house, since these things are its matter; those who describe it as "a receptacle for containing goods and bodies," or something else to the same effect, describe its actuality; but those who combine these two definitions describe the third kind of substance, that which is composed of matter and form.
For it would seem that the formula which involves the differentiae is that of the form and the actuality, while that which involves the constituent parts is rather that of the matter. The same is true of the kind of definitions which Archytas[421] used to accept; for they are definitions of the combined matter and form. E.g., what is "windlessness?" Stillness in a large extent of air; for the air is the matter, and the stillness is the actuality and substance.
What is a calm? Levelness of sea. The sea is the material substrate, and the levelness is the actuality or form.

From the foregoing account it is clear what sensible substance is, and in what sense it exists; either as matter, or as form and actuality, or thirdly as the combination of the two.
We must not fail to realize that sometimes it is doubtful whether a name denotes the composite substance or the actuality and the form—e.g. whether "house" denotes the composite thing, "a covering made of bricks and stones arranged in such-and-such a way," or the actuality and form, "a covering"; and whether "line" means "duality in length" or "duality"[422]; and whether "animal" means "a soul in a body" or "a soul"; for the soul is the substance and actuality of some body.
The term "animal" would be applicable to both cases; not as being defined by one formula, but as relating to one concept. These distinc-

[421] A celebrated Pythagorean, contemporary with Plato.
[422] Cf. *Aristot. Met. 7.11.6.*

tions are of importance from another point of view, but unimportant for the investigation of sensible substance; because the essence belongs to the form and the actualization.
Soul and essence of soul are the same, but man and essence of man are not, unless the soul is also to be called man; and although this is so in one sense, it is not so in another.

It appears, then, upon inquiry into the matter,[423] that a syllable is not derived from the phonetic elements plus combination, nor is a house bricks plus combination. And this is true; for the combination or mixture is not derived from the things of which it is a combination or mixture,
nor, similarly, is any other of the "differences." E.g., if the threshold is defined by its position, the position is not derived from the threshold, but rather vice versa. Nor, indeed, is man "animal" *plus* "two-footed"; there must be something which exists besides these, if they are matter; but it is neither an element nor derived from an element, but the substance; and those who offer the definition given above are omitting this and describing the matter.
If, then, this something else is the cause of a man's being, and this is his substance, they will not be stating his actual substance.

Now the substance must be either eternal or perishable without ever being in process of perishing, and generated without ever being in process of generation. It has been clearly demonstrated elsewhere[424] that no one generates or creates the form; it is the individual thing that is created, and the compound that is generated.
But whether the substances of perishable things are separable or not is not yet at all clear[425]; only it is clear that this is impossible in some cases, i.e. in the case of all things which cannot exist apart from the particular instances; e.g. house or implement.[426] Probably, then, neither these things themselves, nor anything else which is not naturally composed, are substances; for their nature is the only substance which one can assume in the case of perishable things.
Hence the difficulty which perplexed the followers of Antisthenes[427] and others similarly unlearned has a certain application; I mean the difficulty that it is impossible to define *what* a thing is (for the definition, they say, is a lengthy formula), but it *is* possible actually to

[423] Cf. *Plat. Theaet. 204aff.*
[424] Cf. *Aristot. Met. 7.8.*
[425] Cf. *Aristot. Met. 8.1.6. n..*
[426] Cf. *Aristot. Met. 7.8.6.*
[427] Cf. *Aristot. Met. 5.29.4.*

teach others what a thing *is like*; e.g., we cannot say *what* silver is, but we can say that it is like tin.
Hence there can be definition and formula of one kind of substance, i.e. the composite, whether it is sensible or intelligible; but not of its primary constituents, since the defining formula denotes something predicated of something, and this must be partly of the nature of matter and partly of the nature of form.
It is also obvious that, if numbers are in any sense substances, they are such in this sense, and not, as some[428] describe them, aggregates of units. For (a) the definition is a kind of number, since it is divisible, and divisible into indivisible parts (for formulae are not infinite); and number is of this nature.
And (b) just as when any element which composes the number is subtracted or added, it is no longer the same number but a different one, however small the subtraction or addition is; so neither the definition nor the essence will continue to exist if something is subtracted from or added to it. And (c) a number must be something in virtue of which it is a unity (whereas our opponents cannot say what makes it one); that is, if it is a unity.
For either it is not a unity but a kind of aggregate, or if it is a unity, we must explain what makes a unity out of a plurality. And the definition is a unity; but similarly they cannot explain the definition either. This is a natural consequence, for the same reason applies to both, and substance is a unity in the way which we have explained, and not as some thinkers say: e.g. because it is a kind of unit or point; but each substance is a kind of actuality and nature.
Also (d) just as a number does not admit of variation in degree, so neither does substance in the sense of form; if any substance does admit of this, it is substance in combination with matter.[429]

Let this suffice as a detailed account of the generation and destruction of so-called substances, in what sense they are possible and in what sense they are not; and of the reference of things to number.
As regards material substance, we must not fail to realize that even if all things are derived from the same primary cause, or from the same things as primary causes[430]; i.e. even if all things that are generated

[428] Aristotle is referring to the Pythagoreans and Platonists, but seems as usual to misrepresent their views. His object in this section is to show that the relation of number to substance is only one of analogy. Cf. *Aristot. Met. 13.6, 7*, and see Introduction.

[429] In *Aristot. Categories 3b 33-4a 9* Aristotle does not allow this exception.

[430] i.e. from prime matter or the four elements.

have the same matter for their first principle, nevertheless each thing has some matter peculiar to it; e.g., "the sweet" or "the viscous" is the proximate matter of mucus, and "the bitter" or some such thing is that of bile—although probably mucus and bile are derived from the same ultimate matter.
The result is that there is more than one matter of the same thing, when one thing is the matter of the other; e.g., mucus is derived from "the viscous"; and from "the sweet," if "the viscous" is derived from "the sweet"; and from bile, by the analysis of bile into its ultimate matter.
For there are two senses in which X comes from Y; either because X will be found further on than Y in the process of development, or because X is produced when Y is analyzed into its original constituents.
And different things can be generated by the moving cause when the matter is one and the same, e.g. a chest and a bed from wood. But some different things must necessarily have different matter; e.g., a saw cannot be generated from wood, nor does this lie in the power of the moving cause, for it cannot make a saw of wool or wood.
If, then, it is possible to make the same thing from different matter, clearly the art, i.e. the moving principle, is the same; for if both the matter and the mover are different, so too is the product.

So whenever we inquire what the cause is, since there are causes in several senses, we must state all the possible causes.
E.g., what is the material cause of a man? The menses. What is the moving cause? The semen. What is the formal cause? The essence. What is the final cause? The end. (But perhaps both the latter are the same.) We must, however, state the most proximate causes. What is the matter? Not fire or earth, but the matter proper to man.
Thus as regards generable natural substances we must proceed in this manner, if we are to proceed correctly; that is, if the causes are these and of this number, and it is necessary to know the causes. But in the case of substances which though natural are eternal the principle is different. For presumably some of them have no matter; or no matter of this kind, but only such as is spatially mobile.[431]
Moreover, things which exist by nature but are not substances have no matter; their substrate is their substance. E.g., what is the cause of an eclipse; what is its matter? It has none; it is the moon which is affected. What is the moving cause which destroys the light? The earth. There is probably no final cause. The formal cause is the formula; but this is obscure unless it includes the efficient cause.

[431] Cf. *Aristot. Met. 8.1.8 n.*

E.g., what is an eclipse? A privation of light; and if we add "caused by the earth's intervention," this is the definition which includes the ⟨efficient⟩ cause. In the case of sleep it is not clear what it is that is proximately affected. Is it the animal? Yes; but in respect of what, and of what proximately? The heart, or some other part. Again, by what is it affected? Again, what is the affection which affects that part, and not the whole animal? A particular kind of immobility? Yes; but in virtue of what affection of the proximate subject is it this?

Since some things both are and are not, without being liable to generation and destruction[432]—e.g. points,[433] if they exist at all; and in general the forms and shapes of things (because white does not come to be, but the wood becomes white, since everything which comes into being comes from something and becomes something)—not all the contraries[434] can be generated from each other. White is not generated from black in the same way as a white man is generated from a black man; nor does everything contain matter, but only such things as admit of generation and transformation into each other.

And such things as, without undergoing a process of change, both are and are not, have no matter.

There is a difficulty in the question how the matter of the individual is related to the contraries. E.g., if the body is potentially healthy, and the contrary of health is disease, is the body potentially both healthy and diseased? And is water potentially wine and vinegar? Probably in the one case it is the matter in respect of the positive state and form, and in the other case in respect of privation and degeneration which is contrary to its proper nature.

There is also a difficulty as to why wine is not the matter of vinegar, nor potentially vinegar (though vinegar comes from it), and why the living man is not potentially dead. In point of fact they are not; their degeneration is accidental, and the actual matter of the living body becomes by degeneration the potentiality and matter of the dead body, and water the matter of vinegar; for the one becomes the other just as day becomes night.

All things which change reciprocally in this way must return into the matter; e.g., if a living thing is generated from a dead one, it must first become the matter, and then a living thing; and vinegar must first become water, and then wine.

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[432]Cf. *Aristot. Met. 6.3.1*, *Aristot. Met. 7.8.3.*

[433]Cf. *Aristot. Met. 3.5.8, 9.*

[434]i.e., we must distinguish "contraries" in the sense of "contrary qualities" from "contraries" in the sense of "things characterized by contrary qualities."

With regard to the difficulty which we have described[435] in connection with definitions and numbers, what is the cause of the unification? In all things which have a plurality of parts, and which are not a total aggregate but a whole of some sort distinct from the parts, there is some *cause* ; inasmuch as even in bodies sometimes contact is the cause of their unity, and sometimes viscosity or some other such quality.
But a definition is *one* account, not by connection, like the *Iliad* , but because it is a definition of one thing.

What is it, then, that makes "man" one thing, and why does it make him one thing and not many, e.g. "animal" and "two-footed," especially if, as some say, there is an Idea of "animal" and an Idea of "two-footed"?
Why are not these Ideas "man," and why should not man exist by participation, not in any "man," but in two Ideas, those of "animal" and "two-footed"? And in general "man" will be not one, but two things—"animal" and "two-footed." Evidently if we proceed in this way, as it is usual to define and explain, it will be impossible to answer and solve the difficulty.
But if, as we maintain, man is part matter and part form—the matter being potentially, and the form actually man—, the point which we are investigating will no longer seem to be a difficulty. For this difficulty is just the same as we should have if the definition of X[436] were "round bronze"; for this name would give a clue to the formula, so that the question becomes "what is the cause of the unification of "round" and "bronze"?"
The difficulty is no longer apparent, because the one is matter and the other form. What then is it (apart from the active cause) which causes that which exists potentially to exist actually in things which admit of generation? There *is* no other cause of the potential sphere's being an actual sphere; this was the essence of each.[437]
Some matter is intelligible and some sensible, and part of the formula is always matter and part actuality; e.g., the circle is a plane figure.[438]
But such thing[439] as have no matter, neither intelligible nor sensible, are ipso facto each one of them essentially something one; just as they

[435] *Aristot. Met. 7.12*, *Aristot. Met. 8.3.10, 11.*

[436] Literally "cloak"; cf. *Aristot. Met. 7.4.7 n.*

[437] i.e., it was the essence of the potential sphere to become the actual sphere, and of the actual sphere to be generated from the potential sphere.

[438] Even formulae contain matter in a sense ("intelligible matter"); i.e. the generic element in the species. "Plane figure" is the generic element of "circle."

[439] The highest genera, or categories.

are essentially something existent: an individual substance, a quality, or a quantity. Hence neither "existent" nor "one" is present in their definitions. And their essence is ipso facto something one, just as it is something existent.

Hence also there is no other cause of the unity of any of these things, or of their existence; for each one of them is one and "existent" not because it is contained in the genus "being" or "unity," nor because these genera exist separately apart from their particulars, but ipso facto.

It is because of this difficulty that some thinkers[440] speak of "participation," and raise the question of what is the cause of participation, and what participation means; and others speak of "communion"; e.g., Lycophron[441] says that knowledge is a communion of the soul with "knowing"; and others call life a combination or connection of soul with body.

The same argument, however, applies in every case; for "being healthy" will be the "communion" or "connection" or "combination" of soul and health; and "being a bronze triangle" a "combination" of bronze and triangle; and "being white" a "combination" of surface and whiteness. The reason for this is that people look for a unifying formula, and a difference, between potentiality and actuality.

But, as we have said,[442] the proximate matter and the shape are one and the same; the one existing potentially, and the other actually. Therefore to ask the cause of their unity is like asking the cause of unity in general; for each individual thing is one, and the potential and the actual are in a sense one. Thus there is no cause other than whatever initiates the development from potentiality to actuality. And such things as have no matter are all, without qualification, essential unities.

[440] The Platonists.

[441] A sophist, disciple of Gorgias.

[442] Cf. sects. 4, 5.

Book 9

We have now dealt with Being in the primary sense, to which all the other categories of being are related; i.e. substance. For it is from the concept of substance that all the other modes of being take their meaning; both quantity and quality and all other such terms; for they will all involve the concept of substance, as we stated it in the beginning of our discussion.[443]

And since the senses of being are analyzable[444] not only into substance or quality or quantity, but also in accordance with potentiality and actuality and function, let us also gain a clear understanding about potentiality and actuality; and first about potentiality in the sense which is most proper to the word, but not most useful for our present purpose—for potentiality and actuality extend beyond the sphere of terms which only refer to motion.

When we have discussed this sense of potentiality we will, in the course of our definitions of actuality,[445] explain the others also.

We have made it plain elsewhere[446] that "potentiality" and "can" have several senses.

All senses which are merely equivocal may be dismissed; for some are used by analogy, as in geometry,[447] and we call things possible or impossible because they "are" or "are not" in some particular way. But the potentialities which conform to the same type are all principles, and derive their meaning from one primary sense of potency, which is the source of change in some other thing, or in the same thing *qua* other.

[443] *Aristot. Met. 7.1.*
[444] Cf. *Aristot. Met. 6.2.1.*
[445] Chs. 6-10.
[446] *Aristot. Met. 5.12.*
[447] Cf. *Aristot. Met. 5.12.11.*

One kind of potentiality is the power of being affected; the principle in the patient itself which initiates a passive change in it by the action of some other thing, or of itself *qua* other. Another is a positive state of impassivity in respect of deterioration or destruction by something else or by itself *qua* something else; i.e. by a transformatory principle —for all these definitions contain the formula of the primary sense of potentiality.
Again, all these potentialities are so called either because they merely act or are acted upon in a particular way, or because they do so *well* . Hence in their formulae also the formulae of potentiality in the senses previously described are present in some degree.

Clearly, then, in one sense the potentiality for acting and being acted upon is one (for a thing is "capable" both because it itself possesses the power of being acted upon, and also because something else has the power of being acted upon by it);
and in another sense it is not; for it is partly in the patient (for it is because it contains a certain principle, and because even the matter is a kind of principle, that the patient is acted upon; i.e., one thing is acted upon by another: oily stuff is inflammable, and stuff which yields in a certain way is breakable, and similarly in other cases)—
and partly in the agent; e.g. heat and the art of building: the former in that which produces heat, and the latter in that which builds. Hence in so far as it is a natural unity, nothing is acted upon by itself; because it is one, and not a separate thing.

"Incapacity" and "the incapable" is the privation contrary to "capacity" in this sense; so that every "capacity" has a contrary incapacity for producing the same result in respect of the same subject.
Privation has several senses[448]—it is applied (1.) to anything which does not possess a certain attribute; (2.) to that which would naturally possess it, but does not; either (a) in general, or (b) when it would naturally possess it; and either (1) in a particular way, e.g. entirely, or (2) in any way at all. And in some cases if things which would naturally possess some attribute lack it as the result of constraint, we say that they are "deprived."
Since some of these principles are inherent in inanimate things, and others in animate things and in the soul and in the rational part of the soul, it is clear that some of the potencies also will be irrational and some rational. Hence all arts, i.e. the productive sciences, are potencies; because they are principles of change in another thing, or

[448]Cf. *Aristot. Met. 5.22.*

in the artist himself *qua* other.

Every rational potency admits equally of contrary results, but irrational potencies admit of one result only. E.g., heat can only produce heat, but medical science can produce disease and health. The reason of this is that science is a rational account, and the same account explains both the thing and its privation, though not in the same way; and in one sense it applies to both, and in another sense rather to the actual fact.

Therefore such sciences must treat of contraries—essentially of the one, and non-essentially of the other; for the rational account also applies essentially to the one, but to the other in a kind of accidental way, since it is by negation and removal that it throws light on the contrary. For the contrary is the primary privation,[449] and this is the removal of that to which it is contrary.[450]

And since contrary attributes cannot be induced in the same subject, and science is a potency which depends upon the possession of a rational formula, and the soul contains a principle of motion, it follows that whereas "the salutary" can only produce health, and "the calefactory" only heat, and "the frigorific" only cold, the scientific man can produce both contrary results.

For the rational account includes both, though not in the same way; and it is in the soul, which contains a principle of motion, and will therefore, by means of the same principle, set both processes in motion, by linking them with the same rational account. Hence things which have a rational potency produce results contrary to those of things whose potency is irrational[451]; for the results of the former are included under one principle, the rational account.

It is evident also that whereas the power of merely producing (or suffering) a given effect is implied in the power of producing that effect *well* , the contrary is not always true; for that which produces an effect well must also produce it, but that which merely produces a given effect does not necessarily produce it well.

There are some, e.g. the Megaric school,[452] who say that a thing only has potency when it functions, and that when it is not functioning it has no potency. E.g., they say that a man who is not building cannot build, but only the man who is building, and at the moment when he

[449] Cf. *Aristot. Met. 10.4.7.*

[450] Literally "of the other," i.e. the positive term.

[451] The meaning of this awkward sentence is clearly shown in the latter part of 4.

[452] Founded by Euclides of Megara, an enthusiastic admirer of Socrates. The Megarics adopted the Eleatic system and developed it along dialectical lines.

is building; and similarly in the other cases.
It is not difficult to see the absurd consequences of this theory. Obviously a man will not be a builder unless he is building, because "to be a builder" is "to be capable of building"; and the same will be true of the other arts.
If, therefore, it is impossible to possess these arts without learning them at some time and having grasped them, and impossible not to possess them without having lost them at some time (through forgetfulness or some affection or the lapse of time; not, of course, through the destruction of the object of the art,[453] because it exists always), when the artist ceases to practice his art, he will not possess it;
and if he immediately starts building again, how will he have re-acquired the art?

The same is true of inanimate things. Neither the cold nor the hot nor the sweet nor in general any sensible thing will exist unless we are perceiving it (and so the result will be that they are affirming Protagoras' theory[454]). Indeed, nothing will have the faculty of sensation unless it is perceiving, i.e. actually employing the faculty.
If, then, that is blind which has not sight, though it would naturally have it, and when it would naturally have it, and while it still exists, the same people will be blind many times a day; and deaf too.

Further, if that which is deprived of its potency is incapable, that which is not happening will be incapable of happening; and he who says that that which is incapable of happening *is* or *will be*, will be in error, for this is what "incapable" meant.[455]
Thus these theories do away with both motion and generation; for that which is standing will always stand, and that which is sitting will always sit; because if it is sitting it will not get up, since it is impossible that anything which is incapable of getting up should get up.
Since, then, we cannot maintain this, obviously potentiality and actuality are different. But these theories make potentiality and actuality identical; hence it is no small thing that they are trying to abolish.

Thus it is possible that a thing may be capable of being and yet not be, and capable of not being and yet be; and similarly in the other categories that which is capable of walking may not walk, and that which is capable of not walking may walk.
A thing is capable of doing something if there is nothing impossible

[453] i.e. the form of "house."

[454] Cf. IV. v., vi.

[455] i.e., we have just said that that which is incapable is deprived of its potency—in this case, of its potency for happening.

in its having the actuality of that of which it is said to have the potentiality. I mean, e.g., that if a thing is capable of sitting and is not prevented from sitting, there is nothing impossible in its actually sitting; and similarly if it is capable of being moved or moving or standing or making to stand or being or becoming or not being or not becoming. The term "actuality," with its implication of "complete reality," has been extended from motions, to which it properly belongs, to other things; for it is agreed that actuality is properly motion.

Hence people do not invest non-existent things with motion, although they do invest them with certain other predicates. E.g., they say that non-existent things are conceivable and desirable, but not that they are in motion. This is because, although these things do not exist actually, they will exist actually; for some non-existent things exist potentially; yet they do not exist, because they do not exist in complete reality.

Now if, as we have said, that is possible which does not involve an impossibility, obviously it cannot be true to say that so-and-so is possible, but will not be, this view entirely loses sight of the instances of impossibility.[456] I mean, suppose that someone—i.e. the sort of man who does not take the impossible into account—were to say that it is possible to measure the diagonal of a square, but that it will not be measured, because there is nothing to prevent a thing which is capable of being or coming to be from neither being nor being likely ever to be.

But from our premisses this necessarily follows: that if we are to assume that which is not, but is possible, to be or to have come to be, nothing impossible must be involved. But in this case something impossible will take place; for the measuring of the diagonal is impossible.

The false is of course not the same as the impossible; for although it is false that you are now standing, it is not impossible.

At the same time it is also clear that if B must be real if A is, then if it is possible for A to be real, it must also be possible for B to be real; for even if B is not necessarily possible, there is nothing to prevent its being possible. Let A, then, be possible. Then when A was possible, if A was assumed to be real, nothing impossible was involved; but B was necessarily real too. But ex hypothesi B was impossible. Let B be impossible.

Then if B is impossible, A must also be impossible. But A was by definition possible. Therefore so is B.

[456] If it is true to say that a thing which is possible will not be, anything may be possible, and nothing impossible.

If, therefore, A is possible, B will also be possible; that is if their relation was such that if A is real, B must be real.
Then if, A and B being thus related, B is not possible on this condition, A and B will not be related as we assumed; and if when A is possible B is necessarily possible, then if A is real B must be real too. For to say that B must be possible if A is possible means that if A is real at the time when and in the way in which it was assumed that it was possible for it to be real, then B must be real at that time and in that way.
Since all potencies are either innate, like the senses, or acquired by practice, like flute-playing, or by study, as in the arts, some—such as are acquired by practice or a rational formula—we can only possess when we have first exercised them[457]; in the case of others which are not of this kind and which imply passivity, this is not necessary.
Since anything which is possible is something possible at some time and in some way, and with any other qualifications which are necessarily included in the definition; and since some things can set up processes rationally and have rational potencies, while others are irrational and have irrational potencies; and since the former class can only belong to a living thing, whereas the latter can belong both to living and to inanimate things: it follows that as for potencies of the latter kind, when the agent and the patient meet in accordance with the potency in question, the one must act and the other be acted upon; but in the former kind of potency this is not necessary, for whereas each single potency of the latter kind is productive of a single effect, those of the former kind are productive of contrary effects,[458] so that one potency will produce at the same time contrary effects.[459]
But this is impossible. Therefore there must be some other deciding factor, by which I mean *desire* or *conscious choice*. For whichever of two things an animal desires decisively it will do, when it is in circumstances appropriate to the potency and meets with that which admits of being acted upon. Therefore everything which is rationally capable, when it desires something of which it has the capability, and in the circumstances in which it has the capability, must do that thing. Now it has the capability when that which admits of being acted upon is present and is in a certain state; otherwise it will not be able to act. (To add the qualification "if nothing external prevents it" is no

[457]Cf. *Aristot. Met. 9.8.6, 7.*
[458]Cf. *Aristot. Met. 9.2.4, 5.*
[459]sc., if every potency must act automatically whenever agent and patient meet.

longer necessary; because the agent has the capability in so far as it is a capability of acting; and this is not in all, but in certain circumstances, in which external hindrances will be excluded; for they are precluded by some of the positive qualifications in the definition.)
Hence even if it wishes or desires to do two things or contrary things simultaneously, it will not do them, for it has not the capability to do them under these conditions, nor has it the capability of doing things simultaneously, since it will only do the things to which the capability applies and under the appropriate conditions.
Since we have now dealt with the kind of potency which is related to motion, let us now discuss actuality; what it is, and what its qualities are. For as we continue our analysis it will also become clear with regard to the potential that we apply the name not only to that whose nature it is to move or be moved by something else, either without qualification or in some definite way, but also in other senses; and it is on this account that in the course of our inquiry we have discussed these as well.
"Actuality" means the presence of the thing, not in the sense which we mean by "potentially." We say that a thing is present potentially as Hermes is present in the wood, or the half-line in the whole, because it can be separated from it; and as we call even a man who is not studying "a scholar" if he is capable of studying. That which is present in the opposite sense to this is present actually.
What we mean can be plainly seen in the particular cases by induction; we need not seek a definition for every term, but must comprehend the analogy: that as that which is actually building is to that which is capable of building, so is that which is awake to that which is asleep; and that which is seeing to that which has the eyes shut, but has the power of sight; and that which is differentiated out of matter to the matter; and the finished article to the raw material.
Let actuality be defined by one member of this antithesis, and the potential by the other.

But things are not all said to exist actually in the same sense, but only by analogy—as A is in B or to B, so is C in or to D; for the relation is either that of motion to potentiality, or that of substance to some particular matter.
Infinity and void and other concepts of this kind are said to "be" potentially or actually in a different sense from the majority of existing things, e.g. that which sees, or walks, or is seen.
For in these latter cases the predication may sometimes be truly made without qualification, since "that which is seen" is so called sometimes

because it is seen and sometimes because it is capable of being seen; but the Infinite does not exist potentially in the sense that it will ever exist separately in actuality; it is separable only in knowledge. For the fact that the process of division never ceases makes this actuality exist potentially, but not separately.[460]

Since no action which has a limit is an end, but only a means to the end, as, e.g., the process of thinning; and since the parts of the body themselves, when one is thinning them, are in motion in the sense that they are not already that which it is the object of the motion to make them, this process is not an action, or at least not a complete one, since it is not an end; it is the process which includes the end that is an action.

E.g., at the same time we see and have seen, understand and have understood, think and have thought; but we cannot at the same time learn and have learnt, or become healthy and be healthy. We are living well and have lived well, we are happy and have been happy, at the same time; otherwise the process would have had to cease at some time, like the thinning-process; but it has not ceased at the present moment; we both are living and have lived.

Now of these processes we should call the one type motions, and the other actualizations.

Every motion is incomplete—the processes of thinning, learning, walking, building—these are motions, and incomplete at that. For it is not the same thing which at the same time is walking and has walked, or is building and has built, or is becoming and has become, or is being moved and has been moved, but two different things; and that which is causing motion is different from that which has caused motion.

But the same thing at the same time is seeing and has seen, is thinking and has thought. The latter kind of process, then, is what I mean by actualization, and the former what I mean by motion.

What the actual is, then, and what it is like, may be regarded as demonstrated from these and similar considerations.

We must, however, distinguish when a particular thing exists potentially, and when it does not; for it does not so exist at any and every time. E.g., is earth potentially a man? No, but rather when it has already become semen,[461] and perhaps not even then; just as not *everything* can be healed by medicine, or even by chance, but there is

[460] For Aristotle's views about infinity and void see *Aristot. Physics 3.4-8, 4.6-9* respectively.

[461] This is inconsistent with Aristotle's doctrine that the semen is the formal element in reproduction. Cf. *Aristot. Met. 8.4.5*, *Aristot. Met. 6.9.5.*

some definite kind of thing which is capable of it, and this is that which is potentially healthy.
The definition of that which as a result of thought comes, from existing potentially, to exist actually, is that, when it has been willed, if no external influence hinders it, it comes to pass; and the condition in the case of the patient, i.e. in the person who is being healed, is that nothing in him should hinder the process. Similarly a house exists potentially if there is nothing in X, the matter, to prevent it from becoming a house, i.e., if there is nothing which must be added or removed or changed; then X is potentially a house;
and similarly in all other cases where the generative principle is external. And in all cases where the generative principle is contained in the thing itself, one thing is potentially another when, if nothing external hinders, it will of itself become the other. E.g., the semen is not yet potentially a man; for it must further undergo a change in some other medium.[462] But when, by its own generative principle, it has already come to have the necessary attributes, in this state it is now potentially a man, whereas in the former state it has need of another principle;
just as earth is not yet potentially a statue, because it must undergo a change before it becomes bronze.

It seems that what we are describing is not a particular thing, but a definite material; e.g., a box is not wood, but wooden material,[463] and wood is not earth, but earthen material; and earth also is an illustration of our point if it is similarly not some other thing, but a definite material—it is always the latter term in this series which is, in the fullest sense, potentially something else.
E.g., a box is not earth, nor earthen, but wooden; for it is this that is potentially a box, and this is the matter of the box—that is, wooden material in general is the matter of "box" in general, whereas the matter of a particular box is a particular piece of wood.

If there is some primary stuff, which is not further called the material of some other thing, this is primary matter. E.g., if earth is "made of air," and air is not fire, but "made of fire," then fire is primary matter, not being an individual thing.
For the subject or substrate is distinguishable into two kinds by either being or not being an individual thing. Take for example as the subject of the attributes "man," or "body" or "soul," and as an attribute

[462] This is inconsistent with Aristotle's doctrine that the semen is the formal element in reproduction. Cf. *Aristot. Met. 8.4.5*, *Aristot. Met. 9.6.5.*

[463] Cf. *Aristot. Met. 7.7.10-12.*

"cultured" or "white." Now the subject, when culture is induced in it, is called not "culture" but "cultured," and the man is called not whiteness but white; nor is he called "ambulation" or "motion," but "walking" or "moving"; just as we said that things are of a definite material.

Thus where "subject" has this sense, the ultimate substrate is substance; but where it has not this sense, and the predicate is a form or individuality, the ultimate substrate is matter or material substance. It is quite proper that both matter and attributes should be described by a derivative predicate, since they are both indefinite.

Thus it has now been stated when a thing should be said to exist potentially, and when it should not.

Now since we have distinguished[464] the several senses of priority, it is obvious that actuality is prior to potentiality. By potentiality I mean not that which we have defined as "a principle of change which is in something other than the thing changed, or in that same thing *qua* other," but in general any principle of motion or of rest; for nature also is in the same genus as potentiality, because it is a principle of motion, although not in some other thing, but in the thing itself *qua* itself.[465]

To every potentiality of this kind actuality is prior, both in formula and in substance; in time it is sometimes prior and sometimes not.

That actuality is prior in formula is evident; for it is because it can be actualized that the potential, in the primary sense, is potential, I mean, e.g., that the potentially constructive is that which can construct, the potentially seeing that which can see, and the potentially visible that which can be seen.

The same principle holds in all other cases too, so that the formula and knowledge of the actual must precede the knowledge of the potential.

In time it is prior in this sense: the actual is prior to the potential with which it is formally identical, but not to that with which it is identical numerically.

What I mean is this: that the matter and the seed and the thing which is capable of seeing, which are potentially a man and corn and seeing, but are not yet so actually, are prior in time to the individual man and corn and seeing subject which already exist in actuality.

But prior in time to these potential entities are other actual entities from which the former are generated; for the actually existent is al-

[464] *Aristot. Met. 5.11.*

[465] Cf. *Aristot. Met. 5.4.1.*

ways generated from the potentially existent by something which is actually existent—e.g., man by man, cultured by cultured—there is always some prime mover; and that which initiates motion exists already in actuality.

We have said[466] in our discussion of substance that everything which is generated is generated from something and by something; and by something formally identical with itself.
Hence it seems impossible that a man can be a builder if he has never built, or a harpist if he has never played a harp; because he who learns to play the harp learns by playing it, and similarly in all other cases.
This was the origin of the sophists' quibble that a man who does not know a given science will be doing that which is the object of that science, because the learner does not know the science. But since something of that which is being generated is already generated, and something of that which is being moved as a whole is already moved (this is demonstrated in our discussion on Motion[467]), presumably the learner too must possess something of the science.
At any rate from this argument it is clear that actuality is prior to potentiality in this sense too, i.e. in respect of generation and time.

But it is also prior in substantiality; (a) because things which are posterior in generation are prior in form and substantiality; e.g., adult is prior to child, and man to semen, because the one already possesses the form, but the other does not;
and (b) because everything which is generated moves towards a principle, i.e. its *end* . For the object of a thing is its principle; and generation has as its object the *end* . And the actuality is the end, and it is for the sake of this that the potentiality is acquired; for animals do not see in order that they may have sight, but have sight in order that they may see.
Similarly men possess the art of building in order that they may build, and the power of speculation that they may speculate; they do not speculate in order that they may have the power of speculation—except those who are learning by practice; and they do not really speculate, but only in a limited sense, or about a subject about which they have no desire to speculate.

Further, matter exists potentially, because it may attain to the form; but when it exists actually, it is then *in* the form. The same applies in all other cases, including those where the end is motion.

[466] *Aristot. Met. 7.7, 8.*
[467] *Aristot. Physics, 6.6.*

Hence, just as teachers think that they have achieved their end when they have exhibited their pupil performing, so it is with nature. For if this is not so, it will be another case of "Pauson's Hermes"[468]; it will be impossible to say whether the knowledge is *in* the pupil or outside him, as in the case of the Hermes. For the activity is the end, and the actuality is the activity; hence the term "actuality" is derived from "activity," and tends to have the meaning of "complete reality."

Now whereas in some cases the ultimate thing is the use of the faculty, as, e.g., in the case of sight seeing is the ultimate thing, and sight produces nothing else besides this; but in other cases something is produced, e.g. the art of building produces not only the act of building but a house; nevertheless in the one case the use of the faculty is the end, and in the other it is more truly the end than is the potentiality. For the act of building resides in the thing built; i.e., it comes to be and exists simultaneously with the house.

Thus in all cases where the result is something other than the exercise of the faculty, the actuality resides in the thing produced; e.g. the act of building in the thing built, the act of weaving in the thing woven, and so on; and in general the motion resides in the thing moved. But where there is no other result besides the actualization, the actualization resides in the subject; e.g. seeing in the seer, and speculation in the speculator, and life in the soul

(and hence also happiness, since happiness is a particular kind of life).

Evidently, therefore, substance or form is actuality. Thus it is obvious by this argument that actuality is prior in substantiality to potentiality; and that in point of time, as we have said, one actuality presupposes another right back to that of the prime mover in each case.

It is also prior in a deeper sense; because that which is eternal is prior in substantiality to that which is perishable, and nothing eternal is potential. The argument is as follows. Every potentiality is at the same time a potentiality for the opposite.[469] For whereas that which is incapable of happening cannot happen to anything, everything which is capable may fail to be actualized.

Therefore that which is capable of being may both be and not be. Therefore the same thing is capable both of being and of not being. But that which is capable of not being may possibly not be; and that

[468]Probably a "trick" picture of some kind. So Pauson is said to have painted a picture of a horse galloping which when inverted showed the horse rolling on its back. Cf. *Aelian, Var. Hist. 14.15*; *Lucian, Demosth. Enc. 24*; *Plut. Moralia, 396e*; Pfuhl, Malerei und Zeichnung der Griechen, 763.

[469]Cf. 19.

which may possibly not be is perishable; either absolutely, or in the particular sense in which it is said that it may possibly not be; that is, in respect either of place or of quantity or of quality. "Absolutely" means in respect of substance.
Hence nothing which is absolutely imperishable is absolutely potential (although there is no reason why it should not be potential in some particular respect; e.g. of quality or place); therefore all imperishable things are actual. Nor can anything which is of necessity be potential; and yet these things are primary, for if they did not exist, nothing would exist. Nor can motion be potential, if there is any eternal motion. Nor, if there is anything eternally in motion, is it potentially in motion (except in respect of some starting-point or destination), and there is no reason why the matter of such a thing should not exist.
Hence the sun and stars and the whole visible heaven are always active, and there is no fear that they will ever stop—a fear which the writers[470] on physics entertain. Nor do the heavenly bodies tire in their activity; for motion does not imply for them, as it does for perishable things, the potentiality for the opposite, which makes the continuity of the motion distressing; this results when the substance is matter and potentiality, not actuality.
Imperishable things are resembled in this respect by things which are always undergoing transformation, such as earth and fire; for the latter too are always active, since they have their motion independently and in themselves.[471] Other potentialities, according to the distinctions already made,[472] all admit of the opposite result; for that which is capable of causing motion in a certain way can also cause it not in that way; that is if it acts rationally.
The same irrational potentialities can only produce opposite results by their presence or absence.

Thus if there are any entities or substances such as the dialecticians[473] describe the Ideas to be, there must be something which has much more knowledge than absolute knowledge, and much more mobility than motion; for they will be in a truer sense actualities, whereas knowledge and motion will be their potentialities.[474] Thus it is obvi-

[470] e.g. Empedocles; cf. *Aristot. Met. 5.23.3 n.*

[471] Cf. *Aristot. De Gen. et Corr. 337a 1-7.*

[472] *Aristot. Met. 9.5.2.*

[473] For this description of the Platonists cf. *Aristot. Met. 1.6.7.*

[474] This is a passing thrust at the Ideal theory. "Absolute knowledge" (the faculty of knowledge) will be a mere potentiality, and therefore substantially posterior to its actualization in particular instances.

ous that actuality is prior both to potentiality and to every principle of change.

That a good actuality is both better and more estimable than a good potentiality will be obvious from the following arguments. Everything of which we speak as capable is alike capable of contrary results; e.g., that which we call capable of being well is alike capable of being ill, and has both potentialities at once; for the same potentiality admits of health and disease, or of rest and motion, or of building and of pulling down, or of being built and of falling down.

Thus the capacity for two contraries can belong to a thing at the same time, but the contraries cannot belong at the same time; i.e., the actualities, e.g. health and disease, cannot belong to a thing at the same time. Therefore one of them must be the good; but the potentiality may equally well be both or neither. Therefore the actuality is better. Also in the case of evils the end or actuality must be worse than the potentiality; for that which is capable is capable alike of both contraries.

Clearly, then, evil does not exist apart from *things* ; for evil is by nature posterior to potentiality.[475] Nor is there in things which are original and eternal any evil or error, or anything which has been destroyed—for destruction is an evil.

Geometrical constructions, too, are discovered by an actualization, because it is by dividing that we discover them. If the division were already done, they would be obvious; but as it is the division is only there potentially. Why is the sum of the interior angles of a triangle equal to two right angles? Because the angles about one point ⟨in a straight line⟩ are equal to two right angles. If the line parallel to the side had been already drawn, the answer would have been obvious at sight.[476]

Why is the angle in a semicircle always a right angle? If three lines are equal, the two forming the base, and the one set upright from the middle of the base, the answer is obvious to one who knows the former

[475]The argument is presumably as follows (the fallacy, as pointed out by Bonitz, is indicated in parenthesis): That which has a separate substantial existence is actuality. Actuality is prior (substantially) to potentiality. Potentiality is prior to evil (in the moral scale. But since by evil Aristotle means the actualization of a potentiality for evil, potentiality is substantially posterior to evil). Therefore that which has a separate substantial existence is prior to evil; i.e., evil does not exist apart from particular instances of evil. The argument is directed against the Platonic Idea of evil (*Plat. Rep. 476a*); and the corollary which follows against the identification of Evil with one of the principles of the universe (*Aristot. Met. 1.6.10*, *Aristot. Met. 12.10.6*, *Aristot. Met. 14.4.10, 11*; cf. *Plat. Laws 896e*, *Plat. Laws 898c*).

[476]The figure, construction and proof are as follows: ***

proposition.[477] Thus it is evident that the potential constructions are discovered by being actualized. The reason for this is that the actualization is an act of thinking. Thus potentiality comes from actuality (and therefore it is by constructive action that we acquire knowledge). ⟨But this is true only in the abstract⟩, for the individual actuality is posterior in generation to its potentiality.[478]

The terms "being" and "not-being" are used not only with reference to the types of predication, and to the potentiality or actuality, or non-potentiality and non-actuality, of these types, but also (in the strictest sense[479]) to denote truth and falsity. This depends, in the case of the objects, upon their being united or divided; so that he who thinks that what is divided is divided, or that what is united is united, is right; while he whose thought is contrary to the real condition of the objects is in error. Then *when* do what we call truth and falsity exist or not exist? We must consider what we mean by these terms.

It is not because we are right in thinking that you are white that you are white; it is because you are white that we are right in saying so. Now if whereas some things are always united and cannot be divided, and others are always divided and cannot be united, others again admit of both contrary states, then "to be" is to be united, i.e. a unity; and "not to be" is to be not united, but a plurality.

Therefore as regards the class of things which admit of both contrary states, the same opinion or the same statement comes to be false and true, and it is possible at one time to be right and at another wrong; but as regards things which cannot be otherwise the same opinion is not sometimes true and sometimes false, but the same opinions are always true or always false.

But with regard to incomposite things, what is being or not-being, and truths or falsity? Such a thing is not composite, so as to be when it is united and not to be when it is divided, like the proposition that "the wood is white," or "the diagonal is incommensurable"; nor will truth and falsity apply in the same way to these cases as to the previous ones.

In point of fact, just as truth is not the same in these cases, so neither

[477] Aristotle implies a proof something after this fashion: FIGURE BAC is an angle in a semicircle. From D, the mid-point of the diameter BC, draw a perpendicular DE to meet the circumference at E. Join EB, EC.***

[478] This whole passage (sects. 4, 5) should be compared with *Aristot. Met. 9.8.3-7*, where it logically belongs.

[479] This appears to contradict *Aristot. Met. 6.4.3*. But it is just possible to interpret *κυριώτατα* (with Jaeger) as "in the commonest sense."

is being. Truth and falsity are as follows: contact[480] and assertion are truth (for assertion is not the same as affirmation), and ignorance is non-contact. I say ignorance, because it is impossible to be deceived with respect to what a thing is, except accidentally[481];
and the same applies to incomposite substances, for it is impossible to be deceived about them. And they all exist actually, not potentially; otherwise they would be generated and destroyed; but as it is, Being itself is not generated (nor destroyed); if it were, it would be generated out of something. With respect, then, to all things which are essences and actual, there is no question of being mistaken, but only of thinking or not thinking them.
Inquiry as to *what* they are takes the form of inquiring whether they are of such-and-such a nature or not.

As for being in the sense of truth, and not-being in the sense of falsity, a unity is true if the terms are combined, and if they are not combined it is false. Again, if the unity exists, it exists in a particular way, and if it does not exist in that way, it does not exist at all.
Truth means to think these objects, and there is no falsity or deception, but only ignorance—not, however, ignorance such as blindness is; for blindness is like a total absence of the power of thinking. And it is obvious that with regard to immovable things also, if one assumes that there are immovable things, there is no deception in respect of time.
E.g., if we suppose that the triangle is immutable, we shall not suppose that it sometimes contains two right angles and sometimes does not, for this would imply that it changes; but we may suppose that one thing has a certain property and another has not; e.g., that no even number is a prime, or that some are primes and others are not. But about a single number we cannot be mistaken even in this way, for we can no longer suppose that one instance is of such a nature, and another not, but whether we are right or wrong, the fact is always the same.

[480] i.e. direct and accurate apprehension.

[481] i.e. we cannot be mistaken with regard to a simple term X. We either apprehend it or not. Mistake arises when we either predicate something wrongly of X, or analyze X wrongly.

Book 10

That "one" has several meanings has been already stated[482] in our distinction of the various meanings of terms. But although it has a number of senses, the things which are primarily and essentially called one, and not in an accidental sense, may be summarized under four heads:

(1.) That which is continuous, either absolutely or in particular that which is continuous by natural growth and not by contact or ligature; and of these things those are more strictly and in a prior sense one whose motion is more simple and indivisible.

(2.) Of this kind in a still higher degree is that which is a whole and has a definite shape or form, particularly that which is such by nature and not by constraint (like things which are joined by glue or nails or by being tied together), but which contains in itself the cause of its continuity.

A thing is of this kind if its motion is one and indivisible in respect of place and time; so that clearly if a thing has as its principle of motion the primary kind of motion (i.e. locomotion) in its primary form (i.e. circular locomotion), it is in the primary sense *one* spatial magnitude.[483]

Some things, then, are one in this sense, *qua* continuous or whole; the other things which are one are those whose formula is one.

Such are the things of which the concept is one, i.e. of which the concept is indivisible; and this is indivisible when the object is indivisible (3.) in form or (4.) in number. Now in number the individual is indivisible, and in form that which is indivisible in comprehension and

[482] *Aristot. Met. 5.6.*

[483] This description applies to the celestial spheres.

knowledge; so that that which causes the unity of substances must be one in the primary sense.

Such, then, in number are the meanings of "one": the naturally continuous, the whole, the individual, and the universal. All these are one because they are indivisible; some in motion, and others in concept or formula. But we must recognize that the questions, "What sort of things are called one?" and "What is essential unity, and what is the formula?" must not be taken to be the same.

"One" has these several meanings, and each thing to which some one of these senses applies will be one; but essential unity will have now one of these senses and now something else, which is still nearer to the *term* one, whereas they are nearer to its *denotation* . This is also true of "element" and "cause," supposing that one had to explain them both by exhibiting concrete examples and by giving a definition of the term.

There is a sense in which fire is an element (and no doubt so too is "the indeterminate"[484] or some other similar thing, of its own nature), and there is a sense in which it is not; because "to be fire" and "to be an element" are not the same. It is as a concrete thing and as a stuff that fire is an element; but the term "element" denotes that it has this attribute: that something is made of it as a primary constituent.

The same is true of "cause" or "one" and all other such terms.

Hence "to be one" means "to be indivisible" (being essentially a particular thing, distinct and separate in place or form or thought), or "to be whole and indivisible"; but especially "to be the first measure of each kind," and above all of quantity; for it is from this that it has been extended to the other categories.

Measure is that by which quantity is known, and quantity *qua* quantity is known either by unity or by number, and all number is known by unity. Therefore all quantity *qua* quantity is known by unity, and that by which quantities are primarily known is absolute unity.

Thus unity is the starting point of number *qua* number. Hence in other cases too "measure" means that by which each thing is primarily known, and the measure of each thing is a unit—in length, breadth, depth, weight and speed.

(The terms "weight" and "speed" are common to both contraries, for each of them has a double meaning; e.g., "weight" applies to that which has the least amount of gravity and also to that which has excess of it, and speed to that which has the least amount of motion and also

[484]The reference is undoubtedly to Anaximander.

to that which has excess of it; for even the slow has some speed, and the light some weight.)

In all these cases, then, the measure and starting-point is some indivisible unit (since even in the case of lines we treat the "one-foot line" as indivisible). For everywhere we require as our measure an indivisible unit; i.e., that which is simple either in quality or in quantity.

Now where it seems impossible to take away or add, there the measure is exact. Hence the measure of number is most exact, for we posit the unit as in every way indivisible; and in all other cases we follow this example, for with the furlong or talent or in general with the greater measure an addition or subtraction would be less obvious than with a smaller one.

Therefore the first thing from which, according to our perception, nothing can be subtracted is used by all men as their measure of wet and dry, weight and magnitude; and they think that they know the quantity only when they know it in terms of this measure. And they know motion too by simple motion and the most rapid, for this takes least time.

Hence in astronomy a unit of this kind is the starting point and measure; for they assume that the motion of the heavens is uniform and the most rapid, and by it they judge the others. In music the measure is the quarter tone, because it is the smallest interval; and in language the letter. All these are examples of units in this sense—not in the sense that unity is something common to them all, but in the sense which we have described.

The measure is not always numerically one, but sometimes more than one; e.g., there are two quarter tones, distinguished not by our hearing but by their theoretical ratios[485]; and the articulate sounds by which we measure speech are more than one; and the diagonal of a square is measured by two quantities,[486] and so are all magnitudes of this kind. Thus unity is the measure of all things, because we learn of what the substance is composed by dividing it, in respect of either quantity or form.

Hence unity is indivisible, because that which is primary in each class of

[485] i.e., the enharmonic (or quarter-tone proper) and the chromatic, which was 1/3 of a tone (*Aristoxenus 1.21, 2.51*). There was also the *δίεσις ἡμιολία*, which was 3/8 of a tone.

[486] The meaning seems to be that the diameter consists of two parts, one equal to the side, and the other representing its excess over the side; the two parts being incommensurate are measured by different units (Ross). *καὶ ἡ πλευρά* must, I think, be a gloss.

things is indivisible. But not every unit is indivisible in the same sense —e.g. the foot and the arithmetical unit; but the latter is absolutely indivisible, and the former must be classed as indivisible with respect to our power of perception, as we have already stated; since presumably everything which is continuous is divisible.

The measure is always akin to the thing measured. The measure of magnitude is magnitude, and in particular the measure of length is a length; of breadth, a breadth; of sounds, a sound; of weight, a weight; of units, a unit; for this is the view that we must take, and not that the measure of numbers is a number. The latter, indeed, would necessarily be true, if the analogy held good; but the supposition is not analogous —it is as though one were to suppose that the measure of units is units, and not a unit; for number is a plurality of units.

We also speak of knowledge or sense perception as a measure of things for the same reason, because through them we come to know something; whereas really they are measured themselves rather than measure other things. But our experience is as though someone else measured us, and we learned our height by noticing to what extent he applied his foot-rule to us.

Protagoras says that "man is the measure of all things," meaning, as it were, the scholar or the man of perception; and these because they possess, the one knowledge, and the other perception, which we hold to be the measures of objects. Thus, while appearing to say something exceptional, he is really saying nothing.[487]

Obviously, then, unity in the strictest sense, if we make our definition in accordance with the meaning of the term, is a measure; particularly of quantity, and secondarily of quality. Some things will be of this kind if they are indivisible in quantity, and others if in quality. Therefore that which is one is indivisible, either absolutely or *qua* one.

We must inquire, with regard to the substance and nature of unity, in which sense it exists. This is the same question which we approached in our discussion of difficulties[488]: *what* unity is, and what view we are to take of it; whether that unity itself is a kind of substance— as first the Pythagoreans, and later Plato, both maintain—or whether rather some nature underlies it, and we should give a more intelligible account of it, and more after the manner of the physicists; for of them

[487] What Protagoras really meant was (apparently) that appearances are true relatively to the percipient. Cf. *Aristot. Met. 4.4.27*, and see Burnet, Greek Philosophy (Part I. Thales to Plato), 92.

[488] *Aristot. Met. 3.4.24-27.*

one[489] holds that the One is Love, another[490] Air, and another[491] the Indeterminate.
Now if no universal can be a substance (as we have stated in our discussion[492] of substance and being), and being itself cannot be a substance in the sense of one thing existing alongside the many (since it is common to them), but only as a predicate, then clearly neither can unity be a substance; because being and unity are the most universal of all predicates.
Therefore (a) genera are not certain entities and substances separate from other things; and (b) unity cannot be a genus, for the same reasons that being and substance cannot.[493]

Further, the nature of unity must be the same for all categories. Now being and unity have the same number of meanings; so that since in the category of qualities unity is something definite, i.e. some definite entity, and similarly in the category of quantity, clearly we must also inquire in general what unity is, just as in the case of being; since it is not enough to say that its nature is simply unity or being.
But in the sphere of colors unity is a color, e.g. white; that is if all the other colors are apparently derived from white and black, and black is a privation of white, as darkness is of light. Thus if all existing things were colors, all existing things would be a number; but of what?
Clearly of colors. And unity would be some one color, e.g. white.
Similarly if all existing things were tunes, there would be a number—of quarter-tones; but their substance would not be a number; and unity would be something whose substance is not unity but a quarter-tone.
Similarly in the case of sounds, existing things would be a number of letters, and unity would be a vowel;
and if existing things were right-lined figures, they would be a number of figures, and unity would be a triangle. And the same principle holds for all other genera. Therefore if in the categories of passivity and quality and quantity and motion there is in every category a number and a unity, and if the number is of particular things and the unity is a particular unity, and its substance is not unity, then the same must be true in the case of substances, because the same is true in all cases.
It is obvious, then, that in every genus one is a definite entity, and that in no case is its nature merely unity; but as in the sphere of colors the

[489] Empedocles.
[490] Anaximenes.
[491] Anaximander.
[492] *Aristot. Met. 7.13.*
[493] Cf. *Aristot. Met. 3.3.7.*

One-itself which we have to seek is one color, so too in the sphere of substance the One-itself is one substance.

And that in a sense unity means the same as being is clear (a) from the fact that it has a meaning corresponding to each of the categories, and is contained in none of them—e.g., it is contained neither in substance nor in quality, but is related to them exactly as being is; (b) from the fact that in "one man" nothing more is predicated than in "man"[494](just as Being too does not exist apart from some thing or quality or quantity); and (c) because "to be one" is "to be a particular thing."

"One" and "Many" are opposed in several ways. Unity and Plurality are opposed as being indivisible and divisible; for that which is divided or divisible is called a plurality, and that which is indivisible or undivided is called one. Then since opposition is of four kinds, and one of the present pairs of opposites is used in a privative sense, they must be contraries, and neither contradictories nor relative terms.

Unity is described and explained by its contrary—the indivisible by the divisible—because plurality, i.e. the divisible, is more easily perceptible than the indivisible; and so in formula plurality is prior to the indivisible, on account of our powers of perception.

To Unity belong (as we showed by tabulation in our distinction of the contraries[495]) Identity, Similarity and Equality; and to Plurality belong Otherness, Dissimilarity and Inequality.

"Identity"[496] has several meanings. (a) Sometimes we speak of it in respect of number. (b) We call a thing the same if it is one both in formula and in number, e.g., you are one with yourself both in form and in matter; and again (c) if the formula of the primary substance is one, e.g., equal straight lines are the same, and equal quadrilaterals with equal angles, and there are many more examples; but in these equality means unity.

Things are "similar"[497](a) if, while not being the same absolutely or indistinguishable in respect of their concrete substance, they are identical in form; e.g the larger square is similar to the smaller, and unequal straight lines are similar. These are similar, but not absolutely the same. (b) If, having the same form, and being capable of difference in degree, they have no difference of degree.

(c) If things have an attribute which is the same and one in form—e.g.

[494]Cf. *Aristot. Met. 4.2.6-8.*

[495]Cf. *Aristot. Met. 4.2.9.*

[496]Or "the same." Cf. *Aristot. Met. 5.9.*

[497]Or "like." Cf. *Aristot. Met. 5.9.5.*

white—in different degrees, we say that they are similar because their form is one. (d) If the respects in which they are the same are more than those in which they differ, either in general or as regards their more prominent qualities; e.g., tin is similar to silver, as being white; and gold to fire, as being yellow or flame-colored.

Thus it is obvious that "Other"[498] and "Unlike" also have several meanings. (a) In one sense "other" is used in the sense opposite to "the same"; thus everything in relation to every other thing is either "the same" or "other." (b) In another sense things are "other" unless both their matter and their formula are one; thus you are "other" than your neighbor. (c) The third sense is that which is found in mathematics.[499] Therefore everything in relation to everything else is called either "other" or "the same"; that is, in the case of things of which unity and being are predicated;

for "other" is not the contradictory of "the same," and so it is not predicated of non-existent things (they are called "not the same"), but it is predicated of all things which exist; for whatever is by nature existent and one is either one or not one with something else.

"Other" and "same," then, are opposed in this way; but "difference"[500] is distinct from "otherness."

For that which is "other" than something need not be other in a particular respect, since everything which is existent is either "other" or "the same." But that which is different from something is different in some particular respect, so that that in which they differ must be the same sort of thing; i.e. the same genus or species.

For everything which is different differs either in genus or in species —in genus, such things as have not common matter and cannot be generated into or out of each other, e.g. things which belong to different categories; and in species, such things as are of the same genus (genus meaning that which is predicated of both the different things alike in respect of their substance).

The contraries[501] are different, and contrariety is a kind of difference. That this is rightly premissed is made clear by induction; for the contraries are obviously all different, since they are not merely "other," but some are other in genus, and others are in the same line of predication, and so are in the same genus and the same in genus. We have distinguished elsewhere[502] what sort of things are the same or other in

[498] Cf. *Aristot. Met. 5.9.4.*

[499] sc. as opposed to "same" in sense (a); 3 above.

[500] Cf. *Aristot. Met. 5.9.4.*

[501] Cf. *Aristot. Met. 5.10.*

genus.
Since things which differ can differ from one another in a greater or less degree, there is a certain maximum difference, and this I call contrariety. That it is the maximum difference is shown by induction. For whereas things which differ in genus have no means of passing into each other, and are more widely distant, and are not comparable, in the case of things which differ in species the contraries are the extremes from which generation takes place;
and the greatest distance is that which is between the extremes, and therefore also between the contraries. But in every class the greatest thing is complete. For (a) that is greatest which cannot be exceeded, and (b) that is complete outside which nothing proper to it can be found. For complete difference implies an end, just as all other things are called complete because they imply an end.
And there is nothing beyond the end; for in everything the end is the last thing, and forms the boundary. Thus there is nothing beyond the end, and that which is complete lacks nothing.

From this argument, then, it is clear that contrariety is maximum difference; and since we speak of contraries in various senses, the sense of completeness will vary in accordance with the sense of contrariety which applies to the contraries.
This being so, evidently one thing cannot have more than one contrary (since there can be nothing more extreme than the extreme, nor can there be more than two extremes of one interval); and in general this is evident, if contrariety is difference, and difference (and therefore complete difference) is between two things.
The other definitions of contraries must also be true, for (1.) complete difference is the maximum difference; since (a) we can find nothing beyond it, whether things differ in genus or in species (for we have shown that difference in relation to things outside the genus is impossible; this is the maximum difference between them); and (b) the things which differ most in the same genus are contraries; for complete difference is the maximum difference between these.
(2.) The things which differ most in the same receptive material are contraries; for contraries have the same matter. (3.) The most different things which come under the same faculty are contraries; for one science treats of one class of things, in which complete difference is the greatest.
"Positive state" and "Privation" constitute primary contrariety—not

[502] *Aristot. Met. 5.28.4.*

every form of privation (for it has several senses), but any form which is complete. All other contraries must be so called with respect to these; some because they possess these, others because they produce them or are productive of them, and others because they are acquisitions or losses of these or other contraries.

Now if the types of opposition are contradiction, privation, contrariety and relation, and of these the primary type is contradiction, and an intermediate is impossible in contradiction but possible between contraries, obviously contradiction is not the same as contrariety; and privation is a form of contradiction;

for it is either that which is totally incapable of possessing some attribute,[503] or that which would naturally possess some attribute but does not, that suffers privation—either absolutely or in some specified way. Here we already have several meanings, which we have distinguished elsewhere. Thus privation is a kind of contradiction or incapacity which is determinate or associated with the receptive material. This is why though there is no intermediate in contradiction there is one in some kinds of privation. For everything is either equal or not equal, but not everything is either equal or unequal; if it is, it is only so in the case of a material which admits of equality. If, then, processes of material generation start from the contraries, and proceed either from the form and the possession of the form, or from some privation of the form or shape, clearly all contrariety must be a form of privation, although presumably not all privation is contrariety.

This is because that which suffers privation may suffer it in several senses; for it is only the extremes from which changes proceed that are contraries.

This can also be shown by induction. Every contrariety involves privation as one of its contraries, but not always in the same way: inequality involves the privation of equality, dissimilarity that of similarity, evil that of goodness.

And the differences are as we have stated: one case is, if a thing is merely deprived; another, if it is deprived at a certain time or in a certain part—e.g. at a certain age or in the important part—or entirely. Hence in some cases there is an intermediate (there are men who are neither good nor bad), and in others there is not—a thing must be either odd or even.

Again, some have a determinate subject, and others have not. Thus it is evident that one of a pair of contraries always has a privative sense;

[503] This is not a proper example of privation. Cf. *Aristot. Met. 5.22.*

but it is enough if this is true of the primary or generic contraries, e.g. unity and plurality; for the others can be reduced to them.
Since one thing has one contrary, it might be asked in what sense unity is opposed to plurality, and the equal to the great and to the small. For if we always use the word "whether" in an antithesis—e.g., "whether it is white or black," or "whether it is white or not" (but we do not ask "whether it is a man or white," unless we are proceeding upon some assumption, and asking, for instance, whether it was Cleon who came or Socrates.
This is not a necessary disjunction in any class of things, but is derived from the use in the case of opposites—for it is only opposites that cannot be true at the same time—and we have this same use here in the question "which of the two came?" for if both alternatives were possible, the question would be absurd; but even so the question falls into an antithesis: that of "one" or "many"—i.e., "whether both came, or one")—
if, then, the question "whether" is always concerned with opposites, and we can ask "whether it is greater or smaller, or equal," what is the nature of the antithesis between "equal" and "greater or smaller"? It is contrary neither to one only, nor to both: for (a) it is no more contrary to the greater than to the smaller; (b) "equal" is contrary to "unequal," and thus it will be contrary to more than one thing;
(c) if "unequal" means the same as both "greater" and "smaller" at the same time, "equal" must still be opposed to them both: This difficulty supports the theory[504] that "the unequal" is a duality. But the result is that one thing is contrary to two; which is impossible.
Further, it is apparent that "equal" is intermediate between "great" and "small," but it is not apparent that any contrariety is intermediate, nor can it be, by definition; for it could not be complete if it were the intermediate of something, but rather it always has something intermediate between itself and the other extreme.

It remains, then, that it is opposed either as negation or as privation. Now it cannot be so opposed to one of the two, for it is no more opposed to the great than to the small.
Therefore it is a privative negation of both. For this reason we say "whether" with reference to both, and not to one of the two—e.g., "whether it is greater or equal," or "whether it is equal or smaller"; there are always three alternatives. But it is not a necessary privation; for not everything is equal which is not greater or smaller, but only

[504]Held by the Platonists. Cf. *Aristot. Met. 14.1.4, 5.*

things which would naturally have these attributes.
The equal, then, is that which is neither great nor small, but would naturally be either great or small; and it is opposed to both as a privative negation, and therefore is intermediate between them. And that which is neither good nor bad is opposed to both, but it has no name (for each of these terms has several meanings, and there is no one material which is receptive of both); that which is neither white nor black is better entitled to a name,
although even this has no single name, but the colors of which this negation is privatively predicated are to a certain extent limited; for it must be either grey or buff or something similar.
Therefore those persons are wrong in their criticism who imagine that all terms are used analogously, so that that which is neither a shoe nor a hand will be intermediate between "shoe" and "hand," because that which is neither good nor bad is intermediate between good and bad —as though there must be an intermediate in all cases; but this does not necessarily follow.
For the one is a joint negation of opposites where there is an intermediate and a natural interval; but in the other case there is no question of difference, since the joint negation applies to things which are in different genera, and therefore the substrate is not one.[505]
A similar question might be raised about "one" and "many." For if "many" is absolutely opposed to "one," certain impossibilities result. (1) One will be few; for "many" is also opposed to "few."
(2) Two will be many; since "twofold" is "manifold," and "twofold" is derived from two. Therefore one will be few; for in what relation can two be many if not in relation to one, which must therefore be few? for there can be nothing less. (3) If "much" and "little" are in plurality what "long" and "short" are in length, and if whatever is "much" is also "many,"
and "many" is "much" (unless indeed there is a difference in the case of a plastic continuum[506]), "few" will be a plurality. Therefore one will be a plurality, if it is few; and this necessarily follows if two is many. Presumably, however, although "many" in a sense means "much," there is a distinction; e.g., water is called "much" but not "many."
To all things, however, which are divisible the term "many" is applicable: in one sense, if there is a plurality which involves excess either absolutely or relatively (and similarly "few" is a plurality involving de-

[505] Cf. *Aristot. Met. 10.3.8*
[506] i.e., a fluid, which cannot be described as "many."

fect); and in another in the sense of number, in which case it is opposed to "one" only. For we say "one or many" just as if we were to say "one and ones," or "white thing and white things," or were to compare the things measured with the measure.

Multiples, too, are spoken of in this way; for every number is "many," because it consists of "ones," and because every number is measurable by one; and also as being the opposite of one, and not of few. In this sense even two is many; but as a plurality involving excess either relatively or absolutely it is not many, but the first plurality. Two is, however, absolutely few; because it is the first plurality involving defect

(hence Anaxagoras[507] was not right in leaving the subject by saying "all things were together, infinite both in multitude and in smallness"; instead of "in smallness" he should have said "in fewness,"[508] for things cannot be infinite in fewness), since fewness is constituted not by one, as some hold, but by two.

In the sphere of numbers "one" is opposed to many as the measure to the measurable, i.e., as relative terms are opposed which are not of their own nature relative. We have distinguished elsewhere[509] that things are called relative in two senses—either as being contraries, or as knowledge is related to the knowable, A being related to B because B is described in relation to A.

There is no reason why one should not be fewer than something, e.g. two; for if it is fewer it is not therefore few. Plurality is, as it were, a genus of number, since number is a plurality measurable by one. And in a sense one and number are opposed; not, however, as being contrary, but as we have said some relative terms to be; for it is *qua* measure and measurable that they are opposed.

(Hence not everything which is one is a number—e.g., a thing which is indivisible.) But although the relation between knowledge and the knowable is said to be similar to this, it turns out not to be similar. For it would seem that knowledge is a measure, and the knowable that which is measurable by it; but it happens that whereas all knowledge is knowable, the knowable is not always knowledge, because in a way

[507] Cf. *Aristot. Met. 1.3.9.*

[508] sc. "and then the absurdity of his view would have been apparent, for," etc. Aristotle assumes the Anaxagoras meant "smallness" (*μικρότης*) to be the opposite of "multitude" (*πλῆθος*); but he meant just what he said—that the particles of which things consist are infinitely many and infinitely small. See Bowman in Classical Review 30, 42-44.

[509] *Aristot. Met. 5.15.8, 9.*

knowledge is measured by the knowable.[510]
Plurality is contrary neither to the few (whose real contrary is the many, as an excessive plurality to an exceeded plurality) nor in *all* senses to one; but they are contrary in one sense (as has been said) as being the one divisible and the other indivisible; and in another as being relative (just as knowledge is relative to the knowable) if plurality is a number and one is the measure.
Since there can be, and in some cases is, an intermediate between contraries, intermediates must be composed of contraries; for all intermediates are in the same genus as the things between which they are intermediate.
By intermediates we mean those things into which that which changes must first change. E.g., if we change from the highest string to the lowest by the smallest gradations we shall first come to the intermediate notes; and in the case of colors if we change from white to black we shall come to red and grey before we come to black; and similarly in other cases.
But change from one genus into another is impossible except accidentally; e.g., from color to shape. Therefore intermediates must be in the same genus as one another and as the things between which they are intermediate.

But all intermediates are between certain opposites, for it is only from these per se that change is possible.
Hence there can be no intermediate between things which are not opposites; for then there would be change also between things which are not opposites. Of things which are opposites, contradiction has no intermediate term (for contradiction means this: an antithesis one term of which must apply to any given thing, and which contains no intermediate term); of the remaining types of opposites some are relative, others privative, and others contrary.
Those relative opposites which are not contrary have no intermediate. The reason for this is that they are not in the same genus—for what is intermediate between knowledge and the knowable?—but between great and small there is an intermediate. Now since intermediates are in the same genus, as has been shown, and are between contraries, they must be composed of those contraries. For the contraries must either belong to a genus or not. And if there is a genus in such a way that it is something prior to the contraries, then the differentiae which constitute the contrary species (for species consist of genus and differ-

[510]Cf. *Aristot. Met. 10.1.19.*

entiae) will be contraries in a prior sense.
E.g., if white and black are contraries, and the one is a penetrative[511] and the other a compressive color, these differentiae, "penetrative" and "compressive," are prior, and so are opposed to each other in a prior sense.
But it is the species which have contrary differentiae that are more truly contraries; the other, i.e. intermediate, species will consist of genus and differentiae. E.g., all colors which are intermediate between white and black should be described by their genus (i.e. color) and by certain differentiae.
But these differentiae will not be the primary contraries; otherwise every thing will be either white or black. Therefore they will be different from the primary contraries. Therefore they will be intermediate between them, and the primary differentiae will be "the penetrative" and "the compressive." Thus we must first investigate the contraries which are not contained in a genus, and discover of what their intermediates are composed.
For things which are in the same genus must either be composed of differentiae which are not compounded with the genus, or be incomposite. Contraries are not compounded with one another, and are therefore first principles; but intermediates are either all incomposite or none of them. Now from the contraries something is generated in such a way that change will reach it before reaching the contraries themselves (for there must be something which is less in degree than one contrary and greater than the other). Therefore this also will be intermediate between the contraries.
Hence all the other intermediates must be composite; for that which is greater in degree than one contrary and less than the other is in some sense a compound of the contraries of which it is said to be greater in degree than one and less than the other. And since there is nothing else homogeneous which is prior to the contraries, all intermediates must be composed of contraries.
Therefore all the lower terms, both contraries and intermediates, must be composed of the primary contraries. Thus it is clear that intermediates are all in the same genus, and are between contraries, and are all composed of contraries.
That which is "other in species" than something else is "other" in respect of something and that something must apply to both. E.g., if an animal is other in species than something else, they must both

[511] This is Plato's definition. Cf. *Plat. Tim. 67d, e.*

be animals. Hence things which are other in species must be in the same genus. The sort of thing I mean by "genus" is that in virtue of which two things are both called the same one thing; and which is not accidentally differentiated, whether regarded as matter or otherwise. For not only must the common quality belong to both, e.g., that they are both animals, but the very animality of each must be different; e.g., in one case it must be equinity and in the other humanity. Hence the common quality must for one be other in species than that which it is for the other. They must be, then, of their very nature, the one *this* kind of animal, and the other *that* ; e.g., the one a horse and the other a man.

Therefore this difference must be "otherness of genus" (I say "otherness of genus" because by "difference of genus" I mean an otherness which makes the genus itself other); this, then, will be a form of contrariety. This is obvious by induction.[512] For all differentiation is by opposites, and we have shown[513] that contraries are in the same genus, because contrariety was shown to be complete difference. But difference in species is always difference from something in respect of something; therefore this is the same thing, i.e. the genus, for both.

(Hence too all contraries which differ in species but not in genus are in the same line of predication,[514] and are other than each other in the highest degree; for their difference is complete, and they cannot come into existence simultaneously.) Hence the difference is a form of contrariety.

To be "other in species," then, means this: to be in the same genus and involve contrariety, while being indivisible

(and "the same in species" applies to all things which do not involve contrariety, while being indivisible); for it is in the course of differentiation and in the intermediate terms that contrariety appears, before we come to the indivisibles.[515]

Thus it is evident that in relation to what is called genus no species is either the same or other in species (and this is as it should be, for the matter is disclosed by negation, and the genus is the matter of that of which it is predicated as genus; not in the sense in which we speak of the genus or clan of the Heraclidae,[516] but as we speak of a

[512] Aristotle does not use induction to prove his point; indeed he does not prove it at all.

[513] In ch. 4.

[514] Or "category."

[515] i.e., indivisible species and individuals.

[516] Cf. *Aristot. Met. 5.28.1.*

genus in nature); nor yet in relation to things which are not in the same genus. From the latter it will differ in genus, but in species from things which are in the same genus. For the difference of things which differ in species must be a contrariety; and this belongs only to things which are in the same genus.

The question might be raised as to why woman does not differ in species from man, seeing that female is contrary to male, and difference is contrariety; and why a female and a male animal are not other in species, although this difference belongs to "animal" per se, and not as whiteness or blackness does; "male" and "female" belong to it *qua* animal.

This problem is practically the same as "why does one kind of contrariety (e.g. "footed" and "winged") make things other in species, while another (e.g. whiteness and blackness) does not?" The answer may be that in the one case the attributes are peculiar to the genus, and in the other they are less so; and since one element is formula and the other matter, contrarieties in the formula produce difference in species, but contrarieties in the concrete whole do not.

Hence the whiteness or blackness of a man does not produce this, nor is there any specific difference between a white man and a black man; not even if one term is assigned to each. For we are now regarding "man" as matter, and matter does not produce difference; and for this reason, too, individual men are not species of "man," although the flesh and bones of which this and that man consist are different. The concrete whole is "other," but not "other in species," because there is no contrariety in the formula, and this is the ultimate indivisible species.

But Callias is definition *and* matter. Then so too is "white man," because it is the individual, Callias, who is white. Hence "man" is only white accidentally. Again, a bronze circle and a wooden one do not differ in species; and a bronze triangle and a wooden circle differ in species not because of their matter, but because there is contrariety in their formulae.

But does not matter, when it is "other" in a particular way, make things "other in species"? Probably there is a sense in which it does. Otherwise why is this particular horse "other in species" than this particular man, although the definitions involve matter? Surely it is because there is contrariety in the definition, for so there also is in "white man" and "black horse"; and it is a contrariety in species, but not because one is white and the other black; for even if they had both been white, they would still be "other in species."

"Male" and "female" are attributes peculiar to the animal, but not in virtue of its substance; they ar material or physical. Hence the same semen may, as the result of some modification, become either female or male.

We have now stated what "to be other in species" means, and why some things differ in species and others do not.

Since contraries are other in form,[517] and "the perishable" and "imperishable" are contraries (for privation is a definite incapacity), "the perishable" must be "other in kind" than "the imperishable." But so far we have spoken only of the universal terms; and so it might appear to be unnecessary that *anything* perishable and imperishable should be "other in form," just as in the case of white and black.

For the same thing may be both at the same time, if it is a universal (e.g, "man" may be both white and black); and it may still be both if it is a particular, for the same person may be white and black, although not at the same time. Yet white is contrary to black. But although some contraries

(e.g. those which we have just mentioned, and many others) can belong to certain things accidentally, others cannot; and this applies to "the perishable" and "the imperishable." Nothing is accidentally perishable; for that which is accidental may not be applicable; but perishability is an attribute which applies necessarily when it is applicable at all. Otherwise one and the same thing will be imperishable as well as perishable, if it is possible for perishability not to apply to it.

Thus perishability must be either the substance or in the substance of every perishable thing. The same argument also applies to the imperishable; for both perishability and imperishability are attributes which are necessarily applicable. Hence the characteristics in respect of which and in direct consequence of which one thing is perishable and another imperishable are opposed; and therefore they must be other in kind.

Thus it is obvious that there cannot be Forms such as some thinkers maintain; for then there would be both a perishable and an imperishable "man." [518] Yet the Forms are said to be the same in species as the

[517] It appears that in this chapter (apart from 5, which may be a later addition) the terms *εἶδος* and *γένος* are used in a non-technical sense. Cf. Ross on *Aristot. Met. 1058b 28.*

[518] i.e., the individual man is perishable and the Idea of man imperishable; and these must be other in kind (*γένει* non-technical). But the Platonists hold that the Idea is the same in species as the particular. This is impossible if it is other in genus (*γένει* technical).

particulars, and not merely to share a common predicate with them; but things which are other in genus differ more widely than things which are other in species.

Book 11

That wisdom is a science of first principles is clear from our Introductory remarks,[519] in which we of raised objections to the statements of other thinkers about the first principles. It might be asked, however, whether we should regard Wisdom as one science or as more than one.[520] If as one, it may be objected that the objects of one science are always contraries; but the first principles are not contraries. And if it is not one, what sort of sciences are we to suppose them to be?
Again, is it the province of one science, or of more than one, to study the principles of demonstration?[521] If of one, why of it rather than of any other? And if of more than one, of what sort are we to suppose them to be?

Again, are we to suppose that Wisdom deals with all substances or not?[522] If not with all, it is hard to lay down with what kind it does deal; while if there is one science of them all, it is not clear how the same science can deal with more than one subject.
Again, is this science concerned only with substances, or with attributes as well?[523] For if it is a demonstration of attributes, it is not concerned with substances; and if there is a separate science of each, what is each of these sciences, and which of them is Wisdom? *qua* demonstrative, the science of attributes appears to be Wisdom; but *qua* concerned with that which is primary, the science of substances.
Nor must we suppose that the science which we are seeking is concerned

[519] *Aristot. Met. 1.3-10.*

[520] Cf. *Aristot. Met. 3.1.5*, *Aristot. Met. 3.2.1-10.*

[521] Cf. *Aristot. Met. 3.1.5,* , *Aristot. Met. 3.2.10-15*, where the problem takes a slightly different form.

[522] Cf. *Aristot. Met. 3.1.6*, *Aristot. Met. 3.2.15-17.*

[523] Cf. *Aristot. Met. 3.1.8-10*, *Aristot. Met. 3.2.18-19.*

with the causes described in the *Physics.*[524] It is not concerned with the final cause; for this is the Good, and this belongs to the sphere of action and to things which are in motion; and it is this which first causes motion (for the *end* is of this nature); but there is no Prime Mover in the sphere of immovable things.

And in general it is a difficult question whether the science which we are now seeking is concerned with sensible substances, or not with sensible substances, but with some other kind.[525] If with another kind, it must be concerned either with the Forms or with mathematical objects. Now clearly the Forms do not exist. (But nevertheless, even if we posit them, it is a difficult question as to why the same rule does not apply to the other things of which there are Forms as applies to the objects of mathematics.

I mean that they posit the objects of mathematics as intermediate between the Forms and sensible things, as a third class besides the Forms and the things of our world; but there is no "third man"[526] or "horse" besides the Ideal one and the particulars. If on the other hand it is not as they make out, what sort of objects are we to suppose to be the concern of the mathematician? Not surely the things of our world; for none of these is of the kind which the mathematical sciences investigate.)

Nor indeed is the science which we are now seeking concerned with the objects of mathematics; for none of them can exist separately. But it does not deal with sensible substances either; for they are perishable.

In general the question might be raised, to what science it pertains to discuss the problems concerned with the matter[527] of mathematical objects.

It is not the province of physics, because the whole business of the physicist is with things which contain in themselves a principle of motion and rest; nor yet of the science which inquires into demonstration and

scientific knowledge, for it is simply this sort of thing which forms the subject of its inquiry. It remains, therefore, that it is the science which we have set ourselves to find that treats of these subjects.

One might consider the question whether we should regard the science which we are now seeking as dealing with the principles which by some

[524] *Aristot. Physics 2.3.*

[525] Cf. *Aristot. Met. 3.1.7*, *Aristot. Met.3.2.20-30.*

[526] This phrase has no technical sense here; cf. *Aristot. Met. 1.9.4.*

[527] i.e., intelligible matter (cf. *Aristot. Met. 7.10.18*). This problem is not raised in Book 3.

are called elements.[528] But everyone assumes that these are present in composite things; and it would seem rather that the science which we are seeking must be concerned with universals, since every formula and every science is of universals and not of ultimate species; so that in this case it must deal with the primary genera.

These would be Being and Unity; for these, if any, might best be supposed to embrace all existing things, and to be most of the nature of first principles, because they are by nature primary; for if they are destroyed, everything else is destroyed with them, since everything exists and is one.

But inasmuch as, if Being and Unity are to be regarded as genera, they must be predicable of their differentiae, whereas no genus is predicable of any of its differentiae, from this point of view it would seem that they should be regarded neither as genera nor as principles.

Further, since the more simple is more nearly a principle than the less simple, and the ultimate subdivisions of the genus are more simple than the genera (because they are indivisible), and the genera are divided into a number of different species, it would seem that species are more nearly a principle than genera.

On the other hand, inasmuch as species are destroyed together with their genera, it seems more likely that the genera are principles; because that which involves the destruction of something else is a principle. These and other similar points are those which cause us perplexity.

Again, ought we to assume the existence of something else besides particular things, or are they the objects of the science which we are seeking?[529] It is true that they are infinite in number; but then the things which exist besides particulars are genera or species, and neither of these is the object of the science which we are now seeking. We have explained[530] why this is impossible.

Indeed, in general it is a difficult question whether we should suppose that there is some substance which exists separately besides sensible substances (i.e. the substances of our world), or that the latter constitute reality, and that it is with them that Wisdom is concerned. It *seems* that we are looking for some other kind of substance, and that this is the object of our undertaking: I mean, to see whether there is anything which exists separately and independently, and does not appertain to any sensible thing.

[528] Cf. *Aristot. Met. 3.1.10*, *Aristot. Met. 3.3.*

[529] Cf. *Aristot. Met. 3.1.11*, *Aristot. Met. 3.4.1-8.*

[530] *Aristot. Met. 11.1.11-13*

But again, if there is another kind of substance besides sensible substances, to what kind of sensible things are we to suppose that it corresponds? Why should we suppose that it corresponds to men or horses rather than to other animals, or even to inanimate objects in general? And yet to manufacture a set of eternal substances equal in number to those which are sensible and perishable would seem to fall outside the bounds of plausibility.

Yet if the principle which we are now seeking does not exist in separation from bodies, what can we suppose it to be if not matter? Yes, but matter does not exist actually, but only potentially. It might seem rather that a more appropriate principle would be form or shape; but this is perishable[531]; and so in general there is no eternal substance which exists separately and independently.

But this is absurd, because it seems natural that there should be a substance and principle of this kind, and it is sought for as existing by nearly all the most enlightened thinkers. For how can there be any order in the universe if there is not something eternal and separate and permanent?

Again, if there is a substance and principle of such a nature as that which we are now seeking, and if it is one for all things, i.e. the same for both eternal and perishable things, it is a difficult question as to why, when the principle is the same, some of the things which come under that principle are eternal, and others not; for this is paradoxical.[532]

But if there is one principle of perishable things, and another of eternal things, if the principle of perishable things is also eternal, we shall still have the same difficulty; because if the principle is eternal, why are not the things which come under that principle eternal? And if it is perishable, it must have another principle behind it, and that principle must have another behind it; and the process will go on to infinity.

On the other hand, if we posit the principles which seem most unchangeable, Being and Unity,[533](a) unless each of them denotes a particular thing and a substance, how can they be separate and independent? but the eternal and primary principles for which we are looking are of this nature.

(b) If, however, each of them denotes a particular thing and a sub-

[531]Forms which are induced in matter are perishable, although not subject to the process of destruction; they *are* at one time and are not at another (cf. *Aristot. Met. 7.15.1*). The only pure form (i.e., the only form which is independent of matter in any and every sense) is the prime mover (*Aristot. Met. 12.7*).

[532]Cf. *Aristot. Met. 3.1.12*, *Aristot. Met. 3.4.11-23.*

[533]Cf. *Aristot. Met. 3.1.13*, *Aristot. Met. 3.4.24-34.*

stance, then all existing things are substances; for Being is predicated of everything, and Unity also of some things.
But that all things are substances is false. (c) As for those who maintain that Unity is the first principle and a substance, and who generate number from Unity and matter as their first product, and assert that it is a substance, how can their theory be true? How are we to conceive of 2 and each of the other numbers thus composed, as one? On this point they give no explanation; nor is it easy to give one.
But if we posit lines or the things derived from them (I mean surfaces in the primary sense[534]) as principles,[535] these at least are not separately existing substances, but sections and divisions, the former of surfaces and the latter of bodies (and points are sections and divisions of lines); and further they are limits of these same things. All these things are integral parts of something else, and not one of them exists separately.
Further, how are we to suppose that there is a substance of unity or a point? for in the case of every substance[536] there is a process of

generation, but in the case of the point there is not; for the point is a division.

It is a perplexing fact also that whereas every science treats of universals and types, substance is not a universal thing, but rather a particular and separable thing; so that if there is a science that deals with first principles, how can we suppose that substance is a first principle?[537]
Again, is there anything besides the concrete whole (I mean the matter and the form in combination) or not?[538] If not, all things in the nature of matter are perishable; but if there is something, it must be the form or shape. It is hard to determine in what cases this is possible and in what it is not; for in some cases, e.g. that of a house, the form clearly does not exist in separation.

Again, are the first principles formally or numerically the same?[539] If they are numerically one, all things will be the same.
Since the science of the philosopher is concerned with Being *qua* Being universally,[540] and not with some part of it, and since the term Being

[534]i.e., intelligible surfaces, etc.
[535]Cf. *Aristot. Met. 3.1.15*, *Aristot. Met. 3.5.*
[536]sc. which is liable to generation or destruction.
[537]Cf. *Aristot. Met. 3.1.14*, *Aristot. Met. 3.6.7-9.*
[538]This section belongs to the problem discussed in 1-5 above.
[539]Cf. *Aristot. Met. 3.1.12*, *Aristot. Met. 3.4.8-10.*
[540]This chapter corresponds to *Aristot. Met. 4.1, 2*, with which it should be compared.

has several meanings and is not used only in one sense, if it is merely equivocal and has no common significance it cannot fall under one science (for there is no one class in things of this kind); but if it has a common significance it must fall under one science.

Now it would seem that it is used in the sense which we have described, like "medical" and "healthy," for we use each of these terms in several senses; and each is used in this way because it has a reference, one to the science of medicine, and another to health, and another to something else; but each refers always to the same concept. A diagnosis and a scalpel are both called medical, because the one proceeds from medical science and the other is useful to it.

The same is true of "healthy"; one thing is so called because it is indicative, and another because it is productive, of health; and the same applies to all other cases. Now it is in this same way that everything which exists is said to *be* ; each thing is said to be because it is a modification or permanent or temporary state or motion or some other such affection of Being *qua* Being.

And since everything that is can be referred to some one common concept, each of the contrarieties too can be referred to the primary differentiae and contrarieties of Being—whether the primary differentiae of Being are plurality and unity, or similarity and dissimilarity, or something else; for we may take them as already discussed.[541]

It makes no difference whether that which *is* is referred to Being or Unity; for even if they are not the same but different, they are in any case convertible, since that which is one also in a sense *is* , and that which *is* is one.

Now since the study of contraries pertains to one and the same science, and each contrary is so called in virtue of privation (although indeed one might wonder in what sense they can be called contraries in virtue of privation when they admit of a middle term—e.g. "unjust" and "just"), in all such cases we must regard the privation as being not of the whole definition but of the ultimate species. E.g., if the just man is "one who is obedient to the laws in virtue of some volitional state," the unjust man will not be entirely deprived of the whole definition, but will be "one who is in some respect deficient in obedience to the laws"; and it is in this respect that the privation of justice will apply to him (and the same holds good in all other cases).

And just as the mathematician makes a study of abstractions (for in his investigations he first abstracts everything that is sensible, such

[541] Cf. *Aristot. Met. 4.2.9 n.*

as weight and lightness, hardness and its contrary, and also heat and cold and all other sensible contrarieties, leaving only quantity and continuity—sometimes in one, sometimes in two and sometimes in three dimensions—and their affections *qua* quantitative and continuous, and does not study them with respect to any other thing; and in some cases investigates the relative positions of things and the properties of these, and in others their commensurability or incommensurability, and in others their ratios; yet nevertheless we hold that there is one and the same science of all these things, viz. geometry), so it is the same with regard to Being.

For the study of its attributes in so far as it is Being, and of its contrarieties[542] *qua* Being, belongs to no other science than Philosophy; for to physics one would assign the study of things not *qua* Being but *qua* participating in motion, while dialectics and sophistry deal with the attributes of existing things, but not of things *qua* Being, nor do they treat of Being itself in so far as it is Being.

Therefore it remains that the philosopher is the man who studies the things which we have described, in so far as they are Being. And since everything that *is* , although the term has several meanings, is so described in virtue of some one common concept, and the same is true of the contraries (since they can be referred to the primary contrarieties and differences of Being), and since things of this kind can fall under one science, the difficulty which we stated at the beginning[543] may be regarded as solved[544]—I mean the problem as to how there can be one science of several things which are different in genus.

Since even the mathematician uses the common axioms only in a particular application, it will be the province of Primary Philosophy to study the principles of these as well.[545]

That when equals are taken from equals the remainders are equal is an axiom common to all quantities; but mathematics isolates a particular part of its proper subject matter and studies it separately; e.g. lines or angles or numbers or some other kind of quantity, but not *qua* Being, but only in so far as each of them is continuous in one, two or three dimensions. But philosophy does not investigate particular things in so far as each of them has some definite attribute, but studies that which *is* , in so far as each particular thing *is* .

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[542] i.e., identity, otherness, etc.

[543] *Aristot. Met. 11.1.1.*

[544] Also the problem stated in ch. i. 3.

[545] This chapter corresponds to *Aristot. Met. 4.3.1-6*, and answers the problem stated in *Aristot. Met. 11.1.2.*

The same applies to the science of physics as to mathematics, for physics studies the attributes and first principles of things *qua* in motion, and not *qua* Being; but Primary Science, as we have said, deals with these things only in so far as the subjects which underlie them are existent, and not in respect of anything else. Hence we should regard both physics and mathematics as subdivisions of Wisdom.

There is a principle in existing things about which we cannot make a mistake[546]; of which, on the contrary, we must always realize the truth —viz. that the same thing cannot at one and the same time be and not be, nor admit of any other similar pair of opposites. Of such axioms although there is a proof ad hominem, there is no absolute proof; because there is no principle more convincing than the axiom itself on which to base an argument, whereas there must be such a principle if there is to be absolute proof.

But he who wants to convince an opponent who makes opposite statements that he is wrong must obtain from him an admission which shall be identical with the proposition that the same thing cannot at one and the same time be and not be, but shall seem not to be identical with it. This is the only method of proof which can be used against one who maintains that opposite statements can be truly made about the same subject.

Now those who intend to join in discussion must understand one another to some extent; for without this how can there be any common discussion between them? Therefore each of the terms which they use must be intelligible and signify something; not several things, but one only; or if it signifies more than one thing, it must be made clear to which of these the term is applied.

Now he who says that A is and is not denies what he asserts, and therefore denies that the term signifies what it does signify. But this is impossible. Therefore if "to be so-and-so" has a definite meaning, the opposite statement about the same subject cannot be true.

Again, if the term has a definite significance and this is truly stated, it must of necessity be so.[547] But that which of necessity is can never not be. Hence opposite statements about the same subject cannot be true.

Again, if the assertion is no more true than the negation, it will be no more true to say "A is man" than to say "A is not man." [548]

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[546]This chapter corresponds to *Aristot. Met. 4.3.7-4.31.*

[547]sect. 6=*Aristot. Met. 4.4.14-16.*

[548]With this section cf. *Aristot. Met. 4.4.26-30.*

But it would also be admitted that it is more or at least not less true to say that a man is not a horse than to say that he is not a man; and therefore, since it was assumed that opposite statements are equally true, it will be true to say that the same person is also a horse. It follows therefore, that the same person is a man and a horse, or any other animal.

Thus, although there is no absolute proof of these axioms, there is an ad hominem proof where one's opponent makes these assumptions.[549] Perhaps even Heraclitus himself, if he had been questioned on these lines, would have been compelled to admit that opposite statements can never be true of the same subjects; as it is, he adopted this theory through ignorance of what his doctrine implied.

In general,[550] if what he says is true, not even this statement itself (I mean "that the same thing can at one and the same time be and not be") will be true;

because just as, when they are separated, the affirmation is no more true than the negation, so in the same way, if the complex statement is taken as a single affirmation, the negation will be just as true as the whole statement regarded as an affirmation.

And further, if nothing can be truly affirmed, then this very statement —that there is no such thing as a true affirmation—will be false. But if there is such a thing, the contentions of those who raise objections of this kind and utterly destroy rational discourse may be considered to be refuted.[551]

Very similar to the views which we have just mentioned is the dictum of Protagoras[552]; for he said that man is the measure of all things, by which he meant simply that each individual's impressions are positively true.

But if this is so, it follows that the same thing is and is not, and is bad and good, and that all the other implications of opposite statements are true; because often a given thing seems beautiful to one set of people and ugly to another, and that which seems to each individual is the measure.

This difficulty will be solved if we consider the origin of the assumption. It seems probable that it arose in some cases from the doctrine of the natural philosophers, and in others from the fact that everyone does

[549] sect. 8=*Aristot. Met. 4.3.10.*

[550] sect. 9-11=*Aristot. Met. 4.4.31.*

[551] Cf. *Aristot. Met. 4.8.4, 5.*

[552] This chapter forms a summary of *Aristot. Met. 4.5-8.* sect. 1-3=*Aristot. Met. 4.5.1-5.*

not form the same opinion about the same things, but to some a given thing seems sweet and to others the contrary.
For that nothing comes from what is not, but everything from what is, is a doctrine common to nearly all natural philosophers.[553] Since, then, a thing does not become white which was before completely white and in no respect not-white, that which becomes white must come from what was not-white. Hence according to this theory there would be generation from what is not, unless the same thing were originally white *and* not-white.
However, it is not hard to solve this difficulty. We have explained in the *Physics*[554] in what sense things which are generated are generated from what is not, and in what sense from what is.

But to attach equal importance to the opinions and impressions of opposing parties is foolish, because clearly one side or the other must be wrong.[555]
This is evident from what happens in the sphere of sensation; for the same thing never seems to some people sweet and to others to the contrary unless one of the parties has the organ of sense which distinguishes the said flavors injured or impaired. Such being the case, the one party should be taken as the "measure," and the other not.
And I hold the same in the case of good and bad, and of beautiful and ugly, and of all other such qualities. For to maintain this view[556] is just the same as to maintain that what appears to us when we press the finger below the eye and make a thing seem two instead of one must be two because it appears to be so, and then afterwards that it must be one; because if we do not interfere with our sight that which is one appears to be one.
And in general it is absurd to form our opinion of the truth from the appearances of things in this world of ours which are subject to change and never remain in the same state[557]; for it is by reference to those things which are always the same state and undergo no change that we should prosecute our search for truth.
Of this kind are the heavenly bodies; for these do not appear to be now of one nature and subsequently of another, but are manifestly always the same and have no change of any kind.

Again, if there is motion there is also something which is moved;

[553] With sect. 4, 5 cf. *Aristot. Met. 4.5.6.*
[554] *Aristot. Physics 1.7-9.*
[555] sect. 5-7=*Aristot. Met. 4.5.23-27.*
[556] i.e., that the same thing has contrary qualities.
[557] sect. 8, 9 (first half)=*Aristot. Met. 4.5.21, 22.*

and everything is moved from something and into something. Therefore that which is moved must be in that from which it is to be moved, and must also not be in it; and must be moved into so-and-so and must also come to be in it; but the contradictory statements cannot be true at the same time, as our opponents allege.
And if the things of our world are in a state of continuous flux and motion in respect of quantity, and we assume this although it is not true, why should they not be constant in respect of quality?[558] It appears that not the least reason why our opponents predicate opposite statements of the same thing is that they start with the assumption that quantity is not constant in the case of bodies; hence they say that the same thing is and is not six feet long.
But essence depends upon quality, and this is of a determinate, whereas quantity is of an indeterminate nature.

Again, when the doctor orders them to adopt some article of diet, why do they adopt it?[559] For on their view it is no more true that a thing is bread than that it is not; and therefore it would make no difference whether they ate it or not. But as it is, they adopt a particular food as though they knew the truth about it and it were the food prescribed;
yet they ought not to do so if there were no fixed and permanent nature in sensible things and everything were always in a state of motion and flux.

Again, if we are always changing and never remain the same, is it any wonder that to us, as to the diseased, things never appear the same?[560]
For to the diseased, since they are not in the same physical condition as when they were well, sensible qualities do not appear to be the same; although this does not mean that the sensible things themselves partake of any change, but that they cause different, and not the same, sensations in the diseased. Doubtless the same must be true if the change which we have referred to takes place in us.
If, however, we do not change but remain always the same, there must be something permanent.

As for those who raise the aforesaid difficulties on dialectical grounds,[561] it is not easy to find a solution which will convince them unless they grant some assumption for which they no longer require

[558]Cf. *Aristot. Met. 4.5.20, 21.*
[559]Cf. *Aristot. Met. 4.4.39-42.*
[560]With this section cf. *Aristot. Met. 4.5.7-14.*
[561]With this section cf. *Aristot. Met. 4.5.3, 4, Aristot. Met. 4.6.1-3.*

an explanation; for every argument and proof is possible only in this way. If they grant no assumption, they destroy discussion and reasoning in general.

Thus there is no arguing with people of this kind; but in the case of those who are perplexed by the traditional difficulties it is easy to meet and refute the causes of their perplexity. This is evident from what has been already said.

Thus from these considerations it is obvious that opposite statements cannot be true of the same thing at one time; nor can contrary statements, since every contrariety involves privation. This is clear if we reduce the formulae of contraries to their first principles.[562]

Similarly no middle term can be predicated of one and the same thing of which one of the contraries is predicated.[563]

If, when the subject is white, we say that it is neither white nor black, we shall be in error; for it follows that it is and is not white, because the first of the two terms in the complex statement will be true of the subject, and this is the contradictory of white.

Thus we cannot be right in holding the views either of Heraclitus[564] or of Anaxagoras.[565]

If we could, it would follow that contraries are predicable of the same subject; for when he[566] says that in everything there is a part of everything, he means that nothing is sweet any more than it is bitter, and similarly with any of the other pairs of contraries; that is, if everything is present in everything not merely potentially but actually and in differentiation.

Similarly *all* statements cannot be false, nor all true. Among many other difficulties which might be adduced as involved by this supposition there is the objection that if all statements were false, not even this proposition itself would be true; while if they were all true it would not be false to say that they are all false.

Every science inquires for certain principles and causes with respect to every knowable thing which comes within its scope[567]; e.g., the sciences of medicine and physical culture do this, and so does each of the other

[562]Cf. *Aristot. Met. 4.6.10, 11.*

[563]Cf. *Aristot. Met. 4.7* where, however, the point which is proved is that there can be no intermediate between contradictories.

[564]Cf. *Aristot. Met. 11.5.8*

[565]Cf. *Aristot. Met. 4.7.8-8.5*

[566]Anaxagoras. What he really meant was that even the sweetest things contain some bitter particles. Cf. *Anaxagoras Fr. 11 (Diels)*; Burnet, E.G.P. 129.

[567]This chapter corresponds to *Aristot. Met. 6.1*; cf. also *Aristot. Met. 4.3.1-6* and ch. 4 above. It also answers the problem stated in ch. 1.2.

productive and mathematical sciences. Each one of these marks out for itself some class of objects, and concerns itself with this as with something existent and real, but not *qua* real; it is another science distinct from these which does this.

Each of the said sciences arrives in some way at the essence in a particular class of things, and then tries to prove the rest more or less exactly. Some arrive at the essence through sense-perception, and some by hypothesis; hence it is obvious from such a process of induction that there is no demonstration of the reality or essence.

Now since there is a science of nature, clearly it must be different from both practical and productive science. In a productive science the source of motion is in the producer and not in the thing produced, and is either an art or some other kind of potency; and similarly in a practical science the motion is not in the thing acted upon but rather in the agent.

But the science of the natural philosopher is concerned with things which contain in themselves a source of motion. From this it is clear that natural science must be neither practical nor productive, but speculative; since it must fall under one of these classes.

And since every science must have some knowledge of the essence and must use it as a starting-point, we must be careful to observe how the natural philosopher should define, and how he should regard the formula of essence—whether in the same way as the term "snub," or rather as the term "concave."

For of these the formula of "snub" is stated in conjunction with the matter of the object, whereas that of "concave" is stated apart from the matter; since snubness is only found in the nose, which is therefore included in the formula, for "the snub" is a concave *nose* . Thus it is obvious that the formula of "flesh" and "eye" and the other parts of the body must always be stated in conjunction with their matter.

Since there is a science of Being *qua* Being and separately existent, we must inquire whether this should be regarded as identical with natural science or rather as a distinct branch of knowledge. Physics deals with things which contain a source of motion in themselves, and mathematics is speculative and is a science which deals with permanent things, but not with things which can exist separately.

Hence there is a science distinct from both of these, which deals with that which exists separately and is immovable; that is, if there really is a substance of this kind—I mean separately existent and immovable—as we shall endeavor to prove.[568] And if there is an entity of this kind

in the world of reality, here surely must be the Divine, and this must be the first and most fundamental principle.
Evidently, then, there are three kinds of speculative science: physics, mathematics, and theology. The highest class of science is the speculative, and of the speculative sciences themselves the highest is the last named, because it deals with the most important side of reality; and each science is reckoned higher or lower in accordance with the object of its study.

The question might be raised as to whether the science of Being *qua* Being should be regarded as universal or not.
Each of the mathematical sciences deals with some one class of things which is determinate, but universal mathematics is common to all alike. If, then, natural substances are the first of existing things, physics will be the first of the sciences; but if there is some other nature and substance which exists separately and is immovable, then the science which treats of it must be different from and prior to physics, and universal because of its priority.
Since the term Being in its unqualified sense is used with several meanings, of which one is accidental Being, we must first consider Being in this sense.[569] Clearly none of the traditional sciences concerns itself with the accidental; the science of building does not consider what will happen to the occupants of the house, e.g. whether they will find it unpleasant or the contrary to live in; nor does the science of weaving or of shoemaking or of confectionery.
Each of these sciences considers only what is proper to it, i.e. its particular end. As for the question whether "the cultured" is also "the lettered," or the quibble[570] that "the man who is cultured, when he has become lettered, will be both at once although he was not before; but that which is but was not always so must have come to be; therefore he must have become at the same time cultured and lettered"
—none of the recognized sciences considers this, except sophistry. This is the only science which concerns itself with the accidental, and hence Plato was not far wrong in saying[571] that the sophist spends his time in the study of unreality. But that it is not even possible for there to be a science of the accidental will be apparent if we try to see what

[568] *Aristot. Met. 12.6, 7.*

[569] Sections 1-9 of this chapter correspond to *Aristot. Met. 6.2-4.*

[570] This is a different form of the "quibble" in *Aristot. Met. 6.2.4.* Here the fallacy obviously consists in the wrong application of the word ἅμα("at once" or "at the same time").

[571] *Plat. Sop. 254a.*

the accidental really is.
Of some things we say that they are so always and of necessity (necessity having the sense not of compulsion, but that which we use in logical demonstration[572]), and of others that they are so usually, but of others that they are so neither usually nor always and of necessity, but fortuitously. E.g., there might be a frost at midsummer, although this comes about neither always and of necessity nor usually; but it might happen sometimes.
The accidental, then, is that which comes about, but not always nor of necessity nor usually. Thus we have now stated what the accidental is; and it is obvious why there can be no science of such a thing, because every science has as its object that which is so always or usually, and the accidental falls under neither of these descriptions.
Clearly there can be no causes and principles of the accidental such as there are of that which is per se; otherwise everything would be of necessity. For if A is when B is, and B is when C is, and C is not fortuitously but of necessity, then that of which C was the cause will also be of necessity, and so on down to the last *causatum* , as it is called.
(But this was assumed to be accidental.) Therefore everything will be of necessity, and the element of chance, i.e. the possibility of a thing's either happening or not, is entirely banished from the world of events. Even if we suppose the cause not to exist already but to be coming to be, the result will be the same; for everything will come to be of necessity.
The eclipse tomorrow will come about if A does, and A will if B does, and B if C does; and in this way if we keep on subtracting time from the finite time between now and to-morrow, we shall at some point arrive at the present existing condition. Therefore since this exists, everything subsequent to it will happen of necessity, and so everything happens of necessity.
As for "what is" in the sense of what is *true* or what is *accidental* , the former depends upon a combination in thought, and is an affection of thought (hence we do not look for the principles of Being in this sense, but only for those of objective and separable Being) the latter is not necessary but indeterminate (I mean the accidental); and of such a thing the causes are indefinite and cannot be reduced to a system.
Teleology is found in events which come about in the course of nature or as a result of thought.[573] It is "chance" ⟨or "luck"⟩ when one of

[572]Cf. *Aristot. Met. 6.2.6.*

these comes about by accident; for a thing may be a cause, just as it may exist, either per se or accidentally. Chance is an accidental cause of normally purposive teleological events.
Hence chance and thought have the same sphere of action, for there is no purpose without thought. Causes from which chance results may come about are indeterminate; hence chance is inscrutable to human calculation, and is a cause only accidentally, but in the strictest sense is a cause of nothing.
It is "good" or "bad luck" when the result is good or bad, and "good" or "bad fortune" when the result is on a large scale.

Since nothing accidental is prior to that which is per se, neither are accidental causes prior. Therefore if chance or spontaneity is the cause of the universe, mind and nature are prior causes.[574]
A thing may exist only actually or potentially, or actually and potentially; it may be a substance or a quantity or one of the other categories. There is no motion[575] apart from things, for change is always in accordance with the categories of Being[576]; and there is nothing which is common to these and in no one category. Each category belongs to all its members in two ways—e.g. substance, for this is sometimes the form of the thing and sometimes its privation;
and as regards quality there is white and black; and as regards quantity, complete and incomplete; and as regards spatial motion there is up and down or light and heavy—so that there are as many forms of motion and change as there are of Being.[577]

Now since every kind of thing is divided into the potential and the real, I call the actualization of the potential as such,[578] motion.

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[573]This section is taken from *Aristot. Physics 2.5, 6.*

[574]The argument is stated more fully and clearly in *Aristot. Physics 2.6ff.*. Chance produces indirectly the effects produced directly by mind; and spontaneity is similarly related to nature. But the indirect cause presupposes the direct. The argument is directed against the Atomists. Cf. *Aristot. Phys. 196a 24*, *Simplicius 327.24*, *Cicero De Nat. Deor. 1.66* ("nulla cogente natura, sed concursu quodam fortuito").

[575]The discussion of motion in this chapter consists of extracts from *Aristot. Physics 3.1-3.*

[576]i.e., change is substantial (generation and destruction); quantitative (increase and decrease); qualitative (alteration); spatial (locomotion). Cf. *Aristot. Met. 11.12.1, 2.*

[577]This is inaccurate; see previous note.

[578]What Aristotle means by this is explained more clearly in the following sections, which may be summarized thus. The material substrate, e.g. bricks, etc., which is potentially a house, may be regarded (a) as potential material; in this sense it is actualized as bricks before building begins; (b) as potentially a house; in this sense when it is actualized it is no longer buildable but built, i.e., it is no longer potential;

That this is a true statement will be clear from what follows. When the "buildable" in the sense in which we call it such exists actually, it is being built; and this is the process of building. The same is true of the processes of learning, healing, walking, jumping, ageing, maturing. Motion results when the complete reality itself exists, and neither sooner nor later.

The complete reality, then, of that which exists potentially, when it is completely real and actual, not *qua* itself but *qua* movable, is motion. By *qua* I mean this. The bronze is potentially a statue; but nevertheless the complete reality of the bronze *qua* bronze is not motion. To be bronze is not the same as to be a particular potentiality; since if it were absolutely the same by definition the complete reality of the bronze would be a kind of motion; but it is not the same.

(This is obvious in the case of contraries; for the potentiality for health and the potentiality for illness are not the same—for if they were, health and illness would be the same too—but the substrate which becomes healthy or ill, whether it is moisture or blood, is one and the same.) And since it is not the same, just as "color" and "visible" are not the same, it is the complete reality of the potential *qua* potential that is motion.

It is evident that it is this, and that motion results when the complete reality itself exists, and neither sooner nor later. For everything may sometimes be actual, and sometimes not; e.g. the "buildable" *qua* "buildable"; and the actualization of the "buildable" *qua* "buildable" is the act of building.

For the actualization is either this—the act of building—or a house. But when the house exists, it will no longer be buildable; the buildable is that which is *being* built. Hence the actualization must be the act of building, and the act of building is a kind of motion. The same argument applies to the other kinds of motion.

That this account is correct is clear from what the other authorities say about motion, and from the fact that it is not easy to define it otherwise. For one thing, it could not be placed in any other class; this is clear from the fact that some people[579] identify it with otherness and inequality and not-being, none of which is necessarily moved;

moreover change is no more into these or out of them than into or out

(c) as potentially buildable into a house. In this sense its actualization is conterminous with the process of building, and is incomplete (sect.11), and should not be described as *ἐντελέχεια* or "complete reality." But Aristotle often uses this term as synonymous with the vaguer *ἐνέργεια*.

[579]Pythagoreans and Platonists. Cf. *Aristot. Met. 1.5.6*, *Plat. Soph. 256d.*

of their opposites.[580] The reason for placing motion in this class is that it is considered to be indeterminate, and the principles in one of the columns of contraries are indeterminate, being privative; for none of them is a determinate thing or quality or any of the other categories.
The reason for considering motion to be indeterminate is that it cannot be associated either with the potentiality or with the actuality of things; for neither that which is potentially nor that which is actually of a certain size is necessarily moved.
And motion is considered to be a kind of actualization, but incomplete[581]; the reason of this is that the potential, of which it is the actualization, is incomplete.

Thus it is difficult to comprehend what motion is; for we must associate it either with privation or with potentiality or with absolute actuality; and apparently none of these is possible.
There remains, then, the account which we have given; that it is an actuality, and an actuality of the kind which we have described, which is hard to visualize but capable of existing.

That motion is in the movable is evident; for it is the complete realization of the movable by that which is capable of causing motion, and the actualization of that which is capable of causing motion is identical with that of the movable.
For it must be a complete realization of them both; since a thing is capable of moving because it has the potentiality, but it moves only when it is active; but it is upon the movable that it is capable of acting.
Thus the actuality of both alike is one; just as there is the same interval from one to two as from two to one, and the hill up and the hill down are one, although their *being* is not one; the case of the mover and the thing moved is similar.
[582]The infinite is either (a) that which cannot be traversed because it is not its nature to be traversed (just as sound is by nature invisible); or (b) that which admits of an endless traverse; or (c) scarcely admits of traverse; or (d) which, though it would naturally admit of traverse or limit, does not do so. Further, it may be infinite in respect of addition or of subtraction or of both.

That the infinite should be a separate independent entity,[583] and

[580]The criticism implied is: If motion is identified with otherness, inequality, etc., then these concepts must be either (a) subjects of motion, which is absurd, or (b) termini of motion, in which case the same must be true of their contraries, since motion is between contraries.

[581]Cf. note on sect. 2 (end) above, and *Aristot. Met. 9.6.7-10.*

[582]This chapter consists of extracts from *Aristot. Physics 3.4, 5, 7.*

yet imperceptible, is impossible.
For if it is neither magnitude nor plurality, but infinity itself is the essence of it, and not merely an accident, it must be indivisible; because that which is divisible is either magnitude or plurality. And if it is indivisible it cannot be infinite, except in the same way as sound is invisible. But this is not what people mean by infinite; and it is not the infinite in this sense that we are investigating, but the infinite in the sense of the untraversable.
Again, how can the infinite exist independently unless number and magnitude, of which infinity is an attribute, also exist independently?[584] And further, if the infinite is accidental, it cannot, *qua* infinite, be an element of things; just as the invisible is not an element of speech, although sound is invisible. It is clear also that the infinite cannot exist actually.
Otherwise any part of it which we might take would be infinite; for infinity and the infinite are the same, if the infinite is substance and is not predicated of a subject. Therefore it is either indivisible, or if it is partible, the parts into which it is divisible are infinite. But the same thing cannot be many infinites; for just as a part of air is air, so a part of the infinite will be infinite, if the infinite is a substance and principle.
Therefore it is impartible and indivisible. But this is impossible of the actually infinite, because it must be some quantity. Therefore infinity is an accidental attribute. But if so, as we have said, it cannot be it that is a principle, but that of which it is an accident: air[585] or "the even." [586]

The foregoing inquiry is general; but what follows will show that the infinite does not exist in sensible things.
If the definition of a body is "that which is bounded by surfaces," then no body, whether sensible or intelligible, can be infinite nor can there be any separate and infinite number, since number or that which involves number is numerable. This is clearly shown by the following concrete argument. The infinite can neither be composite nor simple. For (a) it cannot be a composite body if the elements are limited in number[587];

[583]The Pythagorean and Platonic view.
[584]Aristotle has argued that they do not in *Aristot. Met. 1.9.16-25.*
[585]According to Anaximenes; cf. *Theophrastus, Phys. Opin. Fr. 2 (Ritter and Preller 26).*
[586]According to the Pythagoreans. Cf. *Aristot. Met. 1.5.5. n*
[587]This is proved in *Aristot. Physics 1.6.*

for the contraries must be equal, and no one of them must be infinite; for if the potency of one of the two corporeal elements is in any way inferior, the finite element will be destroyed by the infinite. And every element cannot be infinite, because body is that which has extension in all directions, and the infinite is that which is extended without limit; so that if the infinite is corporeal it will be infinite in all directions.[588]
Nor (b) can the infinite be any simple body; neither, as some[589] hold, something which is apart from the elements and from which they suppose the elements to be generated (for there is no such body apart from the elements; everything can be resolved into that of which it consists, but we do not see things resolved into anything apart from the simple bodies), nor fire nor any other element.
Apart from the question of how any of them could be infinite, the All, even if it is finite, cannot be or become any one of the elements, as Heraclitus says[590] all things at certain times become fire. The same argument applies as to the One which the physicists posit besides the elements; for all change proceeds from the contrary, e.g. from hot to cold.[591]
Again, a sensible body is in some region, and the region of the whole and of the part (e.g. of the earth) is the same.[592] Therefore if the infinite body is homogeneous, it will be immovable or will always be in motion[593]; but this is impossible, for why should there be rest or motion below rather than above or in any other region? E.g., if there were a clod, in what region would it move or be at rest?
The region proper to the body which is homogeneous with the clod is infinite. Then will the clod occupy the whole of that region? How can it? Then what of its rest or motion? It will either rest everywhere—in which case it cannot move—or move everywhere; in which case it

[588]sc. and so no other body can exist beside it.

[589]Anaximander. It seems, however, that by *ἄπειρον* he meant "indeterminate" or "undifferentiated," although he no doubt regarded this principle as "infinite" as well. Cf. notes on *Aristot. Met. 1.7.3*, *Aristot. Met. 12.2.3.*

[590]Cf. *Hereclitus Fr. 20-22 (Bywater).*

[591]The argument seems to be: Since all change is from contrary to contrary, and it is impossible that either (a) one of the elements should be contrary to the rest, or (b) one material principle should be contrary to all four elements, it follows that no one element, and similarly that no one material principle apart from the elements, can be the ultimate material principle of the universe.

[592]i.e., the region of the universe which is proper to a given element is proper also to any part of that element. The proper region of earth is the center, of fire the circumference of the universe. Cf. *Aristot. De Caelo 1.2.*

[593]Ross is evidently right in taking this to refer to the rest or motion of the parts. An infinite body cannot move as a whole, because there is no space outside it.

cannot rest.[594] And if the whole is not alike throughout, the regions proper to its parts are unlike also; and (a) the body of the whole is not one, except in virtue of contact; (b) the parts will be either finite or infinite in kind.

Finite they cannot be, for then those of one kind would be infinite[595] and those of another would not (if the whole is infinite); e.g., fire or water would be infinite. But such a condition would involve the destruction of the contraries. But if the parts are infinite[596] and simple, the regions proper to them are infinite and the elements will be infinite. And since this is impossible,[597] the regions are finite[598] and the whole must be finite.

In general, there cannot be an infinite body *and* a place for bodies if every body which is sensible has either weight or lightness; for it will have to move either towards the center or upwards, and the infinite—either the whole or the half—cannot do either; for how can you divide it? How can the infinite be part up and part down, or part extreme and part center?

Further, every sensible body is in some place, and of place there are six kinds,[599] but these cannot exist in an infinite body. In general, if an infinite place is impossible, so is an infinite body; because that which is in a place is somewhere, and this means either up or down or one of the other kinds of place, and each of these is a limit.

The infinite is not the same in the sense that it is one nature whether it applies to magnitude or to motion or to time; the posterior is derived from the prior sense, e.g. motion is called infinite in virtue of the magnitude involved when a thing is moved or changed or increased, and time is so called on account of motion.[600]

That which changes either changes accidentally, as when "the cultured" walks; or is said to change in general because something in it changes,

[594] If earth is an infinite body, its region must be infinite. But the infinite has no center (cf. sect. 13). Therefore a clod, which cannot occupy the whole region proper to earth, will have no region proper to itself to which it can move or in which it can rest.

[595] sc. in quantity. If the universe is infinite in quantity, and the elements are limited in kind, some of the elements (or at least one) must be infinite in quantity. But this is impossible, just as it is impossible that all the elements should be infinite in quantity. Cf. sect. 7 above

[596] sc. in kind or number.

[597] Cf. sect. 6 n.

[598] Cf. sect. 14 n.

[599] i.e., above and below, before and behind, right and left (*Aristot. Phys. 205b 31*).

[600] Cf. *Aristot. Met. 5.13.5.*

as in the case of things which change in their parts; the body becomes healthy because the eye does.

But there is something which is moved directly per se, i.e. the essentially movable. The same applies to that which moves, for it moves sometimes accidentally, sometimes partially, and sometimes per se. There is something that moves directly, and something that is moved; and also a time in which, and something from which, and something into which it is moved. But the forms and modifications and place into which moving things are moved are immovable; e.g. knowledge and warmth. It is not warmth that is motion, but the process of warming.

Non-accidental change is not found in all things, but only between contraries and intermediates and contradictories. We can convince ourselves of this by means of induction. That which changes changes either from positive into positive, or from negative into negative, or from positive into negative, or from negative into positive.

By "positive" I mean that which is denoted by an affirmation. Thus there must be three forms of change; for that which is from negative into negative is not change, because they are neither contraries nor contradictories, since they entail no opposition. The change from the negative into its contradictory positive is generation—absolute change absolute generation, and qualified change qualified generation; and the change from the positive to the negative is destruction—absolute change absolute destruction, and qualified change qualified destruction.[601]

Now if "what is not" has several meanings, and neither that which implies a combination or separation of terms,[602] nor that which relates to potentiality and is opposed to unqualified Being, admits of motion ("not-white" or "not-good," however, admits of motion accidentally, because "not-white" may be a man; but that which is "not so-and-so" in an absolute sense does not admit of it at all), then "what is not" cannot be moved. If this is so, generation cannot be motion; for it is "what is not" that is generated.

For even if the generation is in the highest degree accidental, still it is true to say that not-being is predicable of that which is generated

[601] The change from positive to positive is omitted here (but cf. sect. 7). Aristotle no doubt intended to use it as an example of non-substantial change, e.g. from "poor man" to "rich man"; but since this can be regarded as change from "poor man" to "not-poor man," or "not-rich man" to "rich man," he includes it as a qualified type of substantial change.

[602] i.e., falsity. Cf. *Aristot. Met. 9.10.1.*

absolutely. And the argument applies similarly to rest. Thus not only do these difficult conclusions follow, but also that everything which is moved is in a place, whereas "what is not" is not in a place; for then it would *be* somewhere. Nor is destruction motion; for the contrary of motion is motion or rest, but the contrary of destruction is generation. And since every motion is a kind of change, and the three kinds of change are those which we have described,[603] and of these those which relate to generation and destruction are not motions, and these are the changes between contradictories, the change from positive to positive must alone be motion. The subjects are either contraries or intermediates (for privative terms may also be regarded as contraries) and are denoted by a positive term—e.g. "naked" or "toothless" or "black."

Now since the categories are distinguished as substance, quality, place, activity or passivity, relation and quantity,[604] there must be three kinds of motion, in respect of quality, quantity and place. There is no motion[605] in respect of substance, because substance has no contrary; nor of the relative, because it is possible that when one of two related things changes the relation to it of the other thing, even though the thing itself does not change, may become untrue; therefore the motion of these related things is accidental.

Nor is there motion of the agent or patient, or of the mover and the thing moved, because there is no motion of motion nor no generation of generation, nor in general is there change of change. There are two ways in which there might be motion of motion: (1) Motion might be the subject of motion, as, e.g., a man is moved because he changes from white to black; in this way motion might be heated or cooled or might change its place or increase.

But this is impossible, because the change is not a subject. Or (2) some other subject might change from change to some other form of existence, as, e.g., a man changes from sickness to health. But this is also impossible except accidentally.

Every motion is a change from one thing into something else; and

[603] sect. 3.

[604] Aristotle generally distinguishes eight categories (originally ten, but he seems to have abandoned *κεῖσθαι* "position" and *ἔχειν* "state" at an early date); here he omits "time" as being relative to motion (it is that by which motion can be numerically estimated; cf. *Aristot. Met. 12.6.2*, *Aristot. Phys. 219b 1*) and therefore neither the subject nor the terminus of motion. Cf. Ross ad loc.

[605] There is, however, change in respect of substance (generation and destruction), but this is between contradictories and is not motion in the strict sense. Cf. *Aristot. Met. 11.11.6*, and sect. 4 below. The distinction between motion and change is not always maintained.

the same is true of generation and destruction, except that these are changes into opposites in one sense,[606] while the other, i.e. motion, is a change into opposites in another sense.[607] Hence a thing changes at the same time from health to sickness, and from this change itself into another.

Now clearly if it has fallen ill it will be already changed (for it cannot remain at rest) into that other change, whatever it may be; and further this cannot be, in any given case, any chance change; and it also must be from something into something else. Therefore it will be the opposite change, viz. becoming healthy. But this is so accidentally; just as there is change from recollecting to forgetting because the *subject* changes, now in the direction of knowledge and now in that of ignorance.

Further, we shall have an infinite series if there is to be change of change and becoming of becoming, because if the latter of two becomings comes to be from the former, the former must come to be too. E.g., if simple becoming was once coming to be, that which comes to be something was also once coming to be. Therefore that which simply comes to be was not yet, but there was already something coming to be coming to be something.

But this too was at one time coming to be, and therefore it was not at that time coming to be something. But in infinite series there is no first term, and therefore in this series the first term cannot exist, nor can any subsequent term. Therefore nothing can be either generated or moved or changed.

Further, the same thing which admits of motion admits also of the contrary motion and of rest, and that which admits of generation admits also of destruction.

Therefore that which comes to be, when it has come to be coming to be, is then in course of perishing[608]; for it does not perish as soon as it is coming to be coming to be, nor afterwards, because that which is perishing must *exist* .[609]

Further, there must be some matter underlying that which is com-

[606] sc. contradictories.

[607] sc. contraries.

[608] sc. which is absurd.

[609] That which comes to be must cease to be, and it can cease to be only when it exists. Therefore if that which comes to be comes to be coming to be, it must cease to be when it *is* coming to be; before this it does not exist, but is only coming to be coming to be, and after this it is not "that which comes to be" but "that which has come to be."

ing to be or changing. What then will it be? What is it that becomes motion or generation in the same way as it is body or soul that undergoes change? And moreover what is that which is the terminus of the motion? For that which we are considering must be a motion or generation *of* A *from* B *into* C.
How then can these conditions be fulfilled? There can be no learning of learning, and therefore there can be no generation of generation.

Since there is no motion of substance or of the relative or of activity and passivity, it remains that there is motion in respect of quality, quantity and place; for each of these admits of contrariety. By "quality" I mean not that which is in the substance (for indeed even the differentia is a quality), but the passive quality in virtue of which a thing is said to be acted upon or to be immune from being acted upon.[610]
The immovable is either that which is wholly incapable of being moved, or that which is scarcely moved in the course of a long time or is slow in starting, or that which would naturally be moved but cannot be moved at the time when and from the place whence and in the way in which it would naturally be moved. This last is the only kind of immovable thing which I recognize as being at rest; for rest is contrary to motion, and so must be a privation of that which admits of motion.
Things are "together in place" which are in the primary sense[611] in one place, and "separate" which are in different places. "Contrary in place" is that which is at a maximum distance in a straight line.[612]
Things are said to be "in contact" whose extremes are together in place. An "intermediate" is that at which a changing thing which changes continuously in accordance with its nature naturally arrives before it arrives at the extreme into which it is changing. Since all change takes place between opposites, and these are either contraries or contradictories, and contradictories have no middle term, clearly it is to the sphere of contraries that the intermediate belongs.[613]
"Successive" is that which comes after the beginning (the order being determined by position or form or in some other way) and has nothing

[610]Cf. *Aristot. Met. 5.14.*

[611]i.e., when they occupy one place to the exclusion of anything else. Cf. *Aristot. Phys. 209a 33-b 1.*

[612]I have transferred this sentence from the end of the section, where it is placed in the text, on the ground that it fits more naturally here. I suspect that it, like the displaced portion of sect. 13, was originally a marginal note which was later inserted in the body of the text, but in the wrong position.

[613]I have followed Prantl's suggestion in transferring this sentence from the end of sect. 13.

of the same class between itself and that which it succeeds; e.g. lines in the case of a line, and units in that of a unit, and a house in the case of a house (but there is nothing to prevent something else from coming between). For that which is successive is a thing which is successive and posterior to some other thing. 1 is not successive to 2, nor is the new moon[614] to the second day of the month.

"Contiguous" is that which is successive and in contact. The "continuous" is a species of the contiguous.

I call two things continuous when their respective boundaries, by which they are kept together in contact, become one and the same; hence clearly the continuous belongs to the sphere of things whose nature it is to become one by contiguity.

Clearly "successive" is the most ultimate term; for the successive need not be in contact, but contact implies succession; and if there is continuity there is contact, but if there is contact there is not necessarily continuity;

and where there is no contact there is no coalescence. Therefore a point is not the same as a unit; for points admit of contact, whereas units do not, but only of succession; and between points there is something intermediate, but between units there is not.

[614] i.e., the first day of the month.

Book 12

Our inquiry is concerned with substance; for it is the principles and causes of substances that we are investigating. Indeed if the universe is to be regarded as a whole, substance is its first part; and if it is to be regarded as a succession,[615] even so substance is first, then quality, then quantity. Moreover, the latter hardly exist at all in the full sense, but are merely qualifications and affections of Being. Otherwise "not-white" and "not-straight" would also exist; at any rate we say that they too "are," e.g., "it is not white."

Further, none of the other categories is separately existent. Even the ancients in effect testify to this, for it was of substance that they sought the principles and elements and causes. Present-day thinkers[616] tend to regard universals as substance, because genera are universal, and they hold that these are more truly principles and substances because they approach the question theoretically; but the ancients identified substance with particular things, e.g. fire and earth, and not with body in general.

Now there are three kinds of substance. One is *sensible* (and may be either eternal[617] or perishable; the latter, e.g. plants and animals, is universally recognized); of this we must apprehend the elements, whether they are one or many.

Another is *immutable* , which certain thinkers hold to exist separately; some dividing it into two classes, others combining the Forms and the objects of mathematics into a single class, and others recognizing only the objects of mathematics as of this nature.[618] The first two kinds of

[615] Cf. *Aristot. Met. 12.10.14*, *Aristot. Met. 14.3.9.*

[616] Platonists.

[617] i.e., the celestial bodies.

[618] These three views were held respectively by Plato, Xenocrates and Speusippus.

substance come within the scope of physics, since they involve motion; the last belongs to some other science, if there is no principle common to all three.

Sensible substance is liable to change. Now if change proceeds from opposites or intermediates—not however from all opposites (for speech is not white), but only from the contrary[619]—then there must be something underlying which changes into the opposite contrary; for the contraries[620] do not change.

Further, something persists, whereas the contrary does not persist. Therefore besides the contraries there is some third thing, the *matter* . Now if change is of four kinds, in respect either of substance or of quality or of quantity or of place, and if change of substance is generation or destruction in the simple sense, and change of quantity is increase or decrease, and change of affection is alteration, and change of place is locomotion, then changes must be in each case into the corresponding contrary state.

It must be the matter, then, which admits of both contraries, that changes. And since "that which is" is twofold, everything changes from that which is potentially to that which is actually; e.g. from potentially white to actually white. The same applies to increase and decrease. Hence not only may there be generation accidentally from that which is not, but also everything is generated from that which is, but is potentially and is not actually.

And this is the "one" of Anaxagoras; for his "all things were together,"[621] and the "mixture" of Empedocles and Anaximander and the doctrine of Democritus would be better expressed as "all things were together potentially, but not actually." [622]

Hence these thinkers must have had some conception of matter. All things which change have matter, but different things have different kinds; and of eternal things such as are not generable but are movable by locomotion have matter; matter, however, which admits not of

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Cf. *Aristot. Met. 7.2.3, 4*; *Aristot. Met. 13.1.4*, and see Introduction.

[619] Cf. *Aristot. Met. 10.7.*

[620] i.e., contrary qualities. Cf. *Aristot. Met. 8.5.1.*

[621] *Anaxagoras Fr. 1 (Diels).*

[622] In this passage I follow Ross's punctuation and interpretation, which seem to me to be certainly right. Anaxagoras's undifferentiated infinity of homoeomerous particles (although contrasted with the unifying principle of Mind, cf. *Aristot. Met. 1.8.14*) can be regarded as in a sense a unity. Again, *μῖγμα*(as Ross points out) in its Aristotelian sense of "complete fusion" is a fair description of Anaximander's "indeterminate." The general meaning of the passage is that in each of the systems referred to the material principle in its elemental state should have been described as existing only potentially.

generation, but of motion from one place to another.[623]

One might raise the question from what sort of "not-being" generation takes place; for not-being has three senses.[624] If a thing exists through a potentiality, nevertheless it is not through a potentiality for any chance thing; different things are derived from different things.
Nor is it satisfactory to say that "all things were together," for they differ in their matter, since otherwise why did they become an infinity and not one? For Mind is one; so that if matter is also one, only that could have come to be in actuality whose matter existed potentially.
The causes and principles, then, are three; two being the pair of contraries, of which one is the formula or form and the other the privation, and the third being the matter.[625]
We must next observe[626] that neither matter nor form (I mean in the proximate sense) is generated. All change is of some subject by some agent into some object. The agent is the immediate mover; the subject is the matter; and the object is the form. Thus the process will go on to infinity if not only the bronze comes to be round, but also roundness or bronze comes to be; there must, then, be some stopping-point.
We must next observe that every substance is generated from something which has the same name ("substances" including not only natural but all other products). Things are generated either by art or by nature or by chance or spontaneously. Art is a generative principle in something else; nature is a generative principle in the subject itself[627](for man begets man); the other causes are privations of these.[628]
There are three kinds of substance: (1.) matter, which exists individually in virtue of being apparent[629](for everything which is characterized by contact and so not by coalescence is matter and substrate; e.g. fire,

[623]Cf. *Aristot. Met. 12.1.3*, *Aristot. Met. 8.1.7, 8.*

[624](1) the negation of a category, (2) falsity, (3) unrealized potentiality. Cf. *Aristot. Met. 14.2.10.*

[625]This classification is found in *Aristot. Physics 1.6, 7*, but is foreign to the main treatise of the *Metaphysics.* See Introduction.

[626]See Introduction.

[627]In natural reproduction the generative principle is obviously in the parent. But the offspring is in a sense a part of the parent, and so Aristotle identifies the two.

[628]Cf. *Aristot. Met. 11.8.12 n.*

[629]Aristotle is contrasting proximate with primary matter. Fire, the primary matter of a man, is a simple undifferentiated element which cannot be perceived as such, and has no individuality. The head, and the other parts of the body, considered merely as in contact and not as forming an organic unity, are the proximate matter of a man; they are perceptible and individual. Flesh (in general) represents the matter in an intermediate stage.

flesh and head; these are all matter, and the last is the matter of a substance in the strictest sense); (2.) the "nature"[630](existing individually)—i.e. a kind of positive state which is the terminus of motion; and (3.) the particular combination of these, e.g. Socrates or Callias. In some cases the individuality does not exist apart from the composite substance (e.g., the form of a house does not exist separately, except as the art of building;
nor are these forms liable to generation and destruction; there is a distinct sense in which "house" and "health" and every artificial product, considered in the abstract, do or do not exist[631]); if it does so at all, it does so in the case of natural objects. Hence Plato was not far wrong in saying[632] that there are as many Forms as there are kinds of natural objects; that is if there are Forms distinct from the things of our world. Moving causes are causes in the sense of pre-existent things, but formal causes coexist with their effects. For it is when the man becomes healthy that health exists, and the shape of the bronze sphere comes into being simultaneously with the bronze sphere.
Whether any form remains also afterwards is another question. In some cases there is nothing to prevent this, e.g. the soul may be of this nature (not all of it, but the intelligent part; for presumably all of it cannot be). Clearly then there is no need on these grounds for the Ideas to exist; for man begets man, the individual begetting the particular person. And the same is true of the arts, for the art of medicine is the formula of health.
In one sense the causes and principles are different for different things; but in another, if one speaks generally and analogically, they are the same for all. For the question might be raised whether the principles and elements of substances and of relations are the same or different; and similarly with respect to each of the other categories. But it is absurd that they should be the same for all; for then relations and substance would have the same constituents.
What then can their common constituent be? For there is nothing common to and yet distinct from substance and the other predicable categories, yet the element is prior to that of which it is an element. Moreover substance is not an element of relations, nor is any of the latter an element of substance. Further, how can all the categories have the same elements?

[630]i.e., form.
[631]i.e., in the mind of the architect or doctor.
[632]See Introduction.

For no element can be the same as that which is composed of elements; e.g., neither B nor A can be the same as BA (nor indeed can any of the "intelligibles,"[633] e.g. Unity or Being, be an element; for these apply in every case, even to composite things); hence no element can be either substance or relation. But it must be one or the other. Therefore the categories have not all the same elements.

The truth is that, as we say, in one sense all things have the same elements and in another they have not. E.g., the elements of sensible bodies are, let us say, (1) as form, the hot, and in another sense the cold, which is the corresponding privation; as matter, that which directly and of its own nature is potentially hot or cold. And not only these are substances, but so are (2) the compounds[634] of which they are principles, and (3) any unity which is generated from hot and cold, e.g. flesh or bone; for the product of hot and cold must be distinct from them.

These things, then, have the same elements and principles, although specifically different things have specifically different elements; we cannot, however, say that all things have the same elements in this sense, but only by analogy: i.e., one might say that there are three principles, form, privation and matter.

But each of these is different in respect of each class of things, e.g., in the case of color they are white, black, surface; or again there is light, darkness and air, of which day and night are composed. And since not only things which are inherent in an object are its causes, but also certain external things, e.g. the moving cause, clearly "principle" and "element" are not the same; but both are causes. Principles are divided into these two kinds, and that which moves a thing or brings it to rest is a kind of principle and substance.

Thus analogically there are three elements and four causes or principles; but they are different in different cases, and the proximate moving cause is different in different cases. Health, disease, body; and the moving cause is the art of medicine. Form, a particular kind of disorder, bricks; and the moving cause is the art of building.

And since in the sphere of natural objects the moving cause of man is man, while in the sphere of objects of thought the moving cause is the form or its contrary, in one sense there are three causes and in another four. For in a sense the art of medicine is health, and the art

[633] Unity and Being are called intelligibles as being the most universal predicates and as contrasted with particulars, which are sensible.

[634] This apparently refers to the elements; fire and air are hot matter, water and earth cold matter.

of building is the form of a house, and man begets man; but besides these there is that which as first of all things moves all things.[635]
Now since some things can exist in separation and others cannot, it is the former that are substances. And therefore all things have the same causes, because without substance there can be no affections and motions. Next we shall see[636] that these causes are probably soul and body, or mind, appetite and body.[637] Again, there is another sense in which by analogy the principles are the same viz. actuality and potentiality; but these are different for different things, and apply to them in different ways.
For in some cases the same thing exists now actually and now potentially; e.g. wine or flesh or man (actuality and potentiality also fall under the causes as already described; for the form exists actually if it is separable, and so does the compound of form and matter, and the privation, e.g. darkness or disease; and the matter exists potentially, for it is this which has the potentiality of becoming both[638];
but the distinction in virtue of actuality and potentiality applies in a different sense to cases where the matter of cause and effect is not the same, in some of which the form is not the same but different. E.g., the cause of a man is (i) his elements: fire and earth as matter, and the particular form; (2) some external formal cause, viz. his father; and besides these (3) the sun and the ecliptic,[639] which are neither matter nor form nor privation nor identical in form with him, but cause motion.

Further, we must observe that some causes can be stated universally, but others cannot.
The proximate principles of all things are the proximate actual individual and another individual which exists potentially.[640] Therefore the proximate principles are not universal. For it is the particular that is the principle of particulars; "man" in general is the principle of "man"

[635]For the first time the ultimate efficient cause is distinguished from the proximate. Aristotle is leading up to the description of the Prime Mover which occupies the latter half of the book.

[636]See Introduction.

[637]Aristotle is thinking of animals and human beings, which are substances in the truest sense.

[638]i.e., of acquiring either of the contrary qualities distinguished by the form and the privation

[639]The sun, moving in the ecliptic, approaches nearer to the earth in summer, causing generation, and recedes farther from the earth in winter, causing destruction. Cf. *Aristot. Met. 12.6.10 n., Aristot. De Gen. et Corr. 336a 32.*

[640]i.e., the proximate efficient cause and proximate matter.

in general, but there is no such person as "man," whereas Peleus is the principle of Achilles and your father of you, and this particular B of this particular BA; but B in general is the principle of BA regarded absolutely.

Again, even if the causes of substances are universal, still, as has been said,[641] different things, i.e. things which are not in the same genus, as colors, sounds, substances and quantity, have different causes and elements, except in an analogical sense; and the causes of things which are in the same species are different, not in species, but because the causes of individuals are different: your matter and form and moving cause being different from mine, although in their universal formula they are the same.

As for the question what are the principles or elements of substances and relations and qualities, whether they are the same or different, it is evident that when the terms "principle" and "element" are used with several meanings they are the same for everything; but when the meanings are distinguished, they are not the same but different; except that in a certain sense they are the same for all. In a certain sense they are the same or analogous, because (a) everything has matter, form, privation and a moving cause; (b) the causes of substances may be regarded as the causes of all things, since if substances are destroyed everything is destroyed; and further (c) that which is first in complete reality[642] is the cause of all things.

In another sense, however, proximate causes are different; there are as many proximate causes as there are contraries which are predicated neither as genera nor with a variety of meanings[643]; and further the particular material causes are different. Thus we have stated what the principles of sensible things are, and how many they are, and in what sense they are the same and in what sense different.

Since we have seen[644] that there are three kinds of substance, two of which are natural and one immutable, we must now discuss the last named and show that there must be some substance which is eternal and immutable. Substances are the primary reality, and if they are all perishable, everything is perishable. But motion cannot be either generated or destroyed, for it always existed[645]; nor can time, because there can be no priority or posteriority if there is no time.[646]

[641] *Aristot. Met. 12.4.6.*

[642] i.e., the prime mover.

[643] i.e., individual forms and privations of individual things.

[644] *Aristot. Met. 12.1.3, 4.*

[645] Cf. *Aristot. Physics 8.1-3*

Hence as time is continuous, so too is motion; for time is either identical with motion or an affection of it.[647] But there is no continuous motion except that which is spatial, of spatial motion only that which is circular.[648]

But even if we are to suppose that there is something which is kinetic and productive although it does not actually move or produce, there will not necessarily be motion; for that which has a potentiality may not actualize it.

Thus it will not help matters if we posit eternal substances, as do the exponents of the Forms, unless there is in them some principle which can cause change.[649] And even this is not enough, nor is it enough if there is another substance besides the Forms; for unless it actually functions there will not be motion.

And it will still not be enough even if it does function, if its essence is potentiality; for there will not be eternal motion, since that which exists potentially may not exist. Therefore there must be a principle of this kind whose essence is actuality. Furthermore these substances[650] must be immaterial; for they must be eternal if anything is. Therefore they are actuality.

There is a difficulty, however; for it seems that everything which actually functions has a potentiality, whereas not everything which has a potentiality actually functions; so that potentiality is prior. But if this is so, there need be no reality; for everything may be capable of existing, but not yet existent.

Yet if we accept the statements of the cosmologists who generate everything from Night,[651] or the doctrine of the physicists that "all things were together,"[652] we have the same impossibility; for how can there be motion if there is no actual cause? Wood will not move itself—carpentry must act upon it; nor will the menses or the earth move themselves—the seeds must act upon the earth, and the semen on the menses.

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[646]The argument seems to be: If we assume that time was generated, it follows that before that there was no time; but the very term "before" implies time. The same applies to the destruction of time.

[647]Cf. *Aristot. Met. 11.12.1 n.*

[648]These statements are proved in *Aristot. Physics 8.8, 9.*

[649]As there is not, according to Aristotle; cf. *Aristot. Met. 1.7.4.*

[650]Aristotle is now thinking not only of the prime mover (God or Mind) but also of the movers of the celestial spheres. Cf. *Aristot. Met. 12.8.14.*

[651]Cf. *Hes. WD 17, Hes. Th. 116ff.*

[652]Cf. *Aristot. Met. 12.2.3.*

Hence some, e.g. Leucippus[653] and Plato,[654] posit an eternal actuality, for they say that there is always motion; but why there is, and what it is, they do not say; nor, if it moves in this or that particular way, what the cause is. For nothing is moved at haphazard, but in every case there must be some reason present; as in point of fact things are moved in one way by nature, and in another by force or mind or some other agent. And further, what kind of motion is primary? For this is an extremely important point.

Again, Plato at least cannot even explain what it is that he sometimes thinks to be the source of motion, i.e., that which moves itself; for according to him the soul is posterior to motion and coeval with the sensible universe.[655] Now to suppose that potentiality is prior to actuality is in one sense right and in another wrong; we have explained[656] the distinction.

But that actuality is prior is testified by Anaxagoras (since mind is actuality), and by Empedocles with his theory of Love and Strife, and by those who hold that motion is eternal, e.g. Leucippus.

Therefore Chaos or Night did not endure for an unlimited time, but the same things have always existed, either passing through a cycle or in accordance with some other principle—that is, if actuality is prior to potentiality.

Now if there is a regular cycle, there must be something[657] which remains always active in the same way; but if there is to be generation and destruction, there must be something else[658] which is always active in two different ways. Therefore this must be active in one way independently, and in the other in virtue of something else, i.e. either of some third active principle or of the first.

It must, then, be in virtue of the first; for this is in turn the cause both of the third and of the second. Therefore the first is preferable, since it was the cause of perpetual regular motion, and something else was the cause of variety; and obviously both together make up the cause of perpetual variety. Now this is just what actually characterizes motions;

[653] Cf. *Aristot. Met. 1.4.12*, *Aristot. De Caelo 300b 8*, and see Burnet, E.G.P. 178.

[654] Cf. *Plat. Tim. 30a*, and sect. 8 below.

[655] Aristotle refers to Plato's rather inconsistent account in *Plat. Tim. 30-34*.

[656] The reference is probably to 5 above, but cf. *Aristot. Met. 9.8*.

[657] The sphere of the fixed stars, *Aristot. Met. 12.8.9*; cf. *Aristot. De Gen. et Corr. 336a 23ff.*

[658] The sun, which has its own yearly orbit in the ecliptic, and a daily rotation round the earth, which is explained most economically with reference to the rotation of the sphere of the fixed stars. Cf. *Aristot. Met. 12.5.3 n.*, *Aristot. De Gen. et Corr. 336a 23ff.*

therefore why need we seek any further principles?
Since (a) this is a possible explanation, and (b) if it is not true, we shall have to regard everything as coming from "Night"[659] and "all things together" and "not-being,"[660] these difficulties may be considered to be solved. There is something which is eternally moved with an unceasing motion, and that circular motion. This is evident not merely in theory, but in fact. Therefore the "ultimate heaven" must be eternal. Then there is also something which moves it.
And since that which is moved while it moves is intermediate, there is something which moves without being moved; something eternal which is both substance and actuality.

Now it moves in the following manner. The object of desire and the object of thought move without being moved. The primary objects of desire and thought are the same. For it is the apparent good that is the object of appetite, and the real good that is the object of the rational will.[661] Desire is the result of opinion rather than opinion that of desire; it is the act of thinking that is the starting-point.
Now thought is moved by the intelligible, and one of the series of contraries[662] is essentially intelligible. In this series substance stands first, and of substance that which is simple and exists actually. (The one and the simple are not the same; for one signifies a measure,[663] whereas "simple" means that the subject itself is in a certain state.)
But the Good, and that which is in itself desirable, are also in the same series; and that which is first in a class is always best or analogous to the best.

That the final cause may apply to immovable things is shown by the distinction of its meanings. For the final cause is not only "the good *for something*," but also "the good which is *the end of some action*." In the latter sense it applies to immovable things, although in the former it does not; and it causes motion as being an object of love, whereas all other things cause motion because they are themselves in motion.
Now if a thing is moved, it can be otherwise than it is. Therefore if

[659] *Aristot. Met. 12.6.6*

[660] *Aristot. Met. 12.2.2, 3.*

[661] This shows that desire in general (of which appetite and will are the irrational and rational aspects) has as its object the good.

[662] Aristotle himself recognizes two series, lists or columns of contraries, similar to those of the Pythagoreans (*Aristot. Met. 1.5.6*). One, the positive, contains being, unity, substance, etc.; the other is negative and contains not-being, plurality, non-substance, etc. The negative terms are intelligible only in reference to the positive. Cf. *Aristot. Met. 4.2.21.*

[663] Cf *Aristot. Met. 5.6.17.*

the actuality of "the heaven" is primary locomotion, then in so far as "the heaven" is moved, in this respect at least it is possible for it to be otherwise; i.e. in respect of place, even if not of substantiality. But since there is something—X—which moves while being itself unmoved, existing actually, X cannot be otherwise in any respect.

For the primary kind of change is locomotion,[664] and of locomotion circular locomotion[665]; and this is the motion which X induces. Thus X is necessarily existent; and *qua* necessary it is good, and is in this sense a first principle.[666] For the necessary has all these meanings: that which is by constraint because it is contrary to impulse; and that without which excellence is impossible; and that which cannot be otherwise, but is absolutely necessary.[667]

Such, then, is the first principle upon which depend the sensible universe and the world of nature.

And its life is like the best which we temporarily enjoy. It must be in that state always (which for us is impossible), since its actuality is also pleasure.[668](And for this reason waking, sensation and thinking are most pleasant, and hopes and memories are pleasant because of them.) Now thinking in itself is concerned with that which is in itself best, and thinking in the highest sense with that which is in the highest sense best.[669]

And thought thinks itself through participation in the object of thought; for it becomes an object of thought by the act of apprehension and thinking, so that thought and the object of thought are the same, because that which is receptive of the object of thought, i.e. essence, is thought. And it actually functions when it possesses this object.[670] Hence it is actuality rather than potentiality that is held to be the divine possession of rational thought, and its active contemplation is that which is most pleasant and best.

If, then, the happiness which God always enjoys is as great as that

[664]Proved in *Aristot. Physics 8.7.*

[665] *Aristot. Physics 8.9*

[666]The argument is: X (the prime mover), since it imparts the primary motion, cannot be liable to motion (or change) of any kind. Therefore it exists of necessity, and must be good (cf. *Aristot. Met. 5.5.6*); and it is *qua* good, i.e., the object of desire, that X is a first principle.

[667]Cf. *Aristot. Met. 5.5*

[668]For the relation of pleasure to actuality or activity see *Aristot. Nic. Eth. 10.4.*

[669]Since the prime mover is pure actuality, and has or rather is the highest form of life, Aristotle identifies it with the highest activity—pure thinking.

[670]In actualization the subject and object of thought (like those of perception, *Aristot. De Anima 3.2.*) are identical.

which we enjoy sometimes, it is marvellous; and if it is greater, this is still more marvellous. Nevertheless it is so. Moreover, life belongs to God. For the actuality of thought is life, and God is that actuality; and the essential actuality of God is life most good and eternal. We hold, then, that God is a living being, eternal, most good; and therefore life and a continuous eternal existence belong to God; for that is what God is.

Those who suppose, as do the Pythagoreans and Speusippus,[671] that perfect beauty and goodness do

not exist in the beginning (on the ground that whereas the first beginnings of plants and animals are causes, it is in the products of these that beauty and perfection are found) are mistaken in their views. For seed comes from prior creatures which are perfect, and that which is first is not the seed but the perfect creature. E.g., one might say that prior to the seed is the man—not he who is produced from the seed, but another man from whom the seed comes.[672]

Thus it is evident from the foregoing account that there is some substance which is eternal and immovable and separate from sensible things; and it has also been shown that this substance can have no magnitude, but is impartible and indivisible (for it causes motion for infinite time, and nothing finite has an infinite potentiality[673]; and therefore since every magnitude is either finite or infinite, it cannot have finite magnitude,

and it cannot have infinite magnitude because there is no such thing at all); and moreover that it is impassive and unalterable; for all the other kinds of motion are posterior to spatial motion. Thus it is clear why this substance has these attributes.

We must not disregard the question whether we should hold that there is one substance of this kind or more than one, and if more than one, how many; we must review the pronouncements of other thinkers and show that with regard to the number of the substances they have said nothing that can be clearly stated.

The theory of the Ideas contains no peculiar treatment of the question; for the exponents of the theory call the Ideas numbers, and speak of the numbers now as though they were unlimited and now as though they were limited by the number 10[674]; but as for why there should be just

[671] The view is referred to again in *Aristot. Met. 12.10.6*, *Aristot. Met. 14.4.2, 3*, *Aristot. Met. 14.5.1.*

[672] Cf. *Aristot. Met. 9.8.4, 5.*

[673] Cf.*Aristot. Physics 266a24-b6.*

[674] Cf. *Aristot. Met. 13.8.17, 20.* This was a Pythagorean survival, cf. Vol. I.

so many numbers, there is no explanation given with demonstrative accuracy.
We, however, must discuss the question on the basis of the assumptions and distinctions which we have already made.

The first principle and primary reality is immovable, both essentially and accidentally, but it excites the primary form of motion, which is one and eternal.
Now since that which is moved must be moved by something, and the prime mover must be essentially immovable, and eternal motion must be excited by something eternal, and one motion by some one thing; and since we can see that besides the simple spatial motion of the universe[675](which we hold to be excited by the primary immovable substance) there are other spatial motions—those of the planets—which are eternal (because a body which moves in a circle is eternal and is never at rest—this has been proved in our physical treatises[676]); then each of these spatial motions must also be excited by a substance which is essentially immovable and eternal.
For the nature of the heavenly bodies is eternal, being a kind of substance; and that which moves is eternal and prior to the moved; and that which is prior to a substance must be a substance. It is therefore clear that there must be an equal number of substances, in nature eternal, essentially immovable, and without magnitude; for the reason already stated.[677]
Thus it is clear that the movers are substances, and that one of them is first and another second and so on in the same order as the spatial motions of the heavenly bodies.
As regards the number of these motions, we have now reached a question which must be investigated by the aid of that branch of mathematical science which is most akin to philosophy, i.e. astronomy; for this has as its object a substance which is sensible but eternal, whereas the other mathematical sciences, e.g. arithmetic and geometry, do not deal with any substance. That there are more spatial motions than there are bodies which move in space is obvious to those who have even a moderate grasp of the subject, since each of the non-fixed stars has more than one spatial motion.
As to how many these spatial motions actually are we shall now, to give some idea of the subject, quote what some of the mathematicians

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[675]i.e., the (apparent) diurnal revolution of the heavens.

[676]*Aristot. Physics 8.8, 9, Aristot. De Caelo 1.2, 2.3-8.*

[677]*Aristot. Met. 12.7.12, 13.*

say, in order that there may be some definite number for the mind to grasp; but for the rest we must partly investigate for ourselves and partly learn from other investigators, and if those who apply themselves to these matters come to some conclusion which clashes with what we have just stated, we must appreciate both views, but follow the more accurate.

Eudoxus[678] held that the motion of the sun and moon involves in either case three spheres,[679] of which the outermost is that of the fixed stars,[680] the second revolves in the circle which bisects the zodiac,[681] and the third revolves in a circle which is inclined across the breadth of the zodiac[682]; but the circle in which the moon moves is inclined at a greater angle than that in which the sun moves.

And he held that the motion of the planets involved in each case four spheres; and that of these the first and second are the same[683] as before (for the sphere of the fixed stars is that which carries round all the other spheres, and the sphere next in order, which has its motion in the circle which bisects the zodiac, is common to all the planets); the third sphere of all the planets has its poles in the circle which bisects the zodiac; and the fourth sphere moves in the circle inclined to the equator of the third. In the case of the third sphere, while the other planets have their own peculiar poles, those of Venus and Mercury are the same.

Callippus[684] assumed the same arrangement of the spheres as did Eudoxus (that is, with respect to the order of their intervals), but as regards their number, whereas he assigned to Jupiter and Saturn the same number of spheres as Eudoxus, he considered that two further spheres should be added both for the sun and for the moon, if the phenomena are to be accounted for, and one for each of the other planets.

But if all the spheres in combination are to account for the phenomena,

[678]Of Cnidus (circa 408 -355 B.C.). He was a pupil of Plato, and a distinguished mathematician.

[679]For a full discussion of the theories of Eudoxus and Callipus see Dreyer, *Planetary Systems* 87-114; Heath,*Aristarchus of Samos*190-224.

[680]Not identical with that of the fixed stars, but having the same motion.

[681]i.e., revolves with its equator in the ecliptic.

[682]i.e., has the plane of its equator inclined to the plane of the ecliptic. This sphere carries the sun (or moon) fixed to a point in its equator.

[683]Not the same, but having the same motion.

[684]of Cyzicus (fl. 380 B.C.). Simplicius says (*Simplicius 493.5-8*) that he corrected and elaborated Eudoxus's theory with Aristotle's help while on a visit to him at Athens.

there must be for each of the other planets other spheres, one less in number than those already mentioned, which counteract these and restore to the same position the first sphere of the star which in each case is next in order below.[685] In this way only can the combination of forces produce the motion of the planets.

Therefore since the forces by which the planets themselves are moved are 8 for Jupiter and Saturn, and 25 for the others, and since of these the only ones which do not need to be counteracted are those by which the lowest planet[686] is moved, the counteracting spheres for the first two planets will be 6, and those of the remaining four will be 16; and the total number of spheres, both those which move the planets and those which counteract these, will be 55.

If we do not invest the moon and the sun with the additional motions which we have mentioned,[687] there will be 47 (?)[688] spheres in all.

This, then, may be taken to be the number of the spheres; and thus it is reasonable to suppose that there are as many immovable substances and principles,[689]—the statement of logical necessity may be left to more competent thinkers.

If there can be no spatial motion which is not conducive to the motion of a star, and if moreover every entity and every substance which is impassive and has in itself attained to the highest good should be regarded as an end, then there can be no other entity besides these,[690] and the number of the substances must be as we have said. For if there are other substances, they must move something, since they are the end of spatial motion.

But there can be no other spatial motions besides those already mentioned. This is a reasonable inference from a general consideration of spatial motion. For if everything which moves exists for the sake of that which is moved, and every motion for the sake of something which is moved, no motion can exist for the sake of itself or of some other motion, but all motions must exist for the sake of the stars.

For if we are to suppose that one motion is for the sake of another, the latter too must be for the sake of something else; and since the series

[685] Aristotle is trying to establish a mechanical relation between the spheres, which Eudoxus and Callipus did not attempt to do.

[686] The moon.

[687] In sect. 11.

[688] Either Aristotle has made a slip in his calculations, or we should read *ἐννέα*(Sosigenes) for *ἑπτά*; this would give 49, which appears to be the correct total. For alternative explanations of an error in calculation see Ross ad loc.

[689] i.e., the movers of the spheres.

[690] See previous note.

cannot be infinite, the end of every motion must be one of the divine bodies which are moved through the heavens.

It is evident that there is only one heaven.[691] For if there is to be a plurality of heavens (as there is of men), the principle of each must be one in kind but many in number.

But all things which are many in number have matter (for one and the same definition applies to many individuals, e.g. that of "man"; but Socrates is one[692]), but the primary essence has no matter, because it is complete reality. Therefore the prime mover, which is immovable, is one both in formula and in number; and therefore so also is that which is eternally and continuously in motion. Therefore there is only one heaven.

A tradition has been handed down by the ancient thinkers of very early times, and bequeathed to posterity in the form of a myth, to the effect that these heavenly bodies are gods,[693] and that the Divine pervades the whole of nature.

The rest of their tradition has been added later in a mythological form to influence the vulgar and as a constitutional and utilitarian expedient[694]; they say that these gods are human in shape or are like certain other animals,[695] and make other statements consequent upon and similar to those which we have mentioned.

Now if we separate these statements and accept only the first, that they supposed the primary substances to be gods, we must regard it as an inspired saying and reflect that whereas every art and philosophy has probably been repeatedly developed to the utmost and has perished again, these beliefs of theirs have been preserved as a relic of former knowledge. To this extent only, then, are the views of our forefathers and of the earliest thinkers intelligible to us.

The subject of Mind involves certain difficulties. Mind is held to be of all phenomena the most supernatural; but the question of how we

[691]This paragraph seems to belong to an earlier period of Aristotle's thought. At any rate the argument that plurality involves matter is inconsistent with the view that there are 55 immaterial movers.

[692]The definition or form is one and universal; it is the combination of form with matter that constitutes an individual. Thus a plurality of individuals is caused by the combination of the same form with different matter.

[693]This statement is not literally true. The planets do not seem to have been associated with the gods of popular mythology until the fourth century B.C. (see Burnet, E.G.P. p. 23 n.). But Aristotle's general meaning seems to be that the gods were identified with the primary natural forces; and this is substantially true.

[694]Cf. *Aristot. Met. 2.3.1.*

[695]e.g. the Egyptian deities. Zoomorphism in Greek religion is a doubtful quantity.

must regard it if it is to be of this nature involves certain difficulties. If Mind thinks nothing, where is its dignity? It is in just the same state as a man who is asleep. If it thinks, but something else determines its thinking, then since that which is its essence is not thinking but potentiality,[696] it cannot be the best reality; because it derives its excellence from the act of thinking.

Again, whether its essence is thought or thinking, what does it think? It must think either itself or something else; and if something else, then it must think either the same thing always, or different things at different times. Then does it make any difference, or not, whether it thinks that which is good or thinks at random?

Surely it would be absurd for it to think about some subjects. Clearly, then, it thinks that which is most divine and estimable, and does not change; for the change would be for the worse, and anything of this kind would immediately imply some sort of motion. Therefore if Mind is not thinking but a potentiality, (a) it is reasonable to suppose that the continuity of its thinking is laborious[697]; (b) clearly there must be something else which is more excellent than Mind; i.e. the object of thought;

for both thought and the act of thinking will belong even to the thinker of the worst thoughts.[698] Therefore if this is to be avoided (as it is, since it is better not to see some things than to see them), thinking cannot be the supreme good. Therefore Mind thinks itself, if it is that which is best; and its thinking is a thinking of thinking.

Yet it seems that knowledge and perception and opinion and understanding are always of something else, and only incidentally of themselves.

And further, if to think is not the same as to be thought, in respect of which does goodness belong to thought? for the act of thinking and the object of thought have not the same essence. The answer is that in some cases the knowledge is the object. In the productive sciences, if we disregard the matter, the substance, i.e. the essence, is the object; but in the speculative sciences the formula or the act of thinking is the object. Therefore since thought and the object of thought are not different in the case of things which contain no matter, they will be the same, and the act of thinking will be one with the object of thought.

[696] i.e., if its thinking is determined by something else, Mind is only a potentiality, and not (as described in *Aristot. Met. 12.7.1-9*) the highest actuality.

[697] Cf. *Aristot. Met. 9.8.18.*

[698] If Mind is a potentiality, since a potentiality is of contraries, Mind may think that which is worst.

There still remains the question whether the object of thought is composite; for if so, thought would change in passing from one part of the whole to another. The answer is that everything which contains no matter is indivisible. Just as the human mind, or rather the mind of composite beings,[699] is in a certain space of time[700](for it does not possess the good at this or at that moment, but in the course of a certain whole period it attains to the supreme good, which is other than itself), so is absolute self-thought throughout all eternity.

We must also consider in which sense the nature of the universe contains the good or the supreme good; whether as something separate and independent, or as the orderly arrangement of its parts.

Probably in both senses, as an army does; for the efficiency of an army consists partly in the order and partly in the general; but chiefly in the latter, because he does not depend upon the order, but the order depends upon him. All things, both fishes and birds and plants, are ordered together in some way, but not in the same way; and the system is not such that there is no relation between one thing and another; there is a definite connection.

Everything is ordered together to one end; but the arrangement is like that in a household, where the free persons have the least liberty to act at random, and have all or most of their actions preordained for them, whereas the slaves and animals have little common responsibility and act for the most part at random; for the nature of each class is a principle such as we have described.[701]

I mean, for example, that everything must at least come to dissolution; and similarly there are other respects in which everything contributes to the good of the whole.

We must not fail to observe how many impossibilities and absurdities are involved by other theories, and what views the more enlightened thinkers hold, and what views entail the fewest difficulties.

All thinkers maintain that all things come from contraries; but they are wrong both in saying "all things"[702] and in saying that they come from

[699]i.e., beings composed of matter as well as form. Such beings are contrasted with the divine Mind, which is pure form.

[700]The meaning of this sentence is shown by the definition of Happiness in *Aristot. Nic. Eth. 1098a 16-20.* It takes the human mind a lifetime of the highest intellectual activity of which it is capable to attain to happiness; but the divine Mind is always happy. Cf. *Aristot. Met. 12.7.9.*

[701]The free persons correspond to the heavenly bodies, whose movements are fixed by necessity; the servile class to human beings. Each class acts in accordance with its nature, a principle which "produces obedience to duty in the higher creatures, caprice in the lower" (Ross).

contraries,[703] nor do they explain how things in which the contraries really are present come from the contraries; for the contraries cannot act upon each other. For us, however, this problem is satisfactorily solved by the fact that there is a third factor. Other thinkers make one of the two contraries matter; e.g., this is done by those[704] who make the Unequal matter for the Equal, or the Many matter for the One.

But this also is disposed of in the same way; for the one matter of two contraries is contrary to nothing. Further, on their view everything except Unity itself will partake of evil; for "the Bad"[705] is itself one of the elements. The other school[706] does not even regard the Good and the Bad as principles; yet the Good is in the truest sense a principle in all things. The former school is right in holding that the Good is a principle, but they do not explain how it is a principle—whether as an end or as a moving cause or as form.

Empedocles theory is also absurd, for he identifies the Good with Love.[707] This is a principle both as causing motion (since it combines) and as matter (since it is part of the mixture).[708] Now even if it so happens that the same thing is a principle both as matter and as causing motion, still the essence of the two principles is not the same. In which respect, then, is Love a principle? And it is also absurd that Strife should be imperishable; strife is the very essence of evil.[709]

Anaxagoras makes the Good a principle as causing motion; for Mind moves things, but moves them for some end, and therefore there must be some other Good[710]—unless it is as we say; for on our view the art of medicine is in a sense health.[711] It is absurd also not to provide a contrary for the Good, i.e. for Mind.[712] But all those who recognize

[702] Because there is an eternal substance, which is not derived from contraries (*Aristot. Met. 12.6.1*).

[703] Things are derived from a substrate as well (*Aristot. Met. 12.2.1*).

[704] See on *Aristot. Met. 14.1.4.*

[705] The "Bad" was identified with the unequal; cf. *Aristot. Met. 1.6.10.*

[706] See *Aristot. Met. 12.7.10*

[707] Cf. *Aristot. Met. 1.4.3.*

[708] *Empedocles Fr. 17 (Diels), 18-20.*

[709] Cf. *Aristot. Met. 9.9.3.*

[710] Motion presupposes a final cause, which was not what Anaxagoras meant by "Mind." Cf. *Aristot. Met. 1.7.5.*

[711] Aristotle identifies the efficient cause, in a sense, with the final cause. Cf. *Aristot. Met. 7.9.3.*

[712] In *Aristot. Met. 1.6.10* Aristotle describes Anaxagoras as a recognizing contrary principles of good and evil. Moreover, on Aristotle's own showing, evil cannot be a principle (*Aristot. Met. 9.9.3*).

the contraries fail to make use of the contraries, unless we systematize their theories.
And none of them explains why some things are perishable and others imperishable; for they make all existing things come from the same first principles.[713] Again, some[714] make existing things come from not-being, while others,[715] to avoid this necessity, make all things one. Again, no one explains why there must always be generation, and what the cause of generation is.
Moreover, those who posit two principles must admit another superior principle,[716] and so must the exponents of the Forms; for what made or makes particulars participate in the Forms? And on all other views it follows necessarily that there must be something which is contrary to Wisdom or supreme knowledge, but on ours it does not. For there is no contrary to that which is primary,
since all contraries involve matter, and that which has matter exists potentially; and the ignorance which is contrary to Wisdom would tend towards the contrary of the object of Wisdom; but that which is primary has no contrary.

Further, if there is to be nothing else besides sensible things, there will be no first principle, no order, no generation, and no celestial motions, but every principle will be based upon another,[717] as in the accounts of all the cosmologists and physicists.
And if the Forms or numbers are to exist, they will be causes of nothing; or if not of nothing, at least not of motion.

Further, how can extension, i.e. a continuum, be produced from that which is unextended? Number cannot, either as a moving or as a formal cause, produce a continuum. Moreover, no contrary can be essentially productive and kinetic, for then it would be possible for it not to exist;
and further, the act of production would in any case be posterior to the potentiality. Therefore the world of reality is not eternal. But there are real objects which are eternal. Therefore one of these premisses must be rejected. We have described how this may be done.[718]

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[713]Cf. *Aristot. Met. 3.4.11-20.*

[714]Cf. *Aristot. Met. 12.2.2, 3.*

[715]The Eleatics. Cf. *Aristot. Met. 1.5.10-13.*

[716]i.e., an efficient cause.

[717]If there is nothing but what is sensible or potential, there can be no prime mover (which is actuality) to excite motion in the universe, and no teleology in causation. For the cosmologists on causation see *Aristot. Met. 3.3.11-13.*

[718]By assuming an eternal actual mover (*Aristot. Met. 12.6.4*).

Further, in virtue of what the numbers, or soul and body, or in general the form and the object, are one, no one attempts to explain; nor is it possible to do so except on our theory, that it is the moving cause that makes them one.[719]

As for those[720] who maintain that mathematical number is the primary reality, and so go on generating one substance after another and finding different principles for each one, they make the substance of the universe incoherent (for one substance in no way affects another by its existence or non-existence) and give us a great many governing principles. But the world must not be governed badly:

The rule of many is not good; let one be the ruler.[721]

[719] Cf. *Aristot. Met. 8.6.*

[720] Speusippus and his followers; cf. *Aristot. Met. 7.2.4*, *Aristot. Met. 14.3.8.*

[721] *Hom. Il.2.204.*

Book 13

We have already explained what the substance of sensible things is, dealing in our treatise on physics[722] with the material substrate, and subsequently with substance as actuality.[723]

Now since we are inquiring whether there is or is not some immutable and eternal substance besides sensible substances, and if there is, what it is, we must first examine the statements of other thinkers, so that if they have been mistaken in any respect, we may not be liable to the same mistakes; and if there is any view which is common to them and us, we may not feel any private self-irritation on this score. For we must be content if we state some points better than they have done, and others no worse.

There are two views on this subject. Some say that mathematical objects, i.e. numbers and lines, are substances; and others again that the Ideas are substances.

Now since some[724] recognize these as two classes—the Ideas and the mathematical numbers—and others[725] regard both as having one nature, and yet others[726] hold that only the mathematical substances are substances, we must first consider the mathematical objects, without imputing to them any other characteristic—e.g. by asking whether they are really Ideas or not, or whether they are principles and substances of existing things or not—and merely inquire whether as mathematical objects they exist or not, and if they do, in what sense; then after this we must separately consider the Ideas themselves, simply and in so far

[722]The reference is presumably to *Aristot. Physics 1.*

[723]In Books 7-9.

[724]This was the orthodox Platonist view; cf. *Aristot. Met. 1.6.4.*

[725]Xenocrates and his followers.

[726]The Pythagoreans and Speusippus.

as the accepted procedure requires; for most of the arguments have been made familiar already by the criticisms of other thinkers.
And further, the greater part of our discussion must bear directly upon this second question—viz. when we are considering whether the substances and first principles of existing things are numbers and Ideas; for after we have dealt with the Ideas there remains this third question. Now if the objects of mathematics exist, they must be either in sensible things, as some hold; or separate from them (there are some also who hold this view); or if they are neither the one nor the other, either they do not exist at all, or they exist in some other way. Thus the point which we shall have to discuss is concerned not with their existence, but with the mode of their existence.
That the objects of mathematics cannot be in sensible things, and that moreover the theory that they are is a fabrication, has been observed already in our discussion of difficulties[727] —the reasons being (a) that two solids cannot occupy the same space, and (b) that on this same theory all other potentialities and characteristics would exist in sensible things, and none of them would exist separately. This, then, has been already stated;
but in addition to this it is clearly impossible on this theory for any body to be divided. For it must be divided in a plane, and the plane in a line, and the line at a point; and therefore if the point is indivisible, so is the line, and so on.
For what difference does it make whether entities of this kind are sensible objects, or while not being the objects themselves, are yet present in them? the consequence will be the same, for either they must be divided when the sensible objects are divided, or else not even the sensible objects can be divided.

Nor again can entities of this kind exist separately.
For if besides sensible solids there are to be other solids which are separate from them and prior to sensible solids, clearly besides sensible planes there must be other separate planes, and so too with points and lines; for the same argument applies. And if these exist, again besides the planes, lines and points of the mathematical solid, there must be others which are separate;
for the incomposite is prior to the composite, and if prior to sensible bodies there are other non-sensible bodies, then by the same argument the planes which exist independently must be prior to those which are present in the immovable solids. Therefore there will be planes and

[727] Cf. *Aristot. Met. 3.2.23-30.*

lines distinct from those which coexist with the separately-existent solids; for the latter coexist with the mathematical solids, but the former are prior to the mathematical solids.
Again, in these planes there will be lines, and by the same argument there must be other lines prior to these; and prior to the points which are in the prior lines there must be other points, although there will be no other points prior to these.
Now the accumulation becomes absurd; because whereas we get only one class of solids besides sensible solids, we get three classes of planes besides sensible planes—those which exist separately from sensible planes, those which exist in the mathematical solids, and those which exist separately from those in the mathematical solids—four classes of lines, and five of points;
with which of these, then, will the mathematical sciences deal? Not, surely, with the planes, lines and points in the immovable solid; for knowledge is always concerned with that which is prior. And the same argument applies to numbers; for there will be other units besides each class of points, and besides each class of existing things, first the sensible and then the intelligible; so that there will be an infinite number of kinds of mathematical numbers.
Again, there are the problems which we enumerated in our discussion of difficulties[728]: how can they be solved? For the objects of astronomy will similarly be distinct from sensible things, and so will those of geometry; but how can a heaven and its parts (or anything else which has motion) exist apart from the sensible heaven? And similarly the objects of optics and of harmonics will be distinct, for there will be sound and sight apart from the sensible and particular objects.
Hence clearly the other senses and objects of sense will exist separately; for why should one class of objects do so rather than another? And if this is so, animals too will exist separately, inasmuch as the senses will.

Again, there are certain general mathematical theorems which are not restricted to these substances.
Here, then, we shall have yet another kind of substance intermediate between and distinct from the Ideas and the intermediates, which is neither number nor points nor spatial magnitude nor time. And if this is impossible, clearly it is also impossible that the aforesaid substances should exist separately from sensible objects.
In general, consequences result which are contrary both to the truth

[728] *Aristot. Met. 3.2.23-27.*

and to received opinion if we thus posit the objects of mathematics as definite separately-existent entities. For if they exist in this way, they must be prior to sensible spatial magnitudes, whereas in truth they must be posterior to them; for the incomplete spatial magnitude is in point of generation prior, but in point of substantiality posterior, as the inanimate is to the animate.

Again, in virtue of what can we possibly regard mathematical magnitudes as one? Things in this world of ours may be reasonably supposed to be one in virtue of soul or part of the soul, or some other influence; apart from this they are a plurality and are disintegrated. But inasmuch as the former are divisible and quantitative, what is the cause of their unity and cohesion?

Again, the ways in which the objects of mathematics are generated prove our point;

for they are generated first in the dimension of length, then in that of breadth, and finally in that of depth, whereupon the process is complete. Thus if that which is posterior in generation[729] is prior in substantiality, body will be prior to plane and line, and in this sense it will also be more truly complete and whole, because it can become animate; whereas how could a line or plane be animate? The supposition is beyond our powers of apprehension.

Further, body is a kind of substance, since it already in some sense possesses completeness; but in what sense are lines substances? Neither as being a kind of form or shape, as perhaps the soul is, nor as being matter, like the body; for it does not appear that anything can be composed either of lines or of planes or of points,

whereas if they were a kind of material substance it would be apparent that things can be so composed. Let it be granted that they are prior in formula; yet not everything which is prior in formula is also prior in substantiality. Things are prior in substantiality which when separated have a superior power of existence; things are prior in formula from whose formulae the formulae of other things are compounded. And these characteristics are not indissociable.

For if attributes, such as "moving" or "white," do not exist apart from their substances, "white" will be prior in formula to "white man," but not in substantiality; for it cannot exist in separation, but always exists conjointly with the concrete whole—by which I mean "white man."

Thus it is obvious that neither is the result of abstraction prior, nor

[729] i.e., in the natural order of development. Thus "generation" (*γένεσις*) is used in two different senses in this argument, which therefore becomes invalid (Bonitz).

the result of adding a determinant posterior—for the expression "white man" is the result of adding a determinant to "white."

Thus we have sufficiently shown (a) that the objects of mathematics are not more substantial than corporeal objects; (b) that they are not prior in point of existence to sensible things, but only in formula; and (c) that they cannot in any way exist in separation.

And since we have seen[730] that they cannot exist in sensible things, it is clear that either they do not exist at all, or they exist only in a certain way, and therefore not absolutely; for "exist" has several senses.

The general propositions in mathematics are not concerned with objects which exist separately apart from magnitudes and numbers; they are concerned with magnitudes and numbers, but not with them as possessing magnitude or being divisible. It is clearly possible that in the same way propositions and logical proofs may apply to sensible magnitudes; not *qua* sensible, but *qua* having certain characteristics.

For just as there can be many propositions about things merely *qua* movable, without any reference to the essential nature of each one or to their attributes, and it does not necessarily follow from this either that there is something movable which exists in separation from sensible things or that there is a distinct movable nature in sensible things; so too there will be propositions and sciences which apply to movable things, not *qua* movable but *qua* corporeal only; and again *qua* planes only and *qua* lines only, and *qua* divisible, and *qua* indivisible but having position, and *qua* indivisible only.

Therefore since it is true to say in a general sense not only that things which are separable but that things which are inseparable exist, e.g., that movable things exist, it is also true to say in a general sense that mathematical objects exist, and in such a form as mathematicians describe them.

And just as it is true to say generally of the other sciences that they deal with a particular subject—not with that which is accidental to it (e.g. not with "white" if "the healthy" is white, and the subject of the science is "the healthy"), but with that which is the subject of the particular science; with the healthy if it treats of things *qua* healthy, and with man if *qua* man—so this is also true of geometry. If the things of which it treats are accidentally sensible although it does not treat of them *qua* sensible, it does not follow that the mathematical sciences treat of sensible things—nor, on the other hand, that they treat of other things which exist independently apart from these.

[730] sect. 1-3 above.

Many attributes are essential properties of things as possessing a particular characteristic; e.g., there are attributes peculiar to an animal *qua* female or *qua* male, although there is no such thing as female or male in separation from animals. Hence there are also attributes which are peculiar to things merely *qua* lines or planes.

And in proportion as the things which we are considering are prior in formula and simpler, they admit of greater exactness; for simplicity implies exactness. Hence we find greater exactness where there is no magnitude, and the greatest exactness where there is no motion; or if motion is involved, where it is primary, because this is the simplest kind; and the simplest kind of primary motion is uniform motion.[731]

The same principle applies to both harmonics and optics, for neither of these sciences studies objects *qua* sight or *qua* sound, but *qua* lines and numbers[732]; yet the latter are affections peculiar to the former. The same is also true of mechanics.

Thus if we regard objects independently of their attributes and investigate any aspect of them as so regarded, we shall not be guilty of any error on this account, any more than when we draw a diagram on the ground and say that a line is a foot long when it is not; because the error is not in the premisses.[733] The best way to conduct an investigation in every case is to take that which does not exist in separation and consider it separately; which is just what the arithmetician or the geometrician does.

For man, *qua* man, is one indivisible thing; and the arithmetician assumes man to be one indivisible thing, and then considers whether there is any attribute of man *qua* indivisible. And the geometrician considers man neither *qua* man nor *qua* indivisible, but *qua* something solid. For clearly the attributes which would have belonged to "man" even if man were somehow not indivisible can belong to man irrespectively of his humanity or indivisibility.

Hence for this reason the geometricians are right in what they maintain, and treat of what really exists; i.e., the objects of geometry really exist. For things can exist in two ways, either in complete reality or as matter.[734]

And since goodness is distinct from beauty (for it is always in actions that goodness is present, whereas beauty is also in immovable

[731] *Aristot. Met. 12.7.6.*

[732] Optics studies lines and harmonics numbers because these sciences are subordinate to geometry and arithmetic (*Aristot. An. Post. 75b 15*).

[733] Cf. *Aristot. Met. 14.2.9, 10.*

[734] i.e., potentially.

things), they[735] are in error who assert that the mathematical sciences tell us nothing about beauty or goodness;
for they describe and manifest these qualities in the highest degree, since it does not follow, because they manifest the effects and principles of beauty and goodness without naming them, that they do not treat of these qualities. The main species of beauty are orderly arrangement, proportion, and definiteness; and these are especially manifested by the mathematical sciences.
And inasmuch as it is evident that these (I mean, e.g., orderly arrangement and definiteness) are causes of many things, obviously they must also to some extent treat of the cause in this sense, i.e. the cause in the sense of the Beautiful. But we shall deal with this subject more explicitly elsewhere.[736]
As regards the objects of mathematics, then, the foregoing account may be taken as sufficient to show that they exist, and in what sense they exist, and in what sense they are prior and in what they are not. But as regards the Ideas we must first consider the actual theory in relation to the Idea, without connecting it in any way with the nature of numbers, but approaching it in the form in which it was originally propounded by the first exponents[737] of the Ideas.
The theory of Forms occurred to those who enunciated it because they were convinced as to the true nature of reality by the doctrine of Heraclitus, that all sensible things are always in a state of flux; so that if there is to be any knowledge or thought about anything, there must be certain other entities, besides sensible ones, which persist. For there can be no knowledge of that which is in flux.
Now Socrates devoted his attention to the moral virtues, and was the first to seek a general definition of these (for of the Physicists Democritus gained only a superficial grasp of the subject[738] and defined, after a fashion, "the hot" and "the cold"; while the Pythagoreans[739] at an earlier date had arrived at definitions of some few things—whose formulae they connected with numbers—e.g., what "opportunity" is, or "justice" or "marriage"); and he naturally inquired into the essence of things;

[735]Cf. *Aristot. Met. 3.2.4.*

[736]There is no obvious fulfilment of this promise.

[737]It seems quite obvious that Aristotle intends this vague phrase to refer to Plato. Cf. *Aristot. Met. 1.6.1-3*, with which the following sections 2-5 should be compared. On the whole subject see Introduction.

[738]Cf. *Aristot. Phys. 194a 20*, *Aristot. De Part. Anim. 642a 24.*

[739]Cf. *Aristot. Met. 1.5.2, 16.*

for he was trying to reason logically, and the starting-point of all logical reasoning is the essence. At that time there was as yet no such proficiency in Dialectic that men could study contraries independently of the essence, and consider whether both contraries come under the same science.

There are two innovations[740] which, may fairly be ascribed to Socrates: inductive reasoning and general definition. Both of these are associated with the starting-point of scientific knowledge.

But whereas Socrates regarded neither universals nor definitions as existing in separation, the Idealists gave them a separate existence, and to these universals and definitions of existing things they gave the name of Ideas.[741]

Hence on their view it followed by virtually the same argument that there are Ideas of all terms which are predicated universally[742]; and the result was very nearly the same as if a man who wishes to count a number of things were to suppose that he could not do so when they are few, and yet were to try to count them when he has added to them. For it is hardly an exaggeration to say that there are more Forms than there are particular sensible things (in seeking for whose causes these thinkers were led on from particulars to Ideas); because corresponding to each thing there is a synonymous entity, apart from the substances (and in the case of non-substantial things there is a One over the Many) both in our everyday world and in the realm of eternal entities.

Again, not one of the ways in which it is attempted to prove that the Forms exist demonstrates their point; from some of them no necessary conclusion follows, and from others it follows that there are Form of things of which they hold that there are no Forms.

For according to the arguments from the sciences, there will be Forms of all things of which there are sciences; and according to the "One-over-Many" argument, of negations too; and according to the argument that "we have some conception of what has perished" there will be Forms of perishable things, because we have a mental picture of these things. Further, of the most exact arguments some establish Ideas of relations,

[740] This is perhaps too strong a word. What Aristotle means is that Socrates was the first thinker who attached importance to general definitions and systematically used arguments from analogy in order to arrive at them. The Greeks as a whole were only too readily impressed by analogy; Socrates merely developed an already prevalent tendency. For an example of his method see the reference at *Aristot. Met. 5.29.5 n.*

[741] Cf. Introduction.

[742] With sect. 6-13 cf. *Aristot. Met. 1.9.1-8*, which are almost verbally the same. See Introduction.

of which the Idealists deny that there is a separate genus, and others state the "Third Man."
And in general the arguments for the Forms do away with things which are more important to the exponents of the Forms than the existence of the Ideas; for they imply that it is not the Dyad that is primary, but Number; and that the relative is prior to number, and therefore to the absolute; and all the other conclusions in respect of which certain persons by following up the views held about the Forms have gone against the principles of the theory.
Again, according to the assumption by which they hold that the Ideas exist, there will be Forms not only of substances but of many other things (since the concept is one not only in the case of substances but in the case of non-substantial things as well; and there can be sciences not only of substances but also of other things; and there are a thousand other similar consequences);
but it follows necessarily from the views generally held about them that if the Forms are participated in, there can only be Ideas of substances, because they are not participated in accidentally; things can only participate in a Form in so far as it is not predicated of a subject. I mean, e.g., that if a thing participates in absolute doubleness, it participates also in something eternal, but only accidentally; because it is an accident of "doubleness" to be eternal. Thus the Ideas will be substance. But the same terms denote substance in the sensible as in the Ideal world; otherwise what meaning will there be in saying that something exists besides the particulars, i.e. the unity comprising their multiplicity?
If the form of the Ideas and of the things which participate in them is the same, they will have something in common (for why should duality mean one and the same thing in the case of perishable 2's and the 2's which are many but eternal, and not in the case of absolute duality and a particular 2?). But if the form is not the same, they will simply be homonyms; just as though one were to call both Callias and a piece of wood "man," without remarking any property common to them.
[743]And if we profess that in all other respects the common definitions apply to the Forms, e.g. that "plane figure" and the other parts of the definition apply to the Ideal circle, only that we must also state of what the Form is a Form, we must beware lest this is a quite meaningless statement.[744]

[743]sect. 14, 15 have no counterpart in Book 1.

[744]The suggestion is that the definition of an Ideal circle is the same as that of a

For to what element of the definition must the addition be made? to "center," or "plane" or all of them? For all the elements in the essence of an Idea are Ideas; e.g. "animal" and "two-footed." [745] Further, it is obvious that "being an Idea," just like "plane," must be a definite characteristic which belongs as genus to all its species.[746]

[747]Above all we might examine the question what on earth the Ideas contribute to sensible things, whether eternal or subject to generation and decay; for they are not the cause of any motion or change in them. Moreover they are no help towards the knowledge of other things (for they are not the substance of particulars, otherwise they would be *in* particulars) or to their existence (since they are not present in the things which participate in them. If they were, they might perhaps seem to be causes, in the sense in which the admixture of white causes a thing to be white.

But this theory, which was stated first by Anaxagoras and later by Eudoxus in his discussion of difficulties, and by others also, is very readily refuted; for it is easy to adduce plenty of impossibilities against such a view). Again, other things are not in any accepted sense derived from the Forms.

To say that the Forms are patterns, and that other things participate in them, is to use empty phrases and poetical metaphors; for what is it that fashions things on the model of the Ideas? Besides, anything may both be and come to be without being imitated from something else; thus a man may become like Socrates whether Socrates exists or not,

and even if Socrates were eternal, clearly the case would be the same. Also there will be several "patterns" (and therefore Forms) of the same thing; e.g., "animal" and "two-footed" will be patterns of "man," and so too will the Idea of man.

Further, the Forms will be patterns not only of sensible things but of Ideas; e.g. the genus will be the pattern of its species; hence the same thing will be pattern and copy. Further, it would seem impossible for the substance and that of which it is the substance to exist in separation; then how can the Ideas, if they are the substances of things,

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particular circle, except that it must have added to it the statement of what particular the Idea is an Idea.

[745]sc. in the definition or essence of "Ideal man."

[746]i.e., "being an idea" will be a characteristic common to all ideas, and so must be itself an Idea.

[747]This chapter corresponds almost verbally to *Aristot. Met. 1.9.9-15.* Cf. note on *Aristot. Met. 13.4.6.*

exist in separation from them?

In the*Phaedo*[748] this statement is made: that the Forms are causes both of being and of generation. Yet assuming that the Forms exist, still there is no generation unless there is something to impart motion; and many other things are generated (e.g. house and ring) of which the Idealists say that there are no Forms.

Thus it is clearly possible that those things of which they say that there are Ideas may also exist and be generated through the same kind of causes as those of the things which we have just mentioned, and not because of the Forms. Indeed, as regards the Ideas, we can collect against them plenty of evidence similar to that which we have now considered; not only by the foregoing methods, but by means of more abstract and exact reasoning.

Now that we have dealt with the problems concerning the Ideas, we had better re-investigate the problems connected with numbers that follow from the theory that numbers are separate substances and primary causes of existing things. Now if number is a kind of entity, and has nothing else as its substance, but only number itself, as some maintain; then either (a) there must be some one part of number which is primary, and some other part next in succession, and so on, each part being specifically different[749]—

and this applies directly to units, and any given unit is inaddible to any other given unit; or (b) they[750] are all directly successive, and any units can be added to any other units, as is held of mathematical number; for in mathematical number no one unit differs in any way from another.

Or (c) some units must be addible and others not. E.g., 2 is first after 1, and then 3, and so on with the other numbers; and the units in each number are addible, e.g. the units in the first[751]2 are addible to one another, and those in the first 3 to one another, and so on in the case of the other numbers; but the units in the Ideal 2 are inaddible to those in the Ideal 3;

and similarly in the case of the other successive numbers. Hence

[748] *Plat. Phaedo 100d.*

[749] This statement bears two meanings, which Aristotle confuses: (i) There must be more than one number-series, each series being different in kind from every other series; (2) All numbers are different in kind, and inaddible. Confusion (or textual inaccuracy) is further suggested by the fact that Aristotle offers no alternative statement of the nature of number in general, such as we should expect from his language. In any case the classification is arbitrary and incomplete.

[750] The units.

[751] i.e., Ideal or natural.

whereas mathematical number is counted thus: after 1, 2 (which consists of another 1 added to the former) and 3 (which consists of another 1 added to these two) and the other numbers in the same way, Ideal number is counted like this: after 1, a distinct 2 not including the original 1; and a 3 not including the 2, and the rest of the numbers similarly.
Or (d) one kind of number must be such as we first described, and another or such as the mathematicians maintain, and that which we have last described must be a third kind.

Again, these numbers must exist either in separation from things, or not in separation, but in sensible things (not, however, in the way which we first considered,[752] but in the sense that sensible things are composed of numbers which are present in them[753])—either some of them and not others, or all of them.[754]
These are of necessity the only ways in which the numbers can exist. Now of those who say that unity is the beginning and substance and element of all things, and that number is derived from it and something else, almost everyone has described number in one of these ways (except that no one has maintained that all units are inaddible[755]);
and this is natural enough, because there can be no other way apart from those which we have mentioned. Some hold that both kinds of number exist, that which involves priority and posteriority being identical with the Ideas, and mathematical number being distinct from Ideas and sensible things, and both kinds being separable from sensible things[756]; others hold that mathematical number alone exists,[757] being the primary reality and separate from sensible things.
The Pythagoreans also believe in one kind of number—the mathematical; only they maintain that it is not separate, but that sensible substances are composed of it. For they construct the whole universe of numbers, but not of numbers consisting of abstract units; they suppose the units to be extended—but as for how the first extended unit was formed they appear to be at a loss.[758]

[752]In *Aristot. Met. 13.2.1-3.*

[753]The Pythagorean number-atomist view; See Introduction.

[754]i.e., either all numbers are material elements of things, or some are and others are not.

[755]Cf. sect. 2.

[756]Cf. *Aristot. Met. 1.6.4.*

[757]Cf. *Aristot. Met. 12.10.14.*

[758]Cf. *Aristot. Met. 13.8.9, 10*, *Aristot. Met. 14.3.15*, *Aristot. Met. 14.5.7*, and see Introduction.

Another thinker holds that primary or Ideal number alone exists; and some[759] identify this with mathematical number.

The same applies in the case of lines, planes and solids.

Some[760] distinguish mathematical objects from those which "come after the Ideas"[761]; and of those who treat the subject in a different manner some[762] speak of the mathematical objects and in a mathematical way—viz. those who do not regard the Ideas as numbers, nor indeed hold that the Ideas exist—and others[763] speak of the mathematical objects, but not in a mathematical way; for they deny that every spatial magnitude is divisible into extended magnitudes, or that any two given units make 2.

But all who hold that Unity is an element and principle of existing things regard numbers as consisting of abstract units, except the Pythagoreans; and they regard number as having spatial magnitude, as has been previously stated.[764]

It is clear from the foregoing account (1.) in how many ways it is possible to speak of numbers, and that all the ways have been described. They are all impossible, but doubtless some[765] are more so than others.

First, then, we must inquire whether the limits are addible or inaddible; and if inaddible, in which of the two ways which we have distinguished.[766] For it is possible either (a) that any one unit is inaddible to any other, or (b) that the units in the Ideal 2 are inaddible to those in the Ideal 3, and thus that the units in each Ideal number are inaddible to those in the other Ideal numbers.

Now if all units are addible and do not differ in kind, we get one type of number only, the mathematical, and the Ideas cannot be the numbers thus produced;

for how can we regard the Idea of Man or Animal, or any other Form, as a number? There is one Idea of each kind of thing: e.g. one of Humanity and another one of Animality; but the numbers which are similar and do not differ in kind are infinitely many, so that this is no more the Idea of Man than any other 3 is. But if the Ideas are not

[759] Cf. 10ff., *Aristot. Met. 13.1.4.*

[760] Plato.

[761] i.e., the (semi-)Ideal lines, planes, etc. Cf. *Aristot. Met. 1.9.30.*

[762] Speusippus; cf. sect. 7 above.

[763] Xenocrates. For his belief in indivisible lines see Ritter and Preller 362. Aristotle ascribes the doctrine to Plato in *Aristot. Met. 1.9.25.*

[764] sect. 8.

[765] sc. the view of Xenocrates (cf. *Aristot. Met. 13.8.8*).

[766] *Aristot. Met. 13.6.2, 3.*

numbers, they cannot exist at all;
for from what principles can the Ideas be derived? Number is derived from Unity and the indeterminate dyad, and the principles and elements are said to be the principles and elements of number, and the Ideas cannot be placed either as prior or as posterior to numbers.[767]
But if the units are inaddible in the sense that any one unit is inaddible to any other, the number so composed can be neither mathematical number (since mathematical number consists of units which do not differ, and the facts demonstrated of it fit in with this character) nor Ideal number. For on this view 2 will not be the first number generated from Unity and the indeterminate dyad, and then the other numbers in succession, as they[768] say 2, 3, because the units in the primary 2 are generated at the same time,[769] whether, as the originator of the theory held, from unequals[770](coming into being when these were equalized), or otherwise—
since if we regard the one unit as prior to the other,[771] it will be prior also to the 2 which is composed of them; because whenever one thing is prior and another posterior, their compound will be prior to the latter and posterior to the former.[772]
Further, since the Ideal 1 is first, and then comes a particular 1 which is first of the other 1's but second after the Ideal 1, and then a third 1 which is next

[767]Since the only principles which Plato recognizes are Unity and the Dyad, which are numerical (Aristotle insists on regarding them as a kind of 1 and 2), and therefore clearly principles of number; and the Ideas can only be derived from these principles if they (the Ideas) are (a) numbers (which has been proved impossible) or (b) prior or posterior to numbers (i.e., causes or effects of numbers, which they cannot be if they are composed of a different kind of units); then the Ideas are not derived from any principle at all, and therefore do not exist.

[768]The Platonists.

[769]This was the orthodox Platonist view of the generation of ideal numbers; or at least Aristotle is intending to describe the orthodox view. Plato should not have regarded the Ideal numbers as composed of units at all, and there is no real reason to suppose that he did (see Introduction). But Aristotle infers from the fact that the Ideal 2 is the first number generated (and then the other Ideal numbers in the natural order) that the units of the Ideal 2 are generated simultaneously, and then goes on to show that this is incompatible with the theory of inaddible units.

[770]i.e., the Great-and-Small, which Aristotle wrongly understands as two unequal things. It is practically certain that Plato used the term (as he did that of "Indeterminate Dyad") to describe indeterminate quantity. See Introduction.

[771]This is a necessary implication of the theory of inaddible units (cf. *Aristot. Met. 13.6.1, 2*).

[772]So the order of generation will be: (i) Unity (ungenerated); (2) first unit in 2; (3) second unit in 2; and the Ideal 2 will come between (2) and (3).

after the second but third after the first 1, it follows that the units will be prior to the numbers after which they are called; e.g., there will be a third unit in 2 before 3 exists, and a fourth and fifth in 3 before these numbers exist.[773]

It is true that nobody has represented the units of numbers as inaddible in this way; but according to the principles held by these thinkers even this view is quite reasonable, although in actual fact it is untenable.

For assuming that there is a first unit or first 1,[774] it is reasonable that the units should be prior and posterior; and similarly in the case of 2's, if there is a first 2. For it is reasonable and indeed necessary that after the first there should be a second; and if a second, a third; and so on with the rest in sequence.

But the two statements, that there is after 1 a first and a second unit, and that there is a first 2, are incompatible. These thinkers, however, recognize a first unit and first 1, but not a second and third; and they recognize a first 2, but not a second and third.

It is also evident that if all units are inaddible, there cannot be an Ideal 2 and 3, and similarly with the other numbers;

for whether the units are indistinguishable or each is different in kind from every other, numbers must be produced by addition; e.g. 2 by adding 1 to another 1, and 3 by adding another 1 to the 2, and 4 similarly.[775]

This being so, numbers cannot be generated as these thinkers try to generate them, from Unity and the dyad; because 2 becomes a part of 3,[776] and 3 of 4, and the same applies to the following numbers.

But according to them 4 was generated from the first 2 and the indeterminate dyad, thus consisting of two 2's apart from the Ideal 2.[777] Otherwise 4 will consist of the Ideal 2 and another 2 added to it, and the Ideal 2 will consist of the Ideal 1 and another 1; and if this is so the other element cannot be the indeterminate dyad, because it produces one unit and not a definite 2.[778]

Again, how can there be other 3's and 2's besides the Ideal numbers 3 and 2, and in what way can they be composed of prior and posterior

[773]This is a corollary to the previous argument, and depends upon an identification of "ones" (including the Ideal One or Unity) with units.

[774]i.e., the Ideal One.

[775]This is of course not true of the natural numbers.

[776]i.e., 3 is produced by adding 1 to 2.

[777]Cf. sect. 18.

[778]The general argument is: Numbers are produced by addition; but this is incompatible with the belief in the Indeterminate Dyad as a generative principle, because, being duplicative, it cannot produce single units.

units? All these theories are absurd and fictitious, and there can be no primary 2 and Ideal 3. Yet there must be, if we are to regard Unity and the indeterminate dyad as elements.[779]

But if the consequences are impossible, the principles cannot be of this nature.

If, then, any one unit differs in kind from any other, these and other similar consequences necessarily follow. If, on the other hand, while the units in different numbers are different, those which are in the same number are alone indistinguishable from one another, even so the consequences which follow are no less difficult.

For example, in the Ideal number 10 there are ten units, and 10 is composed both of these and of two 5's. Now since the Ideal 10 is not a chance number,[780] and is not composed of chance 5's, any more than of chance units, the units in this number 10 must be different;

for if they are not different, the 5's of which the 10 is composed will not be different; but since these are different, the units must be different too. Now if the units are different, will there or will there not be other 5's in this 10, and not only the two? If there are not, the thing is absurd[781]; whereas if there are, what sort of 10 will be composed of them? for there is no other 10 in 10 besides the 10 itself:

Again, it must also be true that 4 is not composed of chance 2's. For according to them the indeterminate dyad, receiving the determinate dyad, made two dyads; for it was capable of duplicating that which it received.[782]

Again, how is it possible that 2 can be a definite entity existing besides the two units, and 3 besides the three units? Either by participation of the one in the other, as "white man" exists besides "white" and "man," because it partakes of these concepts; or when the one is a differentia of the other, as "man" exists besides "animal" and "two-footed."

Again, some things are one by contact, others by mixture, and others by position; but none of these alternatives can possibly apply to the units of which 2 and 3 consist. Just as two men do not constitute any one thing distinct from both of them, so it must be with the units.

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[779] i.e., if numbers are not generated by addition, there must be Ideal (or natural) numbers.

[780] I think Ross's interpretation of this passage must be right. The Ideal 10 is a unique number, and the numbers contained in it must be ideal and unique; therefore the two 5's must be specifically different, and so must their units—which contradicts the view under discussion.

[781] i.e., it is only reasonable to suppose that other 5's might be made up out of different combinations of the units.

[782] Cf. Introduction.

The fact that the units are indivisible will make no difference; because points are indivisible also, but nevertheless a pair of points is not anything distinct from the two single points.

Moreover we must not fail to realize this: that on this theory it follows that 2's are prior and posterior, and the other numbers similarly. Let it be granted that the 2's in 4 are contemporaneous; yet they are prior to those in 8, and just as the ⟨determinate⟩ 2 produced the 2's in 4, so[783] they produced the 4's in 8. Hence if the original 2 is an Idea, these 2's will also be Ideas of a sort.

And the same argument applies to the units, because the units in the original 2 produce the four units in 4; and so all the units become Ideas, and an Idea will be composed of Ideas. Hence clearly those things also of which these things are Ideas will be composite; e.g., one might say that animals are composed of animals, if there are Ideas of animals.

In general, to regard units as different in any way whatsoever is absurd and fictitious (by "fictitious" I mean "dragged in to support a hypothesis"). For we can see that one unit differs from another neither in quantity nor in quality; and a number must be either equal or unequal —this applies to all numbers, but especially to numbers consisting of abstract units.

Thus if a number is neither more nor less, it is equal; and things which are equal and entirely without difference we assume, in the sphere of number, to be identical. Otherwise even the 2's in the Ideal 10 will be different, although they are equal; for if anyone maintains that they are not different, what reason will he be able to allege?

Again, if every unit plus another unit makes 2, a unit from the Ideal 2 plus one from the Ideal 3 will make 2—a 2 composed of different units[784]; will this be prior or posterior to 3? It rather seems that it must be prior, because one of the units is contemporaneous with 3, and the other with 2.[785]

We assume that in general 1 and 1, whether the things are equal or unequal, make 2; e.g. good and bad, or man and horse; but the supporters of this theory say that not even two units make 2.

If the number of the Ideal 3 is not greater than that of the Ideal 2, it is strange; and if it is greater, then clearly there is a number in it equal to the 2, so that this number is not different from the Ideal 2. But this is impossible, if there is a first and second number.[786] Nor

[783] In each case the other factor is the indeterminate dyad (cf. sect. 18).

[784] Which conflicts with the view under discussion.

[785] The implication seems to be, as Ross says, that the Platonists will refuse to admit that there is a number between 2 and 3.

will the Ideas be numbers. For on this particular point they are right who claim that the units must be different if there are to be Ideas, as has been already stated.[787] For the form is unique; but if the units are undifferentiated, the 2's and 3's will be undifferentiated.

Hence they have to say that when we count like this, l, 2, we do not add to the already existing number; for if we do, (a) number will not be generated from the indeterminate dyad, and (b) a number cannot be an Idea; because one Idea will pre-exist in another, and all the Forms will be parts of one Form.[788]

Thus in relation to their hypothesis they are right, but absolutely they are wrong, for their view is very destructive, inasmuch as they will say that this point presents a difficulty: whether, when we count and say "1, 2, 3," we count by addition or by enumerating distinct portions.[789] But we do both; and therefore it is ridiculous to refer this point to so great a difference in essence.

First of all it would be well to define the differentia of a number; and of a unit, if it has a differentia. Now units must differ either in quantity or in quality; and clearly neither of these alternatives can be true. "But units may differ, as number does, in quantity." But if units also differed in quantity, number would differ from number, although equal in number of units.

Again, are the first units greater or smaller, and do the later units increase in size, or the opposite? All these suggestions are absurd. Nor can units differ in quality; for no modification can ever be applicable to them, because these thinkers hold that even in numbers quality is a later attribute than quantity.[790]

Further, the units cannot derive quality either from unity or from the dyad; because unity has no quality, and the dyad produces quantity, because its nature causes things to be many. If, then, the units differ in some other way, they should most certainly state this at the outset, and explain, if possible, with regard to the differentia of the unit, why

[786] i.e., if numbers are specifically different. Cf. *Aristot. Met. 13.6.1.*

[787] sect. 2-4 above.

[788] i.e., the biggest number.

[789] This is Apelt's interpretation of *κατὰ μερίδας*. For this sense of the word he quotes *Plut. Mor. 644c.* The meaning then is: If you count by addition, you regard number as exhibited only in concrete instances; if you treat each number as a "distinct portion" (i.e. generated separately), you admit another kind of number besides the mathematical. Aristotle says that number can be regarded in both ways.

[790] Numbers have quality as being prime or composite, "plane" or "solid" (i.e., products of two or three factors); but these qualities are clearly incidental to quantity. Cf. *Aristot. Met. 5.14.2.*

it must exist; or failing this, what differentia they mean.
Clearly, then, if the Ideas are numbers, the units cannot all be addible, nor can they all be inaddible in either sense. Nor again is the theory sound which certain other thinkers[791] hold concerning numbers.
These are they who do not believe in Ideas, either absolutely or as being a kind of numbers, but believe that the objects of mathematics exist, and that the numbers are the first of existing things, and that their principle is Unity itself. For it is absurd that if, as they say, there is a 1 which is first of the 1's,[792] there should not be a 2 first of the 2's, nor a 3 of the 3's; for the same principle applies to all cases.
Now if this is the truth with regard to number, and we posit only mathematical number as existing, Unity is not a principle. For the Unity which is of this nature must differ from the other units; and if so, then there must be some 2 which is first of the 2's; and similarly with the other numbers in succession.
But if Unity is a principle, then the truth about numbers must rather be as Plato used to maintain; there must be a first 2 and first 3, and the numbers cannot be addible to each other. But then again, if we assume this, many impossibilities result, as has been already stated.[793]
Moreover, the truth must lie one way or the other; so that if neither view is sound, number cannot have a separate abstract existence.
From these considerations it is also clear that the third alternative[794] —that Ideal number and mathematical number are the same—is the worst; for two errors have to be combined to make one theory. (1.) Mathematical number cannot be of this nature, but the propounder of this view has to spin it out by making peculiar assumptions; (2.) his theory must admit all the difficulties which confront those who speak of Ideal number.
The Pythagorean view in one way contains fewer difficulties than the view described above, but in another way it contains further difficulties peculiar to itself. By not regarding number as separable, it disposes of many of the impossibilities; but that bodies should be composed of numbers, and that these numbers should be mathematical, is impossible.[795]
For (a) it is not true to speak of indivisible magnitudes[796]; (b) as-

[791] Cf. *Aristot. Met. 13.1.4.*
[792] i.e., Speusippus recognized unity or "the One" as a formal principle, but admitted no other ideal numbers. Aristotle argues that this is inconsistent.
[793] *Aristot. Met. 13.7.1-8.3.*
[794] Cf. *Aristot. Met. 13.6.7.*
[795] See Introduction.

suming that this view is perfectly true, still units at any rate have no magnitude; and how can a magnitude be composed of indivisible parts? Moreover arithmetical number consists of abstract units. But the Pythagoreans identify number with existing things; at least they apply mathematical propositions to bodies as though they consisted of those numbers.[797]

Thus if number, if it is a self-subsistent reality, must be regarded in one of the ways described above, and if it cannot be regarded in any of these ways, clearly number has no such nature as is invented for it by those who treat it as separable.

Again, does each unit come from the Great and the Small, when they are equalized[798]; or does one come from the Small and another from the Great? If the latter, each thing is not composed of all the elements, nor are the units undifferentiated; for one contains the Great, and the other the Small, which is by nature contrary to the Great.

Again, what of the units in the Ideal 3? because there is one over. But no doubt it is for this reason that in an odd number they make the Ideal One the middle unit.[799] If on the other hand each of the units comes from both Great and Small, when they are equalized, how can the Ideal 2 be a single entity composed of the Great and Small? How will it differ from one of its units? Again, the unit is prior to the 2; because when the unit disappears the 2 disappears.

Therefore the unit must be the Idea of an Idea, since it is prior to an Idea, and must have been generated before it. From what, then? for the indeterminate dyad, as we have seen,[800] causes duality.

Again, number must be either infinite or finite (for they make number separable, so that one of these alternatives must be true).[801]

Now it is obvious that it cannot be infinite, because infinite number is neither odd nor even, and numbers are always generated either from odd or from even number. By one process, when 1 is added to an even number, we get an odd number; by another, when 1 is multiplied by 2, we get ascending powers of 2; and by another, when powers of 2 are multiplied by odd numbers, we get the remaining even numbers.

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[796] This is proved in *Aristot. De Gen. et. Corr. 315b 24-317a 17.*

[797] See Introduction.

[798] Cf. *Aristot. Met. 13.7.5 n.* Aristotle is obviously referring to the two units in the Ideal 2.

[799] Cf. DieIs, *Vorsokratiker* 270. 18.

[800] *Aristot. Met. 13.7.18.*

[801] The point seems to be that if number is self-subsistent it must be *actually* finite or infinite. Aristotle himself holds that number is infinite only potentially; i.e., however high you can count, you can always count higher.

Again, if every Idea is an Idea of something, and the numbers are Ideas, infinite number will also be an Idea of something, either sensible or otherwise. This, however, is impossible, both logically[802] and on their own assumption,[803] since they regard the Ideas as they do.

If, on the other hand, number is finite, what is its limit? In reply to this we must not only assert the fact, but give the reason.

Now if number only goes up to 10, as some hold,[804] in the first place the Forms will soon run short. For example, if 3 is the Idea of Man, what number will be the Idea of Horse? Each number up to 10 is an Idea; the Idea of Horse, then, must be one of the numbers in this series, for they are substances or Ideas.

But the fact remains that they will run short, because the different types of animals will outnumber them. At the same time it is clear that if in this way the Ideal 3 is the Idea of Man, so will the other 3's be also (for the 3's in the same numbers[805] are similar), so that there will be an infinite number of men; and if each 3 is an Idea, each man will be an Idea of Man; or if not, they will still be men.

And if the smaller number is part of the greater, when it is composed of the addible units contained in the same number, then if the Ideal 4 is the Idea of something, e.g. "horse" or "white," then "man" will be part of "horse," if "man" is 2. It is absurd also that there should be an Idea of 10 and not of 11, nor of the following numbers.

Again, some things exist and come into being of which there are no Forms[806]; why, then, are there not Forms of these too? It follows that the Forms are not the causes of things.

Again, it is absurd that number up to 10 should be more really existent, and a Form, than 10 itself; although the former is not generated as a unity, whereas the latter is. However, they try to make out that the series up to 10 is a complete number;

at least they generate the derivatives, e.g. the void, proportion, the odd, etc., from within the decad. Some, such as motion, rest, good and evil, they assign to the first principles; the rest to numbers.[807]

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[802] i.e., as implying an actual infinite.

[803] i.e., as inconsistent with the conception of an Idea as a determining principle.

[804] Cf. *Aristot. Met. 12.8.2.* The Platonists derived this view from the Pythagoreans; see Introduction.

[805] Robin is probably right in taking this to mean that the 3 which is in the ideal 4 is like the 3 which is in the 4 which is in a higher ideal number, and so on (*La Theorie platonicienne des Idees et des Nombres d'apres Aristote*, p. 352).

[806] Cf. *Aristot. Met. 13.4.7, 8*; *Aristot. Met. 1.9.2, 3.*

[807] From the Dyad were derived void (*Theophrastus, Met. 312.18-313.3*) and motion (cf. *Aristot. Met. 1.9.29*, *Aristot. Met. 11.9.8*). Rest would naturally be derived

Hence they identify the odd with Unity; because if oddness depended on 3, how could 5 be odd?[808]

Again, they hold that spatial magnitudes and the like have a certain limit; e.g. the first or indivisible line, then the 2, and so on; these too extending up to 10.[809]

Again, if number is separable, the question might be raised whether Unity is prior, or 3 or 2.

Now if we regard number as composite, Unity is prior; but if we regard the universal or form as prior, number is prior, because each unit is a material part of number, while number is the form of the units. And there is a sense in which the right angle is prior to the acute angle—since it is definite and is involved in the definition of the acute angle—and another sense in which the acute angle is prior, because it is a part of the other, i.e., the right angle is divided into acute angles.

Thus regarded as matter the acute angle and element and unit are prior; but with respect to form and substance in the sense of formula, the right angle, and the whole composed of matter and form, is prior. For the concrete whole is nearer to the form or subject of the definition, although in generation it is posterior.[810]

In what sense, then, is the One a first principle? Because, they say, it is indivisible.

But the universal and the part or element are also indivisible. Yes, but they are prior in a different sense; the one in formula and the other in time. In which sense, then, is the One a first principle? for, as we have just said, both the right angle seems to be prior to the acute angle, and the latter prior to the former; and each of them is one.

Accordingly the Platonists make the One a first principle in both senses. But this is impossible; for in one sense it is the One *qua* form or essence, and in the other the One *qua* part or matter, that is primary.

There is a sense in which both number and unit are one; they are so in truth potentially—that is, if a number is not an aggregate but a unity consisting of units distinct from those of other numbers, as the Platonists hold—

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from unity. For good and evil see *Aristot. Met. 1.6.10.* Proportion alone of the "derivatives" here mentioned appears to be derived from number. As Syrianus says, the three types of proportion can be illustrated by numbers from within the decad—arithmetical 1. 2. 3, geometrical 1. 2. 4, harmonic 2. 3. 6.

[808]sc. because (on their theory) 3 is not contained in 5. Thus oddness had to be referred to not a number but a principle—unity.

[809]The "indivisible line" or point was connected with 1, the line with 2, the plane with 3 and the solid with 4 (*Aristot. Met. 14.3.9*); and 1+2+3+4=10.

[810]Cf. *Aristot. Met. 7.10, 11.*

but each of the two[811] units is not one in complete reality. The cause of the error which befell the Platonists was that they were pursuing their inquiry from two points of view—that of mathematics and that of general definition—at the same time. Hence as a result of the former they conceived of the One or first principle as a point, for the unit is a point without position. (Thus they too, just like certain others, represented existing things as composed of that which is smallest.)[812]
We get, then, that the unit is the material element of numbers, and at the same time is prior to the number 2; and again we get that it is posterior to 2 regarded as a whole or unity or form. On the other hand, through looking for the universal, they were led to speak of the unity predicated of a given number as a part in the formal sense also. But these two characteristics cannot belong simultaneously to the same thing.
And if Unity itself must only be without position[813](for it differs only in that it is a principle) and 2 is divisible whereas the unit is not, the unit will be more nearly akin to Unity itself; and if this is so, Unity itself will also be more nearly akin to the unit than to 2. Hence each of the units in 2 will be prior to 2. But this they deny; at least they make out that 2 is generated first.[814] Further, if 2 itself and 3 itself are each one thing, both together make 2. From what, then, does this 2 come?
Since there is no contact in numbers, but units which have nothing between them—e.g. those in 2 or 3—are successive, the question might be raised whether or not they are successive to Unity itself, and whether of the numbers which succeed it 2 or one of the units in 2 is prior.
We find similar difficulties in the case of the genera posterior to number[815]—the line, plane and solid. Some derive these from the species of the Great and Small; viz. lines from the Long and Short, planes from the Broad and Narrow, and solids from the Deep and Shallow. These are species of the Great and Small.
As for the geometrical first principle which corresponds to the arith-

[811]Aristotle takes the number two as an example, but the principle is of course universal. In a sense both number and unit are one; but if the number exists as an actual unity, the unit can only exist potentially.

[812]Perhaps the Atomists; but cf. *Aristot. Met. 1.8.3, 4.*

[813]If the text is sound (and no convincing emendation has been suggested), it seems best to understand *ἄθετον* in a rather wider sense than the semi-technical one put forward by Ross. "Without position" = not localized, i.e. abstract. Unity as a principle has no concrete instance.

[814]Cf. *Aristot. Met. 13.7.5.*

[815]Cf. *Aristot. Met. 13.6.10.*

metical One, different Platonists propound different views.[816] In these too we can see innumerable impossibilities, fictions and contradictions of all reasonable probability. For (a) we get that the geometrical forms are unconnected with each other, unless their principles also are so associated that the Broad and Narrow is also Long and Short; and if this is so, the plane will be a line and the solid a plane.
Moreover, how can angles and figures, etc., be explained? And (b) the same result follows as in the case of number; for these concepts are modifications of magnitude, but magnitude is not generated from them, any more than a line is generated from the Straight and Crooked, or solids from the Smooth and Rough.
Common to all these Platonic theories is the same problem which presents itself in the case of species of a genus when we posit universals —viz. whether it is the Ideal animal that is present in the particular animal, or some other "animal" distinct from the Ideal animal. This question will cause no difficulty if the universal is not separable; but if, as the Platonists say, Unity and the numbers exist separately, then it is not easy to solve (if we should apply the phrase "not easy" to what is impossible).
For when we think of the one in 2, or in number generally, are we thinking of an Idea or of something else?

These thinkers, then, generate geometrical magnitudes from this sort of material principle, but others[817] generate them from the point (they regard the point not as a unity but as similar to Unity) and another material principle which is not plurality but is similar to it; yet in the case of these principles none the less we get the same difficulties. For if the matter is one, line, plane and solid will be the same; because the product of the same elements must be one and the same. If on the other hand there is more than one kind of matter—one of the line, another of the plane, and another of the solid—either the kinds are associated with each other, or they are not. Thus the same result will follow in this case also; for either the plane will not contain a line, or it will be a line.
Further, no attempt is made to explain how number can be generated from unity and plurality; but howsoever they account for this, they have to meet the same difficulties as those who generate number from unity and the indeterminate dyad. The one school generates number

[816] Cf. *Aristot. Met. 3.4.34*, *Aristot. Met. 14.3.9*.

[817] The reference is probably to Speusippus; Plato and Xenocrates did not believe in points (*Aristot. Met. 1.9.25*, *Aristot. Met. 13.5.10 n*).

not from a particular plurality but from that which is universally predicated; the other from a particular plurality, but the first; for they hold that the dyad is the first plurality.[818]
Thus there is practically no difference between the two views; the same difficulties will be involved with regard to mixture, position, blending, generation and the other similar modes of combination.[819]

We might very well ask the further question: if each unit is one, of what it is composed; for clearly each unit is not absolute unity. It must be generated from absolute unity and either plurality or a part of plurality.
Now we cannot hold that the unit is a plurality, because the unit is indivisible; but the view that it is derived from a part of plurality involves many further difficulties, because (a) each part must be indivisible; otherwise it will be a plurality and the unit will be divisible, and unity and plurality will not be its elements, because each unit will not be generated from plurality[820] and unity.
(b) The exponent of this theory merely introduces another number; because plurality is a number of indivisible parts.[821]

Again, we must inquire from the exponent of this theory whether the number[822] is infinite or finite.
There was, it appears, a finite plurality from which, in combination with Unity, the finite units were generated; and absolute plurality is different from finite plurality. What sort of plurality is it, then, that is, in combination with unity, an element of number?

We might ask a similar question with regard to the point, i.e. the element out of which they create spatial magnitudes.
This is surely not the one and only point. At least we may ask from what each of the other points comes; it is not, certainly, from some interval and the Ideal point. Moreover, the parts of the interval cannot be indivisible parts, any more than the parts of the plurality of which the units are composed; because although number is composed of indivisible parts, spatial magnitudes are not.
All these and other similar considerations make it clear that number and spatial magnitudes cannot exist separately. Further, the fact that the leading authorities[823] disagree about numbers indicates that it is

[818] Aristotle again identifies the indeterminate dyad with the number 2.

[819] sc. of the elements of number.

[820] sc. but from an indivisible part of plurality—which is not a plurality but a unity.

[821] i.e., to say that number is derived from plurality is to say that number is derived from number—which explains nothing.

[822] sc. which plurality has been shown to be.

the misrepresentation of the facts themselves that produces this confusion in their views.
Those[824] who recognize only the objects of mathematics as existing besides sensible things, abandoned Ideal number and posited mathematical number because they perceived the difficulty and artificiality of the Ideal theory. Others,[825] wishing to maintain both Forms and numbers, but not seeing how, if one posits these[826] as first principles, mathematical number can exist besides Ideal number, identified Ideal with mathematical number,—but only in theory, since actually mathematical number is done away with, because the hypotheses which they state are peculiar to them and not mathematical.[827]
And he[828] who first assumed that there are Ideas, and that the Ideas are numbers, and that the objects of mathematics exist, naturally separated them. Thus it happens that all are right in some respect, but not altogether right; even they themselves admit as much by not agreeing but contradicting each other. The reason of this is that their assumptions and first principles are wrong;
and it is difficult to propound a correct theory from faulty premisses: as Epicharmus says, "no sooner is it said than it is seen to be wrong."[829]

We have now examined and analyzed the questions concerning numbers to a sufficient extent; for although one who is already convinced might be still more convinced by a fuller treatment, he who is not convinced would be brought no nearer to conviction.
As for the first principles and causes and elements, the views expressed by those who discuss only sensible substance either have been described in the *Physics*[830] or have no place in our present inquiry; but the views of those who assert that there are other substances besides sensible ones call for investigation next after those which we have just discussed.
Since, then, some thinkers hold that the Ideas and numbers are such substances, and that their elements are the elements and principles of

[823] Alexander preferred the reading *πρώτους*, interpreting it in this sense; and I do not see why he should not be followed. Ross objects that *πρῶτος* is used in the chronological sense in 16., but this is really no argument. For a much more serious (although different) inconsistency in the use of terms cf. *Aristot. Met. 12.3.1.*
[824] Speusippus and his followers.
[825] Xenocrates and his followers.
[826] Unity and the indeterminate dyad; for the difficulty see *Aristot. Met. 13.7.3, 4.*
[827] Cf. *Aristot. Met. 13.6.10.*
[828] Plato.
[829] *Epicharmus, Fr. 14, Diels.*
[830] *Aristot. Physics 1.4-6.*

reality, we must inquire what it is that they hold, and in what sense they hold it.

Those[831] who posit only numbers, and mathematical numbers at that, may be considered later[832]; but as for those who speak of the Ideas, we can observe at the same time their way of thinking and the difficulties which befall them. For they not only treat the Ideas as universal substances, but also as separable and particular.

(That this is impossible has been already shown[833] by a consideration of the difficulties involved.) The reason why those who hold substances to be universal combined these two views was that they did not identify substances with sensible things. They considered that the particulars in the sensible world are in a state of flux, and that none of them persists, but that the universal exists besides them and is something distinct from them.

This theory, as we have said in an earlier passage,[834] was initiated by Socrates as a result of his definitions, but he did not separate universals from particulars; and he was right in not separating them. This is evident from the facts; for without the universal we cannot acquire knowledge, and the separation of the universal is the cause of the difficulties which we find in the Ideal theory.

Others,[835] regarding it as necessary, if there are to be any substances besides those which are sensible and transitory, that they should be separable, and having no other substances, assigned separate existence to those which are universally predicated; thus it followed that universals and particulars are practically the same kind of thing. This in itself would be one difficulty in the view which we have just described.[836]

Let us now mention a point which presents some difficulty both to those who hold the Ideal theory and to those who do not. It has been stated already, at the beginning of our treatise, among the problems.[837] If we do not suppose substances to be separate, that is in the way in which particular things are said to be separate, we shall do away with substance in the sense in which we wish to maintain it; but if we suppose substances to be separable, how are we to regard their elements and principles?

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[831] The Pythagoreans and Speusippus.

[832] *Aristot. Met. 14.2.21*, *Aristot. Met. 14.3.2-8, 15, 16.*

[833] *Aristot. Met. 3.6.7-9.*

[834] *Aristot. Met. 13.4*, and cf. *Aristot. Met. 1.6.*

[835] The Platonists.

[836] See Introduction.

[837] Cf. *Aristot. Met. 3.4.8-10*, *Aristot. Met. 3.6.7-9.*

If they are particular and not universal, there will be as many real things as there are elements, and the elements will not be knowable. For let us suppose that the syllables in speech are substances, and that their letters are the elements of substances. Then there must be only one BA, and only one of each of the other syllables; that is, if they are not universal and identical in form, but each is numerically one and an individual, and not a member of a class bearing a common name. (Moreover, the Platonists assume that each Ideal entity is unique.) Now if this is true of the syllables, it is also true of their letters. Hence there will not be more than one A, nor more than one of any of the other letters,[838] on the same argument by which in the case of the syllable there cannot be more than one instance of the same syllable. But if this is so, there will be no other things besides the letters, but only the letters.

Nor again will the elements be knowable; for they will not be universal, and knowledge is of the universal. This can be seen by reference to proofs and definitions; for there is no logical conclusion that a given triangle has its angles equal to two right angles unless every triangle has its angles equal to two right angles, or that a given man is an animal unless every man is an animal.

On the other hand, if the first principles are universal, either the substances composed of them will be universal too, or there will be a non-substance prior to substance; because the universal is not substance, and the element or first principle is universal; and the element or first principle is prior to that of which it is an element or first principle.

All this naturally follows when they compose the Ideas of elements and assert that besides the substances which have the same form there are also Ideas each of which is a separate entity.

But if, as in the case of the phonetic elements, there is no reason why there should not be many A's and B's, and no "A itself" or "B itself" apart from these many, then on this basis there may be any number of similar syllables.

The doctrine that all knowledge is of the universal, and hence that the principles of existing things must also be universal and not separate substances, presents the greatest difficulty of all that we have discussed; there is, however, a sense in which this statement is true, although there is another in which it is not true.

Knowledge, like the verb "to know," has two senses, of which one is

[838] This is, as a matter of fact, the assumption upon which the whole argument rests; Aristotle is arguing in a circle.

potential and the other actual. The potentiality being, as matter, universal and indefinite, has a universal and indefinite object; but the actuality is definite and has a definite object, because it is particular and deals with the particular.

It is only accidentally that sight sees universal color, because the particular color which it sees is color; and the particular A which the grammarian studies is an A. For if the first principles must be universal, that which is derived from them must also be universal, as in the case of logical proofs[839]; and if this is so there will be nothing which has a separate existence; i.e. no substance. But it is clear that although in one sense knowledge is universal, in another it is not.

[839]"Because *ἀπόδειξις*" (logical or syllogistic proof) "must be in the first figure (*Aristot. An. Post. 1.14*), and in that figure universal premises always give a universal conclusion." (Ross.)

Book 14

With regard to this kind of substance,[840] then, let the foregoing account suffice. All thinkers make the first principles contraries; as in the realm of natural objects, so too in respect of the unchangeable substances.
Now if nothing can be prior to the first principle of all things, that first principle cannot be first principle if it is an attribute of something else. This would be as absurd as to say that "white" is the first principle, not *qua* anything else but *qua* white, and yet that it is predicable of a subject, and is white because it is an attribute of something else; because the latter will be prior to it.
Moreover, all things are generated from contraries as from a substrate, and therefore contraries must most certainly have a substrate. Therefore all contraries are predicated of a subject, and none of them exists separately. But there is no contrary to substance; not only is this apparent, but it is borne out by reasoned consideration.[841] Thus none of the contraries is strictly a first principle; the first principle is something different.
But the Platonists treat one of the contraries as matter, some opposing "the unequal" to Unity (on the ground that the former is of the nature of plurality) and others plurality.
For according to some,[842] numbers are generated from the unequal dyad of the Great and Small; and according to another,[843] from plural-

[840] i.e., the Platonic Ideas or numbers, which they regarded as unchangeable substances. There is, however, no definite transition to a fresh subject at this point. The criticisms of the Ideas or numbers as substances, and of the Platonic first principles, have not been grouped systematically in Books 13 and 14. Indeed there is so little distinction in subject matter between the two books that in some Mss. 14 was made to begin at 13.9.10. (Syrianus ad loc.). See Introduction.

[841] Cf. *Aristot. Categories 3b 24-27*

[842] Plato; cf. *Aristot. Met. 13.7.5.*

ity; but in both cases they are generated by the essence of unity. For he who speaks of "the unequal" and Unity as elements, and describes the unequal as a dyad composed of Great and Small, speaks of the unequal, i.e. the Great and Small, as being one; and does not draw the distinction that they are one in formula but not in number.[844]
Again, they state the first principles, which they call elements, badly; some say that the Great and the Small, together with Unity (making 3[845] in all), are the elements of numbers; the two former as matter, and Unity as form. Others speak of the Many and Few, because the Great and the Small are in their nature more suited to be the principles of magnitude; and others use the more general term which covers these —"the exceeding" and "the exceeded."
But none of these variations makes any appreciable difference with respect to some of the consequences of the theory; they only affect the abstract difficulties, which these thinkers escape because the proofs which they themselves employ are abstract.
There is, however, this exception: if "the exceeding" and "the exceeded" are the first principles, and not the Great and the Small, on the same principle number should be derived from the elements before 2 is derived; for as "the exceeding and the exceeded" is more universal than the Great and Small, so number is more universal than 2. But in point of fact they assert the one and not the other.

Others oppose "the different" or "other" to Unity; and others contrast Plurality and Unity.
Now if, as they maintain, existing things are derived from contraries, and if there is either no contrary to unity, or if there is to be any contrary it is plurality; and if the unequal is contrary to the equal, and the different to the same, and the other to the thing itself then those who oppose unity to plurality have the best claim to credibility—but even their theory is inadequate, because then unity will be few. For plurality is opposed to paucity, and many to few.
That "unity" denotes a measure[846] is obvious. And in every case there is something else which underlies it; e.g., in the scale there is the quarter-tone; in spatial magnitude the inch or foot or some similar

[843]Probably Speusippus.

[844]This shows clearly that by the Great-and Small Plato meant a single principle, i.e., indeterminate quantity. Aristotle admits this here because he is contrasting the Great-and Small with the One; but elsewhere he prefers to regard the Platonic material principle as a duality. See Introduction.

[845]Cf. previous note.

[846]Cf. *Aristot. Met. 5.6.17, 18*, *Aristot. Met. 10.1.8, 21.*

thing; and in rhythms the foot or syllable. Similarly in the case of gravity there is some definite weight. Unity is predicated of all things in the same way; of qualities as a quality, and of quantities as a quantity. (The measure is indivisible, in the former case in kind, and in the latter to our senses.) This shows that unity is not any independent substance. And this is reasonable; because unity denotes a measure of some plurality, and number denotes a measured plurality and a plurality of measures. (Hence too it stands to reason that unity is not a number; for the measure is not measures, but the measure and unity are starting-points.)

The measure must always be something which applies to all alike; e.g., if the things are horses, the measure is a horse; if they are men, the measure is a man; and if they are man, horse and god, the measure will presumably be an animate being, and the number of them animate beings.

If the things are "man," "white" and "walking," there will scarcely be a number of them, because they all belong to a subject which is one and the same in number; however, their number will be a number of genera, or some other such appellation.

Those[847] who regard the unequal as a unity, and the dyad as an indeterminate compound of great and small, hold theories which are very far from being probable or possible. For these terms represent affections and attributes, rather than substrates, of numbers and magnitudes—"many" and "few" applying to number, and "great" and "small" to magnitude—just as odd and even, smooth and rough, straight and crooked, are attributes.

Further, in addition to this error, "great" and "small" and all other such terms must be relative. And the relative is of all the categories in the least degree a definite entity or substance; it is posterior to quality and quantity. The relative is an affection of quantity, as we have said, and not its matter; since there is something else distinct which is the matter both of the relative in general and of its parts and kinds.

There is nothing great or small, many or few, or in general relative, which is many or few, great or small, or relative to something else without having a distinct nature of its own. That the relative is in the lowest degree a substance and a real thing is shown by the fact that of it alone[848] there is neither generation nor destruction nor change in

[847] Cf. sect. 5.

[848] Cf. *Aristot. Met. 11.12.1.* There Aristotle refers to seven categories, but here he omits "activity" and "passivity" as being virtually identical with motion.

the sense that in respect of quantity there is increase and decrease, in respect of quality, alteration, in respect of place, locomotion, and in respect of substance, absolute generation and destruction.

There is no real change in respect of the relative; for without any change in itself, one term will be now greater, now smaller or equal, as the other term undergoes quantitative change. Moreover, the matter of every thing, and therefore of substance, must be that which is potentially of that nature; but the relative is neither potentially substance nor actually.

It is absurd, then, or rather impossible, to represent non-substance as an element of substance and prior to it; for all the other categories are posterior to substance. And further, the elements are not predicated of those things of which they are elements; yet "many" and "few" are predicated, both separately and together, of number; and "long" and "short" are predicated of the line, and the Plane is both broad and narrow.

If, then, there is a plurality of which one term, viz. "few," is always predicable, e.g. 2 (for if 2 is many, 1 will be few[849]), then there will be an absolute "many"; e.g., 10 will be many (if there is nothing more than 10[850]), or 10,000. How, then, in this light, can number be derived from Few and Many? Either both ought to be predicated of it, or neither; but according to this view only one or the other is predicated.

But we must inquire in general whether eternal things can be composed of elements. If so, they will have matter; for everything which consists of elements is composite.

Assuming, then, that that which consists of anything, whether it has always existed or it came into being, must come into being ⟨if at all⟩ out of that of which it consists; and that everything comes to be that which it comes to be out of that which is it potentially (for it could not have come to be out of that which was not potentially such, nor could it have consisted of it); and that the potential can either be actualized or not; then however everlasting number or anything else which has matter may be, it would be possible for it not to exist, just as that which is any number of years old is as capable of not existing as that which is one day old. And if this is so, that which has existed for so long a time that there is no limit to it may also not exist.

Therefore things which contain matter cannot be eternal, that is, if that which is capable of not existing is not eternal, as we have had

[849]Cf. *Aristot. Met. 10.6.1-3.*

[850]Cf. *Aristot. Met. 13.8.17.*

occasion to say elsewhere.[851] Now if what we have just been saying—that no substance is eternal unless it is actuality—is true universally, and the elements are the matter of substance, an eternal substance can have no elements of which, as inherent in it, it consists.

There are some who, while making the element which acts conjointly with unity the indeterminate dyad, object to "the unequal," quite reasonably, on the score of the difficulties which it involves. But they are rid only of those difficulties[852] which necessarily attend the theory of those who make the unequal, i.e. the relative, an element; all the difficulties which are independent of this view must apply to their theories also, whether it is Ideal or mathematical number that they construct out of these elements.

There are many causes for their resorting to these explanations, the chief being that they visualized the problem in an archaic form. They supposed that all existing things would be one, absolute Being, unless they encountered and refuted Parmenides' dictum:

> It will ne'er be proved that things which are not, are,[853]

i.e., that they must show that that which is not, is; for only so—of that which is, and of something else—could existing things be composed, if they are more than one.[854]

However, (i) in the first place, if "being" has several meanings (for sometimes it means substance, sometimes quality, sometimes quantity, and so on with the other categories), what sort of unity will all the things that are constitute, if not-being is not to be? Will it be the substances that are one, or the affections (and similarly with the other categories), or all the categories together? in which case the "this" and the "such" and the "so great," and all the other categories which denote some sense of Being, will be one.

But it is absurd, or rather impossible, that the introduction of one thing should account for the fact that "what is" sometimes means "so-and-so," sometimes "such-and-such," sometimes "of such-and-such a size," sometimes "in such-and-such a place."

(2) Of what sort of not-being and Being do real things consist? Not-being, too, has several senses, inasmuch as Being has; and "not-man" means "not so-and-so," whereas "not straight" means "not such-and-such," and "not five feet long" means "not of such-and-such a size." What sort of Being and not-being, then, make existing things a plural-

[851] *Aristot. Met. 9.8.15-17, Aristot. De Caelo 1.12.*

[852] Cf. *Aristot. Met. 14.1.14-17.*

[853] *Parmenides Fr. 7 (Diels).*

[854] Cf. *Plat. Soph. 237a, 241d, 256e.*

ity?
This thinker means by the not-being which together with Being makes existing things a plurality, falsity and everything of this nature[855]; and for this reason also it was said[856] that we must assume something which is false, just as geometricians assume that a line is a foot long when it is not.
But this cannot be so; for (a) the geometricians do not assume anything that is false (since the proposition is not part of the logical inference[857]), and (b) existing things are not generated from or resolved into not-being in this sense. But not only has "not-being" in its various cases as many meanings as there are categories, but moreover the false and the potential are called "not-being"; and it is from the latter that generation takes place—man comes to be from that which is not man but is potentially man, and white from that which is not white but is potentially white; no matter whether one thing is generated or many.
Clearly the point at issue is how "being" in the sense of the substances is many; for the things that are generated are numbers and lines and bodies. It is absurd to inquire how Being as substance is many, and not how qualities or quantities are many.
Surely the indeterminate dyad or the Great and Small is no reason why there should be two whites or many colors or flavors or shapes; for then these too would be numbers and units. But if the Platonists had pursued this inquiry, they would have perceived the cause of plurality in substances as well; for the cause[858] is the same, or analogous.
This deviation of theirs was the reason why in seeking the opposite of Being and unity, from which in combination with Being and unity existing things are derived, they posited the relative (i.e. the unequal), which is neither the contrary nor the negation of Being and unity, but is a single characteristic of existing things, just like substance or quality. They should have investigated this question also; how it is that relations are many, and not one.
As it is, they inquire how it is that there are many units besides the primary unity, but not how there are many unequal things besides the Unequal. Yet they employ in their arguments and speak of Great and Small, Many and Few (of which numbers are composed), Long and

[855] *Plat. Soph. 237a, 240*; but Aristotle's statement assumes too much.

[856] Presumably by some Platonist.

[857] i.e., the validity of a geometrical proof does not depend upon the accuracy of the figure.

[858] Matter, according to Aristotle; and there is matter, or something analogous to it, in every category. Cf. *Aristot. Met. 12.5.*

Short (of which the line is composed), Broad and Narrow (of which the plane is composed), Deep and Shallow (of which solids are composed); and they mention still further kinds of relation.[859] Now what is the cause of plurality in these relations?

We must, then, as I say, presuppose in the case of each thing that which is it potentially. The author[860] of this theory further explained what it is that is potentially a particular thing or substance, but is not per se existent—that it is the relative (he might as well have said "quality"); which is neither potentially unity or Being, nor a negation of unity or Being, but just a particular kind of Being.

And it was still more necessary, as we have said,[861] that, if he was inquiring how it is that things are many, he should not confine his inquiry to things in the same category, and ask how it is that substances or qualities are many, but that he should ask how it is that things in general are many; for some things are substances, some affections, and some relations.

Now in the case of the other categories there is an additional difficulty in discovering how they are many. For it may be said that since they are not separable, it is because the substrate becomes or is many that qualities and quantities are many; yet there must be some matter for each class of entities, only it cannot be separable from substances.

In the case of particular substances, however, it is explicable how the particular thing can be many, if we do not regard a thing both as a particular substance and as a certain characteristic.[862] The real difficulty which arises from these considerations is how substances are actually many and not one.

Again, even if a particular thing and a quantity are not the same, it is not explained how and why existing things are many, but only how quantities are many;

for all number denotes quantity, and the unit, if it does not mean a measure, means that which is quantitatively indivisible. If, then, quantity and substance are different, it is not explained whence or how substance is many; but if they are the same, he who holds this has to face many logical contradictions.

One might fasten also upon the question with respect to numbers, whence we should derive the belief that they exist.

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[859] Cf. *Aristot. Met. 14.1.6, 18*, *Aristot. Met. 1.9.23.*

[860] Plato.

[861] sect. 11.

[862] This, according to Aristotle, is how the Platonists regard the Ideas. See Introduction.

For one[863] who posits Ideas, numbers supply a kind of cause for existing things; that is if each of the numbers is a kind of Idea, and the Idea is, in some way or other, the cause of existence for other things; for let us grant them this assumption.

But as for him[864] who does not hold this belief, because he can see the difficulties inherent in the Ideal theory (and so has not this reason for positing numbers), and yet posits mathematical number, what grounds have we for believing his statement that there is a number of this kind, and what good is this number to other things? He who maintains its existence does not claim that it is the cause of anything, but regards it as an independent entity; nor can we observe it to be the cause of anything; for the theorems of the arithmeticians will all apply equally well to sensible things, as we have said.[865]

Those, then, who posit the Ideas and identify them with numbers, by their assumption (in accordance with their method of abstracting each general term from its several concrete examples) that every general term is a unity, make some attempt to explain why number exists.[866] Since, however, their arguments are neither necessarily true nor indeed possible, there is no justification on this ground for maintaining the existence of number.

The Pythagoreans, on the other hand, observing that many attributes of numbers apply to sensible bodies, assumed that real things are numbers; not that numbers exist separately, but that real things are composed of numbers.[867] But why? Because the attributes of numbers are to be found in a musical scale, in the heavens, and in many other connections.[868]

As for those who hold that mathematical number alone exists,[869] they cannot allege anything of this kind[870] consistently with their hypotheses; what they did say was that the sciences could not have sensible things as their objects. But we maintain that they can; as we have said before. And clearly the objects of mathematics do not exist in separation; for if they did their attributes would not be present in corporeal things.

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[863] Plato and his orthodox followers.

[864] Speusippus.

[865] *Aristot. Met. 13.3.1.*

[866] I have followed Ross's text and interpretation of this sentence. For the meaning cf. *Aristot. Met. 14.2.20.*

[867] See Introduction.

[868] Cf. *Aristot. Met. 14.6.5.*

[869] Cf. *Aristot. Met. 14.2.21.*

[870] i.e., that things are composed of numbers.

Thus in this respect the Pythagoreans are immune from criticism; but in so far as they construct natural bodies, which have lightness and weight, out of numbers which have no weight or lightness, they appear to be treating of another universe and other bodies, not of sensible ones.[871]

But those who treat number as separable assume that it exists and is separable because the axioms will not apply to sensible objects; whereas the statements of mathematics are true and appeal to the soul.[872] The same applies to mathematical extended magnitudes.

It is clear, then, both that the contrary theory[873] can make out a case for the contrary view, and that those who hold this theory must find a solution for the difficulty which was recently raised[874]—why it is that while numbers are in no way present in sensible things, their attributes are present in sensible things.

There are some[875] who think that, because the point is the limit and extreme of the line, and the line of the plane, and the plane of the solid, there must be entities of this kind.

We must, then, examine this argument also, and see whether it is not exceptionally weak. For (1.) extremes are not substances; rather all such things are merely limits. Even walking, and motion in general, has some limit; so on the view which we are criticizing this will be an individual thing, and a kind of substance. But this is absurd. And moreover (2.) even if they are substances, they will all be substances of particular sensible things, since it was to these that the argument applied. Why, then, should they be separable?

Again, we may, if we are not unduly acquiescent, further object with regard to all number and mathematical objects that they contribute nothing to each other, the prior to the posterior. For if number does not exist, none the less spatial magnitudes will exist for those who maintain that only the objects of mathematics exist; and if the latter do not exist, the soul and sensible bodies will exist.[876]

[871] See Introduction.

[872] The statements of mathematics appeal so strongly to our intelligence that they must be true; therefore if they are not true of sensible things, there must be some class of objects of which they are true.

[873] The Pythagorean theory, which maintains that numbers not only are present in sensible things but actually compose them, is in itself an argument against the Speusippean view, which in separating numbers from sensible things has to face the question why sensible things exhibit numerical attributes.

[874] sect. 3.

[875] Probably Pythagoreans. Cf. *Aristot. Met. 7.2.2*, *Aristot. Met. 3.5.3.*

[876] That the criticism is directed against Speusippus is clear from *Aristot. Met.*

But it does not appear, to judge from the observed facts, that the natural system lacks cohesion, like a poorly constructed drama. Those[877] who posit the Ideas escape this difficulty, because they construct spatial magnitudes out of matter and a number—2 in the case of lines, and 3, presumably, in that of planes, and 4 in that of solids; or out of other numbers, for it makes no difference.

But are we to regard these magnitudes as Ideas, or what is their mode of existence? and what contribution do they make to reality? They contribute nothing; just as the objects of mathematics contribute nothing. Moreover, no mathematical theorem applies to them, unless one chooses to interfere with the principles of mathematics and invent peculiar theories[878] of one's own. But it is not difficult to take any chance hypotheses and enlarge upon them and draw out a long string of conclusions.

These thinkers, then, are quite wrong in thus striving to connect the objects of mathematics with the Ideas. But those who first recognized two kinds of number, the Ideal and the mathematical as well, neither have explained nor can explain in any way how mathematical number will exist and of what it will be composed; for they make it intermediate between Ideal and sensible number.

For if it is composed of the Great and Small, it will be the same as the former, i.e. Ideal, number. But of what other Great and Small can it be composed? for Plato makes spatial magnitudes out of a Great and Small.[879] And if he speaks of some other component, he will be maintaining too many elements; while if some one thing is the first principle of each kind of number, unity will be something common to these several kinds.

We must inquire how it is that unity is these many things, when at the same time number, according to him, cannot be derived otherwise than from unity and an indeterminate dyad.[880]

All these views are irrational; they conflict both with one another

7.2.4. Cf. *Aristot. Met. 12.10.14.*

[877]Xenocrates (that the reference is not to Plato is clear from sect. 11).

[878]e.g. that of "indivisible lines."

[879]This interpretation (Ross's second alternative, reading *τίνος* for *τινος*) seems to be the most satisfactory. For the objection cf. *Aristot. Met. 3.4.34.*

[880]The argument may be summarized thus. If mathematical number cannot be derived from the Great-and-Small or a species of the Great-and-Small, either it has a different material principle (which is not economical) or its formal principle is in some sense distinct from that of the Ideal numbers. But this implies that unity is a kind of plurality, and number or plurality can only be referred to the dyad or material principle.

and with sound logic, and it seems that in them we have a case of Simonides' "long story[881]"; for men have recourse to the "long story," such as slaves tell, when they have nothing satisfactory to say.
The very elements too, the Great and Small, seem to protest at being dragged in; for they cannot possibly generate numbers except rising powers of 2.[882]

It is absurd also, or rather it is one of the impossibilities of this theory, to introduce generation of things which are eternal.
There is no reason to doubt whether the Pythagoreans do or do not introduce it; for they clearly state that when the One had been constituted—whether out of planes or superficies or seed or out of something that they cannot explain—immediately the nearest part of the Infinite began to be drawn in and limited by the Limit.[883]
However, since they are here explaining the construction of the universe and meaning to speak in terms of physics, although we may somewhat criticize their physical theories, it is only fair to exempt them from the present inquiry; for it is the first principles in unchangeable things that we are investigating, and therefore we have to consider the generation of this kind of numbers.
They[884] say that there is no generation of odd numbers,[885] which clearly implies that there is generation of even ones; and some hold that the even is constructed first out of unequals—the Great and Small —when they are equalized.[886] Therefore the inequality must apply to them before they are equalized. If they had always been equalized they would not have been unequal before; for there is nothing prior to that which has always been.
Hence evidently it is not for the sake of a logical theory that they introduce the generation of numbers

A difficulty, and a discredit to those who make light of the difficulty, arises out of the question how the elements and first principles are related to the the Good and the Beautiful. The difficulty is this: whether any of the elements is such as we mean when we[887] speak of

[881]The exact reference is uncertain, but Aristotle probably means Simonides of Ceos. Cf. *Simonides Fr. 189 (Bergk)*.

[882]Assuming that the Great-and-Small, or indeterminate dyad, is duplicative (*Aristot. Met. 13.7.18*).

[883]Cf. *Aristot. Physics 3.4*, *Aristot. Physics 4.6*, and Burnet, E.G.P. sect. 53.

[884]The Platonists.

[885]This statement was probably symbolical. "They described the odd numbers as ungenerated because they likened them to the One, the principle of pure form" (Ross ad loc.).

[886]Cf. *Aristot. Met. 13.7.5*.

the Good or the Supreme Good, or whether on the contrary these are later in generation than the elements.

It would seem that there is an agreement between the mythologists and some present-day thinkers,[888] who deny that there is such an element, and say that it was only after some evolution in the natural order of things that both the Good and the Beautiful appeared. They do this to avoid a real difficulty which confronts those who hold, as some do, that unity is a first principle.

This difficulty arises not from ascribing goodness to the first principle as an attribute, but from treating unity as a principle, and a principle in the sense of an element, and then deriving number from unity. The early poets agree with this view in so far as they assert that it was not the original forces—such as Night, Heaven, Chaos or Ocean—but Zeus who was king and ruler.

It was, however, on the ground of the changing of the rulers of the world that the poets were led to state these theories; because those of them who compromise by not describing everything in mythological language —e.g. Pherecydes[889] and certain others—make the primary generator the Supreme Good; and so do the Magi,[890] and some of the later philosophers such as Empedocles and Anaxagoras: the one making Love an element,[891] and the other making Mind a first principle.[892]

And of those who hold that unchangeable substances exist, some[893] identify absolute unity with absolute goodness; but they considered that the essence of goodness was primarily unity.

This, then, is the problem: which of these two views we should hold.

Now it is remarkable if that which is primary and eternal and supremely self-sufficient does not possess this very quality, viz. self-sufficiency and immunity, in a primary degree and as something good. Moreover, it is imperishable and self-sufficient for no other reason than because it is good. Hence it is probably true to say that the first principle is of this nature.

But to say that this principle is unity, or if not that, that it is an

[887] Aristotle speaks as a Platonist. See Introduction.

[888] The Pythagoreans and Speusippus; cf. *Aristot. Met. 12.7.10.*

[889] Of Syros (circa 600-525 B.C.). He made Zeus one of the three primary beings (Diels, *Vorsokratiker* 201, 202).

[890] The Zoroastrian priestly caste.

[891] Cf. *Aristot. Met. 3.1.13.*

[892] Cf. *Aristot. Met. 1.3.16.*

[893] Plato; cf. *Aristot. Met. 1.6.10.*

element, and an element of numbers, is impossible; for this involves a serious difficulty, to avoid which some thinkers[894] have abandoned the theory (viz. those who agree that unity is a first principle and element, but of *mathematical* number). For on this view all units become identical with some good, and we get a great abundance of goods.[895]

Further, if the Forms are numbers, all Forms become identical with some good. Again, let us assume that there are Ideas of anything that we choose. If there are Ideas only of goods, the Ideas will not be substances[896]; and if there are Ideas of substances also, all animals and plants, and all things that participate in the Ideas, will be goods.[897]

Not only do these absurdities follow, but it also follows that the contrary element, whether it is plurality or the unequal, i.e. the Great and Small, is absolute badness. Hence one thinker[898] avoided associating the Good with unity, on the ground that since generation proceeds from contraries, the nature of plurality would then necessarily be bad. Others[899] hold that inequality is the nature of the bad. It follows, then, that all things partake of the Bad except one—absolute unity; and that numbers partake of it in a more unmitigated form than do spatial magnitudes[900]; and that the Bad is the province for the activity of the Good, and partakes of and tends towards that which is destructive of the Good; for a contrary is destructive of its contrary.

And if, as we said,[901] the matter of each thing is that which is it potentially—e.g., the matter of actual fire is that which is potentially fire—then the Bad will be simply the potentially Good.

Thus all these objections follow because (1.) they make every principle an element; (2.) they make contraries principles; (3.) they make unity a principle; and (4.) they make numbers the primary substances, and separable, and Forms.

If, then, it is impossible both not to include the Good among the first principles, and to include it in this way, it is clear that the first principles are not being rightly represented, nor are the primary substances.

[894] Speusippus and his followers; cf. sect. 3.

[895] If unity is goodness, and every unit is a kind of unity, every unit must be a kind of goodness—which is absurd.

[896] Because they are Ideas not of substances but of qualities.

[897] Because the Ideas are goods.

[898] Speusippus.

[899] Plato and Xenocrates.

[900] As being more directly derived from the first principles. Cf. *Aristot. Met. 1.9.23 n.*

[901] *Aristot. Met. 14.1.17.*

Nor is a certain thinker[902] right in his assumption when he likens the principles of the universe to that of animals and plants, on the ground that the more perfect forms are always produced from those which are indeterminate and imperfect, and is led by this to assert that this is true also of the ultimate principles; so that not even unity itself is a real thing.[903]

He is wrong; for even in the natural world the principles from which these things are derived are perfect and complete—for it is man that begets man; the seed does not come first.[904] It is absurd also to generate space simultaneously with the mathematical solids (for space is peculiar to particular things, which is why they are separable in space, whereas the objects of mathematics have no position) and to say that they must be somewhere, and yet not explain what their spatial position is.

Those who assert that reality is derived from elements, and that numbers are the primary realities, ought to have first distinguished the senses in which one thing is derived from another, and then explained in what way number is derived from the first principles. Is it by mixture? But (a) not everything admits of mixture[905]; (b) the result of mixture is something different; and unity will not be separable,[906] nor will it be a distinct entity, as they intend it to be.

Is it by composition, as we hold of the syllable? But (a) this necessarily implies position; (b) in thinking of unity and plurality we shall think of them separately. This, then, is what number will be—a unit *plus* plurality, or unity *plus* the Unequal.

And since a thing is derived from elements either as inherent or as not inherent in it, in which way is number so derived? Derivation from inherent elements is only possible for things which admit of generation.[907] Is it derived as from seed?

But nothing can be emitted from that which is indivisible.[908] Is it

[902]Evidently Speusippus; cf. *Aristot. Met. 14.4.3.*

[903]Speusippus argued that since all things are originally imperfect, unity, which is the first principle, must be imperfect, and therefore distinct from the good. Aristotle objects that the imperfect does not really exist, and so Speusippus deprives his first principle of reality.

[904]Cf. *Aristot. Met. 9.8.5.*

[905]e.g. to admit of mixture a thing must first have a separate existence, and the Great-and-Small, which is an affection or quality of number (*Aristot. Met. 14.1.14*) cannot exist separately.

[906]sc. when it has once been mixed. Cf. *Aristot. De Gen. et Corr. 327b 21-26.*

[907]And numbers are supposed to be eternal. Cf. *Aristot. Met. 14.2.1-3.*

[908]i.e., unity, being indivisible, cannot contribute the formal principle of generation

derived from a contrary which does not persist? But all things which derive their being in this way derive it also from something else which does persist. Since, therefore, one thinker[909] regards unity as contrary to plurality, and another (treating it as the Equal) as contrary to the Unequal, number must be derived as from contraries.
Hence there is something else which persists from which, together with one contrary, number is or has been derived.[910]

Further, why on earth is it that whereas all other things which are derived from contraries or have contraries perish, even if the contrary is exhausted in producing them,[911] number does not perish? Of this no explanation is given; yet whether it is inherent or not, a contrary is destructive; e.g., Strife destroys the mixture.[912] It should not, however, do this; because the mixture is not its contrary.
Nor is it in any way defined in which sense numbers are the causes of substances and of Being; whether as bounds,[913] e.g. as points are the bounds of spatial magnitudes,[914] and as Eurytus[915] determined which number belongs to which thing—e.g. this number to man, and this to horse—by using pebbles to copy the shape of natural objects, like those who arrange numbers in the form of geometrical figures, the triangle and the square.[916]
Or is it because harmony is a ratio of numbers, and so too is man and everything else? But in what sense are attributes—white, and sweet, and hot—numbers?[917] And clearly numbers are not the essence of things, nor are they causes of the form; for the ratio[918] is the essence, and number[919] is matter.
E.g. the essence of flesh or bone is number only in the sense that it

in the way that the male parent contributes it.

[909]Speusippus: Plato. Cf. *Aristot. Met. 14.1.5.*

[910]The objection is directed against the Platonist treatment of the principles as contraries (cf. *Aristot. Met. 14.4.12*), and may be illustrated by *Aristot. Met. 12.1.5-2.2.* Plurality, as the contrary of unity, is privation, not matter; the Platonists should have derived numbers from unity and some other principle which is truly material.

[911]Because it may be regarded as still potentially present.

[912]According to *Empedocles Fr. 17 (Diels).*

[913]The theories criticized from this point onwards to *Aristot. Met. 14.6.11* are primarily Pythagorean. See Introduction.

[914]e.g. the line by 2 points, the triangle (the simplest plane figure) by 3, the tetrahedron (the simplest solid figure) by 4.

[915]Disciple of Philolaus; he "flourished" in the early fourth century B.C.

[916]cf. Burnet, E.G.P. sect. 47.

[917]This is an objection to the view that numbers are causes as bounds.

[918]Or "formula."

[919]In the sense of a number of material particles.

is three parts of fire and two of earth.[920] And the number, whatever it is, is always a number of something; of particles of fire or earth, or of units. But the essence is the proportion of one quantity to another in the mixture; i.e. no longer a number, but a ratio of the mixture of numbers, either of corporeal particles or of any other kind. Thus number is not an efficient cause—neither number in general, nor that which consists of abstract units—nor is it the matter, nor the formula or form of things. Nor again is it a final cause.

The question might also be raised as to what the good is which things derive from numbers because their mixture can be expressed by a number, either one which is easily calculable,[921] or an odd number.[922] For in point of fact honey-water is no more wholesome if it is mixed in the proportion "three times three"[923]; it would be more beneficial mixed in no particular proportion, provided that it be diluted, than mixed in an arithmetical proportion, but strong.

Again, the ratios of mixtures are expressed by the relation of numbers, and not simply by numbers; e.g., it is 3 : 2, not 3 X 2[924]; for in products of multiplication the units must belong to the same genus. Thus the product of 1 x 2 x 3 must be measurable by 1, and the product of 4 X 5 x 7 by 4. Therefore all products which contain the same factor must be measurable by that factor. Hence the number of fire cannot be 2 X 5 X 3 X 7 if the number of water is 2 x 3.[925]

If all things must share in number, it must follow that many things are the same; i.e., that the same number belongs both to this thing and to something else. Is number, then, a cause; i.e., is it because of number that the object exists? Or is this not conclusive? E.g., there is a certain number of the sun's motions, and again of the moon's,[926] and indeed of the life and maturity of every animate thing. What reason, then, is there why some of these numbers should not be squares and others cubes, some equal and others double?

There is no reason; all things must fall within this range of numbers if, as was assumed, all things share in number, and different things may

[920] Cf. *Empedocles Fr. 96 (Diels).*

[921] i.e., a simple ratio.

[922] It is hard to see exactly what this means. If the terms of a ratio are rational, one of them must be odd. Alexander says a ratio like 1 : 3 is meant. Oddness was associated with goodness (cf. *Aristot. Met. 1.5.6*).

[923] Apparently the Pythagoreans meant by this "three parts of water to three of honey." Aristotle goes on to criticize this way of expressing ratios.

[924] Cf. previous note.

[925] sc. because if so, a particle of fire would simply equal 35 particles of water.

[926] 5 in each case, according to Aristotle; cf. *Aristot. Met. 12.7.9, 11.*

fall under the same number. Hence if certain things happened to have the same number, on the Pythagorean view they would be the same as one another, because they would have the same form of number; e.g., sun and moon would be the same.[927]

But why are these numbers causes? There are seven vowels,[928] seven strings to the scale,[929] seven Pleiads; most animals (though not all[930]) lose their teeth in the seventh year; and there were seven heroes who attacked Thebes. Is it, then, because the number 7 is such as it is that there were seven heroes, or that the Pleiads consist of seven stars? Surely there were seven heroes because of the seven gates, or for some other reason, and the Pleiads are seven because we count them so; just as we count the Bear as 12, whereas others count more stars in both. Indeed, they assert also that *Ξ, Ψ* and *Z* are concords,[931] and that because there are three concords, there are three double consonants. They ignore the fact that there might be thousands of double consonants—because there might be one symbol for *ΓΡ*. But if they say that each of these letters is double any of the others, whereas no other is,[932] and that the reason is that there are three regions[933] of the mouth, and that one consonant is combined with *σ* in each region, it is for this reason that there are only three double consonants, and not because there are three concords—because there are really more than three; but there cannot be more than three double consonants.

Thus these thinkers are like the ancient Homeric scholars, who see minor similarities but overlook important ones.

Some say that there are many correspondences of this kind; e.g., the middle notes[934] of the octave are respectively 8 and 9, and the epic hexameter has seventeen syllables, which equals the sum of these two; and the line scans in the first half with nine syllables, and in the second with eight.[935]

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[927] Cf. previous note.

[928] In the Greek alphabet.

[929] In the old heptachord; cf. note on *Aristot. Met. 5.11.4.*

[930] Cf. *Aristot. Hist. An. 576a 6.*

[931] According to Alexander *ζ* was connected with the fourth, *ξ* with the fifth, and *ψ* with the octave.

[932] *θ, φ* , and *χ* are aspirated, not double, consonants.

[933] Palate, lips, and teeth.

[934] i.e., the *μέση*(fourth) and *παραμέση*(fifth), whose ratios can be expressed as 8 : 6, 9 : 6.

[935] i.e., a dactylic hexameter whose sixth foot is always a spondee or trochee has nine syllables in the first three feet and eight in the last three. For *τὸ δεξιόν* meaning "the first part" of a metrical system see Bassett,*Journal of Classical Philology* 11.458-460.

And they point out that the interval from *a* to *ω* in the alphabet is equal to that from the lowest note of a flute to the highest, whose number is equal to that of the whole system of the universe.[936] We must realize that no one would find any difficulty either in discovering or in stating such correspondences as these in the realm of eternal things, since they occur even among perishable things.

As for the celebrated characteristics of number, and their contraries, and in general the mathematical properties, in the sense that some describe them and make them out to be causes of the natural world, it would seem that if we examine them along these lines, they disappear; for not one of them is a cause in any of the senses which we distinguished with until respect to the first Principles.[937]

There is a sense, however, in which these thinkers make it clear that goodness is predicable of numbers, and that the odd, the straight, the equal-by-equal,[938] and the powers[939] of certain numbers, belong to the series of the Beautiful.[940] For the seasons are connected with a certain kind of number[941]; and the other examples which they adduce from mathematical theorems all have the same force.

Hence they would seem to be mere coincidences, for they are accidental; but all the examples are appropriate to each other, and they are one by analogy. For there is analogy between all the categories of Being —as "straight" is in length, so is "level" in breadth, perhaps "odd" in number, and "white" in color.

Again, it is not the Ideal numbers that are the causes of harmonic relations, etc. (for Ideal numbers, even when they are equal, differ in kind, since their units also differ in kind)[942]; so on this ground at least we need not posit Forms.

Such, then, are the consequences of the theory, and even more might be adduced. But the mere fact that the Platonists find so much trouble with regard to the generation of Ideal numbers, and can in no way build

[936] Alexander suggests that the number 24 may have been made up of the 12 signs of the zodiac, the 8 spheres (fixed stars, five planets, sun and moon) and 4 elements.

[937] Cf. *Aristot. Met. 1.3.1*, *Aristot. Met. 5.1, 2.*

[938] i.e., square.

[939] Probably their "power" of being represented as regular figures; e.g. the triangularity of 3 or 6.

[940] Cf. *Aristot. Met. 1.5.6.*

[941] i.e., 4.

[942] Aristotle has argued (*Aristot. Met. 13.6-8.*) that if the Ideal numbers differ in kind, their units must differ in kind. Hence even equal numbers, being composed of different units, must be different in kind. In point of fact, since each ideal number is unique, no two of them could be equal.

up a system, would seem to be a proof that the objects of mathematics are not separable from sensible things, as some maintain, and that the first principles are not those which these thinkers assume.

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