# Metaphysics

ARISTOTLE

384–322 BC

# Metaphysics

Τὰ μετὰ τὰ φυσικά

*Translated from the Greek with AI (Claude) and edited*



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*Metaphysics* · Aristotle (384–322 BC)

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# CONTENTS

**Introduction** . . . . . xi

**Book Alpha (I)** . . . . . 1

All people desire to know . . . . . 1
What wisdom is . . . . . 4
The four causes and the first philosophers . . . . . 6
Love, Strife and the atomists . . . . . 10
The Pythagoreans and the Eleatics . . . . . 12
Plato and the Forms . . . . . 16
No cause beyond the four . . . . . 18
Criticism of the early thinkers . . . . . 19
Against the Forms . . . . . 23
Early philosophy lisps . . . . . 29

**Book Little Alpha (II)** . . . . . 31

The study of truth . . . . . 31
Causes cannot go on forever . . . . . 32
Methods suited to the subject . . . . . 35

**Book Beta (III)** . . . . . 37

Why begin with puzzles . . . . . 37
One science or many? . . . . . 39
Are genera the principles? . . . . . 44
Universals, particulars and the one . . . . . 46
Are numbers and figures substances? . . . . . 52
Why posit Forms? . . . . . 54

**Book Gamma (IV)** . . . . . 57

The science of being qua being . . . . . 57
Being is said in many ways . . . . . 57
The principle of non-contradiction . . . . . 62
Defending non-contradiction . . . . . 64

Protagoras and appearances ..... 71
Who is to judge? ..... 76
Nothing between contradictories ..... 78
Not everything true, not everything false ..... 80

**Book Delta (V)** ..... 83
Chapter 1 ..... 83
Four kinds of cause ..... 84
The senses of “element” ..... 86
The senses of “nature” ..... 87
The senses of “necessary” ..... 89
The senses of “one” ..... 90
The senses of “being” ..... 94
The senses of “substance” ..... 95
Same, other, different, like ..... 96
Chapter 9 ..... 96
Opposites and contraries ..... 97
Prior and posterior ..... 98
Chapter 11 ..... 98
Capacity and potentiality ..... 100
Quantity ..... 102
Quality ..... 103
Relatives ..... 104
Complete ..... 106
Chapter 16 ..... 106
Limit ..... 107
“In virtue of which” and “in its own right” ..... 107
Disposition ..... 108
Having, or state ..... 108
Affection ..... 109
Privation ..... 109
To have and to hold ..... 110
Coming from something ..... 111
Part ..... 112
Whole and all ..... 112
Mutilated ..... 113

Genus . . . . . 114
False . . . . . 115
Accident . . . . . 116

**Book Epsilon (VI)** . . . . . 119
Chapter 1 . . . . . 119
No science of accidental being . . . . . 121
Not everything happens of necessity . . . . . 123
Being as truth . . . . . 124
Chapter 4 . . . . . 125

**Book Zeta (VII)** . . . . . 127
Chapter 1 . . . . . 127
Which things are substances? . . . . . 128
Substance as the underlying subject . . . . . 129
Essence . . . . . 131
The snub nose . . . . . 133
Is a thing the same as its essence? . . . . . 135
How things come to be . . . . . 137
Form does not come to be . . . . . 140
Craft, spontaneity and seed . . . . . 142
Parts of the account and parts of the thing . . . . . 143
Which parts belong to the form? . . . . . 147
The unity of definition . . . . . 150
No universal is substance . . . . . 152
Against Forms composed of genus and differentia . . . . . 154
Individuals cannot be defined . . . . . 155
Potentialities, unity and being . . . . . 157
Substance as cause . . . . . 159

**Book Eta (VIII)** . . . . . 163
Chapter 1 . . . . . 163
Differentiae as actuality . . . . . 164
Form, composite, and number . . . . . 166
Proper matter and the causes . . . . . 169
Matter and contraries . . . . . 170
What makes a definition one . . . . . 171

**Book Theta (IX)** ..... 175
Chapter 1 ..... 175
Rational and nonrational capacities ..... 176
Against the Megarians ..... 178
The possible and the impossible ..... 179
How capacities are exercised ..... 180
What actuality is ..... 181
When a thing is potentially something ..... 183
Actuality is prior to potentiality ..... 185
Actuality is better than capacity ..... 189
Being as truth ..... 190

**Book Iota (X)** ..... 193
Chapter 1 ..... 193
Is the one a substance? ..... 196
The one and the many ..... 198
Contrariety as complete difference ..... 200
How the equal is opposed to great and small ..... 202
How the one is opposed to the many ..... 204
Intermediates ..... 206
Difference in species ..... 208
Why male and female are not different species ..... 209
The perishable and the imperishable ..... 210
Chapter 10 ..... 210

**Book Kappa (XI)** ..... 213
Chapter 1 ..... 213
More puzzles about separate substance ..... 215
One science of being as being ..... 217
First philosophy, mathematics and physics ..... 219
The principle of non-contradiction ..... 220
Protagoras and the appearances ..... 221
The three theoretical sciences ..... 224
The accidental and luck ..... 226
What motion is ..... 228
The infinite ..... 230

Kinds of change . . . . . 233
No change of change . . . . . 234

**Book Lambda (XII)** . . . . . 239
Chapter 1 . . . . . 239
Matter and the contraries . . . . . 240
Neither matter nor form comes to be . . . . . 241
The same principles by analogy . . . . . 242
Actuality and potentiality as principles . . . . . 244
An eternal unmovable substance . . . . . 245
The unmoved mover . . . . . 247
How many unmoved movers? . . . . . 250
Thinking of thinking . . . . . 254
The good of the universe . . . . . 255

**Book Mu (XIII)** . . . . . 259
Chapter 1 . . . . . 259
Mathematical objects are not separate . . . . . 260
How mathematical objects exist . . . . . 263
How the theory of Forms arose . . . . . 265
What do the Forms contribute? . . . . . 268
Ways numbers might exist . . . . . 269
Chapter 6 . . . . . 270
Are units comparable? . . . . . 271
Further objections to separate number . . . . . 276
Lines, planes, solids and the One . . . . . 280
Are the principles universal or particular? . . . . . 284

**Book Nu (XIV)** . . . . . 287
Chapter 1 . . . . . 287
Eternal things cannot be made of elements . . . . . 290
Why believe numbers exist? . . . . . 294
The principles and the good . . . . . 296
How could number come from principles? . . . . . 299
Number mysticism . . . . . 301

# INTRODUCTION

"All human beings by nature desire to know." So opens the *Metaphysics*, the work that gave its name to a whole branch of philosophy, though the title only means "the books after the *Physics*" in the ancient arrangement of Aristotle's writings.

Its subject is what Aristotle calls first philosophy: the study of being as being, and of the first causes and principles of everything. It includes the first history of philosophy (Book Alpha), the defense of the principle of non-contradiction (Gamma), a dictionary of key terms (Delta), the long investigation of substance, matter and form (Zeta and Eta), potentiality and actuality (Theta), and the famous account of the unmoved mover, "thinking of thinking" (Lambda).

The fourteen books are lecture treatises assembled after Aristotle's death; they are difficult, and often argue their way through puzzles rather than to settled conclusions.

# Book Alpha (I)

*Wisdom, causes, and the earlier philosophers.*

## ALL PEOPLE DESIRE TO KNOW

*From perception and memory come experience and craft; knowing causes is what makes someone wise.*

980a All human beings by nature desire to know. A sign of this is the delight we take in our senses: even apart from their usefulness we love them for their own sake, and above all the others the sense that works through the eyes. For not only in order to act, but even when we are not going to do anything, we prefer seeing to practically everything else. The cause is that of all the senses this one most makes us know things, and reveals many differences. Animals, then, are born by nature with sense perception, and from this memory arises in some of them but not in others. 980b And for this reason these are more intelligent and more apt at learning than those that cannot remember. Those that cannot hear sounds are intelligent without learning (the bee, for example, and any other kind of animal that may be like it); those that have this sense as well as memory can learn. The other animals, then, live by appearances and memories, and have only a small share of experience; but the human race lives also by craft and reasoning. In human beings experience comes from memory: many memories of the same thing amount to the capacity of a single experience. 981a Experience seems to be much like scientific knowledge and craft; but in fact scientific knowledge and craft come to human beings through experience. For “experience made craft,” as Polus says, “and inexperience,

luck."[1] Craft arises when, out of many notions gained by experience, a single universal judgment about similar cases is formed. To judge that when Callias was sick with this disease this remedy helped him, and so too with Socrates, and likewise in many individual cases, belongs to experience. But to judge that it helped all people of a certain type, marked off as a single class, when they were sick with this disease—the phlegmatic, for instance, or the bilious when burning with fever—belongs to craft. With a view to action, experience seems not to differ at all from craft; in fact people with experience succeed better than those who have the rational account without the experience. (The cause is that experience is knowledge of particulars, while craft is knowledge of universals; and actions and productions are all concerned with the particular. For the doctor does not cure a human being, except incidentally, but Callias or Socrates or someone else called by a name of this sort, who happens also to be a human being. So if someone has the account without the experience, and knows the universal but does not recognize the particular within it, he will often fail in his treatment; for it is the particular that is to be treated.) Nevertheless we think that knowing and understanding belong to craft rather than to experience, and we take craftsmen to be wiser than people of experience—on the assumption that in every case wisdom goes more with knowing. And this is because the former know the cause and the latter do not. People of experience know the fact that, but not the reason why; the others recognize the why, the cause. That is also why we think the master craftsmen in each field are more to be honored than the manual workers, know more, and are wiser, [981b] because they know the causes of what is being made. (The manual workers we think of as being like certain lifeless things that act, but act without knowing what they do, as fire burns—except that lifeless things do each of these things by a kind of nature, and manual workers through habit.) So they are wiser not by being practical but by having the

1 Polus: a teacher of rhetoric and pupil of Gorgias; he speaks in Plato's *Gorgias*, where a similar line is attributed to him.

account and knowing the causes. In general, a sign of the one who knows as against the one who does not is the ability to teach; and for this reason we think craft, rather than experience, is scientific knowledge. For craftsmen can teach, and the others cannot. Again, we do not regard any of the senses as wisdom, though they are the most authoritative knowledge of particulars. But they do not tell us the why of anything—why fire is hot, for instance—but only that it is hot. It is likely, then, that at first whoever discovered any craft beyond the common perceptions was admired by people, not only because some of his discoveries were useful, but as wise and superior to the rest. And as more crafts were discovered, some for the necessities of life and some for the pastimes of leisure, the discoverers of the latter were always regarded as wiser than those of the former, because their kinds of knowledge were not directed toward use. Hence, when all such crafts were already established, the sciences that aim neither at pleasure nor at the necessities were discovered, and first in the places where people first had leisure. That is why the mathematical crafts first took shape in Egypt: there the priestly caste was allowed leisure. We have said in the *Ethics* what the difference is between craft and science and the other kindred states. The point of our present discussion is this: everyone supposes that what is called wisdom is concerned with the first causes and the principles. So, as we said before, the person of experience is thought to be wiser than those who have any sense perception at all, the craftsman wiser than people of experience, the master craftsman wiser than the manual worker, and the theoretical kinds of knowledge more so than the productive. 982a It is clear, then, that wisdom is scientific knowledge about certain principles and causes.[2]

2 The *Ethics*: Aristotle's *Nicomachean Ethics*, whose sixth book distinguishes craft, science and the other intellectual states.

## WHAT WISDOM IS

*Wisdom is the most universal, precise and free science of first causes, and it begins in wonder.*

Since this is the knowledge we are seeking, we should examine what kind of causes and what kind of principles wisdom is the knowledge of. If we take the views we hold about the wise person, perhaps this will become clearer. We suppose, first, that the wise person knows all things, as far as possible, without having knowledge of each of them individually. Next, that the one who can know difficult things, things not easy for a human being to know, is wise (perceiving is common to everyone, which is why it is easy and nothing wise). Again, that in every branch of knowledge the one who is more precise and better able to teach the causes is wiser. And that among the sciences, the one chosen for its own sake and for the sake of knowing is more truly wisdom than the one chosen for its results, and the more commanding is more truly wisdom than the subordinate. For the wise person must not be ordered but must give orders; he must not obey another, but the less wise must obey him. —These, then, are the kind and number of views we hold about wisdom and the wise. Of these features, knowing all things must belong to the one who has universal knowledge in the highest degree, for he knows in a way all the things that fall under it. And these things, the most universal, are also pretty much the hardest for human beings to know, since they are farthest from the senses. The most precise of the sciences are those most concerned with first things; for sciences that start from fewer principles are more precise than those that involve additional ones—arithmetic, for instance, than geometry. Again, the science that studies causes is also better able to teach, since the people who teach are those who state the causes of each thing. And knowing and understanding for their own sake belong most of all to the knowledge of what is most knowable. (For someone who chooses knowing for its own sake will choose most of all the

knowledge that is most truly knowledge, [982b] and that is the knowledge of what is most knowable.) And the most knowable things are the first things and the causes; for it is through these and from these that other things are known, not these through the things that fall under them. The most commanding of the sciences, more commanding than any subordinate one, is the one that knows for the sake of what each thing must be done; and this is the good of each thing, and, in general, the best in the whole of nature. From everything that has been said, then, the name we are looking for falls to one and the same science. It must be the one that studies the first principles and causes; for the good—that for the sake of which—is also one of the causes.

That it is not a productive science is clear even from the first people to philosophize. It is through wonder that human beings, now as at first, began to philosophize. At the start they wondered at the oddities close at hand; then, advancing little by little, they raised puzzles about greater matters, such as the changes of the moon and those of the sun and stars, and the coming-to-be of the universe. Someone who is puzzled and wonders thinks himself ignorant (which is why the lover of myth is in a way a lover of wisdom, since myth is made of wonders). So if they philosophized to escape ignorance, they were evidently pursuing understanding for the sake of knowing, and not for any use. What actually happened bears this out: it was when almost all the necessities, and the things that make for ease and leisure, were already available that this kind of understanding began to be sought. Clearly, then, we seek it for no other use. Just as we call a person free who exists for his own sake and not for another's, so we pursue this as the only free science, since it alone exists for its own sake. That is why its possession might justly be thought to be beyond human reach; for in many ways human nature is in bondage, so that, as Simonides says, "a god alone could have this prize"—yet it is unworthy of a man not to seek the knowledge that befits him. Now if the poets have a point, and the divine is by nature jealous, [983a] it would be likely to happen here above all, and all who excel would be unfortu-

nate. But the divine cannot be jealous—as the proverb has it, "bards tell many lies"—nor should any other knowledge be thought more honorable than this.[3] For the most divine science is also the most honorable, and there are only two ways in which a science could be such. A science is divine if it is the one the god would most of all have, or if it is about divine things. This science alone has both features. The god is thought by everyone to be among the causes and to be a kind of principle, and it is the god, either alone or most of all, who would have such knowledge. All the other sciences, then, are more necessary than this one, but none is better.—Yet the acquisition of it must in a way bring us to the opposite of where our inquiries began. For everyone begins, as we said, by wondering whether things are really so—as with self-moving puppets, or the turnings of the sun, or the incommensurability of the diagonal (for it seems a wonder to all who have not yet studied the cause that something should not be measured even by the smallest unit). But we must end in the opposite and, as the proverb has it, the better state, as happens in these cases too once people learn: nothing would astonish a geometer so much as if the diagonal turned out to be commensurable. We have stated, then, what the nature of the science we are seeking is, and what goal the inquiry and the whole investigation must reach.[4]

### THE FOUR CAUSES AND THE FIRST PHILOSOPHERS

*Aristotle names four kinds of cause and reviews early thinkers who sought a material principle.*

It is clear that we must acquire knowledge of the original causes, since we say we know each thing when we think we recognize its first cause. Causes are spoken of in four ways. One of them, we say, is the substance, the essence (for the why is traced back ultimately to the account, and the primary why is a cause and

3 Simonides of Ceos: a lyric poet of the sixth and fifth centuries BC.
4 The diagonal of a square cannot be measured by any unit that also measures its side exactly.

principle). A second is the matter, the underlying subject. The third is the source from which motion begins. The fourth is the cause opposite to this: that for the sake of which, the good (for this is the end of all coming-to-be and motion). We have studied these sufficiently in our works on nature; [983b] nevertheless, let us call in as well those who before us undertook the investigation of the things that are and philosophized about the truth.[5] For clearly they too speak of certain principles and causes. Going over their views, then, will be of some help to our present investigation: either we shall find some other kind of cause, or we shall have more confidence in those we are now stating.—Most of the first philosophers thought that the only principles of all things were principles in the form of matter. That of which all things that are consist, from which they first come to be and into which they finally perish—the substance persisting while it changes in its attributes—this, they say, is the element and the principle of the things that are. And for this reason they think that nothing comes to be or perishes, since such a nature is always preserved. In the same way, we do not say that Socrates comes to be without qualification when he becomes handsome or cultured, or perishes when he loses these states, because the underlying subject, Socrates himself, persists; and so with everything else. For there is always some nature, either one or more than one, from which the other things come to be while it is preserved. Not all of them, however, say the same about the number and the kind of such a principle. Thales, the founder of this sort of philosophy, says it is water (which is why he declared that the earth rests on water). He perhaps got this idea from seeing that the nourishment of all things is moist, and that heat itself comes to be from moisture and lives by it (and that from which things come to be is the principle of all things)—he got the idea from this, then, and also from the fact that the seeds of all things have a moist nature, and water is the principle of the

5 "Substance" renders *ousia*, literally "being-ness"; "essence" renders *to ti ēn einai*, literally "the what-it-was-to-be."

nature of moist things.[6] Some think that even the very ancient people, who lived long before the present generation and were the first to give accounts of the gods, held this view about nature. For they made Ocean and Tethys the parents of coming-to-be, and made the oath of the gods to be by water—what they call Styx. For what is oldest is most honored, and what one swears by is the most honored thing.[7] 984a Whether this view of nature really is primitive and ancient may perhaps be unclear; but Thales at any rate is said to have expressed himself in this way about the first cause. (Hippo no one would think fit to place among these thinkers, because of the poverty of his thought.) Anaximenes and Diogenes make air prior to water, and the principle above all others among the simple bodies; Hippasus of Metapontum and Heraclitus of Ephesus make it fire; Empedocles makes it the four, adding earth as a fourth to those mentioned. For these, he says, always persist and do not come to be, except in being more or fewer, as they are combined into one and separated out of one;[8] Anaxagoras of Clazomenae, who was older than Empedocles but later in his works, says the principles are infinite in number. For he says that almost all things made of like parts come to be and perish in the way water or fire do, only by combination and separation, and otherwise neither come to be nor perish but persist eternally.—From these views, then, one might think that the only cause is the one described as being in the form of matter. But as they advanced in this way, the facts themselves opened the road for them and compelled them to inquire. For however true it may be that every coming-to-be and perishing is out of some one thing, or out of more than one, why does this happen, and what is the cause?[9] Certainly the

6 Thales of Miletus (early sixth century BC) was traditionally counted the first Greek philosopher.

7 Ocean and Tethys are primeval deities in Homer; Styx is the underworld river by which the gods swore their most binding oaths.

8 These are early Greek thinkers of the sixth and fifth centuries BC; Diogenes is Diogenes of Apollonia.

9 Things "made of like parts" (homoeomerous) are stuffs such as flesh, bone or gold, every part of which is the same as the whole.

underlying subject does not itself make itself change. I mean, for instance, that neither the wood nor the bronze is the cause of its own change; the wood does not make a bed, nor the bronze a statue, but something else is the cause of the change. And to seek this is to seek the second principle—as we would put it, the source from which motion begins. Now those who took up this sort of inquiry at the very beginning, and said that the underlying subject is one, were not troubled by this at all. But some of those who say it is one, as though defeated by this inquiry, say that the one, and nature as a whole, is motionless—not only with respect to coming-to-be and perishing (that is an ancient belief, and all agreed on it) but also with respect to every other kind of change. And this view is peculiar to them. 984b Of those who say that the universe is one, then, none managed to catch sight of this kind of cause, except perhaps Parmenides—and he only in so far as he posits not only one but also, in a way, two causes. But those who make more than one are better able to speak of it—for instance, those who make them hot and cold, or fire and earth; for they treat fire as having a nature that moves things, and water and earth and the like as the opposite.—After these thinkers and principles of this sort, since these were not adequate to generate the nature of things, people were again compelled, as we said, by the truth itself to seek the next principle. For that some things are, and others come to be, in a good and beautiful way—of this it is not likely that fire or earth or anything else of the kind is the cause, nor likely that those thinkers supposed so. Nor, again, would it be right to entrust so great a matter to spontaneity and chance. So when someone said that intellect was present—in nature, just as in animals—as the cause of the world-order and of all arrangement, he seemed like a sober man compared with his predecessors, who spoke at random. We know that Anaxagoras clearly took up these ideas, but Hermotimus of Clazomenae is credited with stating them earlier. Those who held this view, then, posited the cause of things' being beautiful as at the same time a principle of the

things that are, and the kind of principle from which motion comes to them.

### LOVE, STRIFE AND THE ATOMISTS

*Hesiod, Empedocles, Anaxagoras and the atomists grope toward a cause of motion and of good.*

> One might suspect that Hesiod was the first to look for such a thing, or anyone else who made Eros or desire a principle among the things that are, as Parmenides also did. For he, constructing the coming-to-be of the universe, says: "First of all the gods she devised Eros." And Hesiod: "First of all things Chaos came to be, and then
> broad-breasted Earth...
> and Eros, who stands out among all the immortals"—implying that among the things that are there must be some cause that will move things and bring them together.[10]

How these thinkers should be ranked as to who came first may be decided later. But since the contraries of good things were also evidently present in nature—not only order and the beautiful but also disorder and the ugly, [985a] and bad things more numerous than good, and base things than beautiful—so someone else introduced Love and Strife, each as the cause of one of these two sets of things. For if one follows Empedocles and takes him according to his meaning rather than his lisping expression, one will find that Love is the cause of good things and Strife of bad. So if someone said that Empedocles in a sense states, and is the first to state, the bad and the good as principles, he would perhaps be right—if indeed the cause of all good things is the good itself.—These thinkers, then, as we say, evidently grasped, up to this point, two of the causes we distin-

10 Hesiod: the early epic poet whose *Theogony* recounts the origins of the gods and the world.

guished in our works on nature, the matter and the source of motion—but dimly and without any clarity, rather as untrained fighters do in battle. They rush about and often land good blows, but not from knowledge; and likewise these thinkers do not seem to know what they are saying. For they evidently make almost no use of these causes, except to a small extent.[11] Anaxagoras uses intellect as a stage device for making the world: whenever he is at a loss as to why something is necessarily so, he drags it in, but otherwise he names anything rather than intellect as the cause of what comes to be. Empedocles uses the causes more than he does, but not adequately either, nor does he achieve consistency in using them. At any rate, in many places in his account Love separates and Strife combines.[12] For whenever the universe is dissolved into its elements by Strife, fire is combined into one, and so is each of the other elements; and whenever they come together again into one under Love, the parts must be separated out again from each element.—Empedocles, then, was the first, in contrast to his predecessors, to introduce the division of this cause, making the source of motion not one but two different and contrary sources. Further, he was the first to speak of the four elements described as being in the form of matter. (He does not, however, use them as four but as if they were only two, [985b] fire by itself on the one side, and on the other its opposites—earth, air and water—as a single nature; one can see this by studying his verses.)—He, then, as we say, has spoken of the principles in this way and as being this many. Leucippus and his associate Democritus say that the elements are the full and the void, calling the one being and the other non-being: the full and solid is being, and the void is non-being (which is why they also say that being no more is than non-being, since body no more is than the void). And they say

11 Empedocles of Acragas (fifth century BC) held that four elements—earth, water, air, fire—are combined and separated by two forces, Love and Strife.

12 A "stage device": the crane on which a god was lowered onto the stage to resolve a play's plot.

these are the causes of the things that are, as matter.[13] And just as those who make the underlying substance one generate the other things through its attributes, positing the rare and the dense as the principles of the attributes, in the same way these thinkers say that the differences are the causes of the other things. These differences, they say, are three: shape, order and position. For they say that what is differs only by "rhythm," "contact" and "turning"; and of these, rhythm is shape, contact is order, and turning is position. A differs from N in shape, AN from NA in order, and Z from H in position. As for motion—where it comes from, or how it belongs to things—these thinkers too, like the others, lazily neglected it. So far, then, as we say, the inquiry into these two causes seems to have been carried by our predecessors.[14]

### THE PYTHAGOREANS AND THE ELEATICS

*The Pythagoreans make numbers the principles of things; the Eleatics say that all is one.*

Contemporary with these thinkers, and before them, the so-called Pythagoreans took up mathematics and were the first to advance it; and having been brought up in it, they thought its principles were the principles of all things. Since among these principles numbers are by nature first, and in numbers they seemed to see many resemblances to the things that are and that come to be—more than in fire and earth and water—one attribute of numbers being justice, another soul and intellect, another the right moment, and similarly, one might say, with each of the rest; and since, further, they saw the attributes and ratios of musical scales in numbers—since, then, all other things seemed to be modeled in their whole nature on numbers, and numbers seemed to be first in the whole of nature, [986a] they supposed the

13 Leucippus and Democritus of Abdera (fifth century BC) were the founders of atomism.

14 "Rhythm," "contact" and "turning" are the atomists' own dialect terms, which Aristotle translates into ordinary words.

elements of numbers to be the elements of all the things that are, and the whole heaven to be a harmony and a number. And whatever agreements they could show between numbers and harmonies on the one hand and the attributes and parts of the heaven and its whole arrangement on the other, they collected and fitted into their scheme.[15] And if there was a gap anywhere, they eagerly supplied what was needed to make their whole system hang together. For instance, since the ten is thought to be complete and to embrace the whole nature of numbers, they say that the bodies that move in the heavens are also ten; but since only nine are visible, they invent the "counter-earth" as the tenth. We have discussed these matters more precisely elsewhere. But the reason we are going over them is to learn from these thinkers too what principles they posit, and how these fall under the causes we have named.[16] These thinkers too, then, evidently consider number to be a principle, both as matter for the things that are and as their attributes and states. The elements of number are the even and the odd, one of these limited and the other unlimited; the one is from both of these (for it is both even and odd); number comes from the one; and, as has been said, the whole heaven is numbers.—Others of this same school say there are ten principles, arranged in two columns: limit and unlimited, odd and even, one and plurality, right and left, male and female, resting and moving, straight and curved, light and darkness, good and bad, square and oblong. Alcmaeon of Croton seems to have taken the same view in this way, and either he took this doctrine from them or they from him; for Alcmaeon expressed himself much as they did. He says that most human things come in pairs, meaning not definitely fixed contrarieties, as theirs were, but any at random—white and black, sweet and bitter, good and bad, large and small.[17] He,

15 The Pythagoreans: followers of Pythagoras of Samos (sixth century BC), who settled at Croton in southern Italy.

16 The counter-earth: an invisible body the Pythagoreans placed opposite the earth; Aristotle discusses it in *On the Heavens*.

17 Alcmaeon of Croton: a physician and natural philosopher of the early fifth century BC.

then, threw out vague remarks about the rest, [986b] while the Pythagoreans declared both how many and which the contrarieties are. From both of these, then, we can take this much: that contraries are the principles of the things that are; and from the latter, how many they are and which. But how these can be brought under the causes we have named has not been clearly articulated by them; they seem, though, to rank their elements as in the form of matter, for they say that substance is composed and molded out of them as its constituents.—From these, then, we can sufficiently see the thinking of the ancients who said the elements of nature are more than one. But there are some who spoke of the universe as being a single nature, though not all in the same way, either in the quality of their account or in its conformity with nature. A discussion of them does not fit at all into the present inquiry into causes. (For they do not, like some of the natural philosophers who suppose that being is one, nevertheless generate things from the one as from matter; they speak in another way. Those others add motion, since they do generate the universe, whereas these say it is motionless.) Still, this much is relevant to the present inquiry. Parmenides seems to fasten on what is one in account, Melissus on what is one in matter (which is why the former says it is limited, the latter unlimited). Xenophanes, the first of them to make things one (Parmenides is said to have been his pupil), made nothing clear, and does not seem to have grasped the nature of either of these; rather, gazing at the whole heaven, he says that the one is the god.[18] These thinkers, then, as we said, must be set aside for the purposes of the present inquiry—two of them entirely, Xenophanes and Melissus, as being a little too crude. Parmenides, though, seems to speak with more insight. For, holding that besides what is, what is not is nothing, he thinks that of necessity what is is one, and there is nothing else (we have spoken about this more clearly in our works on nature). But being compelled to follow the appearances, and supposing that what is is one according to

18 Xenophanes of Colophon, Parmenides of Elea and Melissus of Samos held, in different ways, that what is is one.

the account but many according to perception, he posits in turn two causes and two principles, hot and cold, calling them fire and earth, as it were; 987a and of these he ranks the hot with what is, and the other with what is not.—From what has been said, then, and from the wise men who have so far sat in council with us on the question, we have gathered this. From the first thinkers, that the principle is bodily (for water and fire and the like are bodies), with some making the bodily principles one and others more than one, though both place them in the form of matter; and from some, that there is this cause and, in addition to it, the source of motion—which some of them make one and others two. Down to the Italians, then, and apart from them, the others have spoken rather obscurely about these matters, except that, as we said, they happen to have used two causes, and of these one—the source of motion—some make one and others two. The Pythagoreans spoke of two principles in the same way, but added this much, which is peculiar to them: they did not think that the limited and the unlimited were some other natures, such as fire or earth or something else of the kind, but that the unlimited itself and the one itself were the substance of the things of which they are predicated; and that is why number is the substance of all things. On these matters, then, this is how they expressed themselves; and about the what-it-is they began to make statements and to define, but they treated it too simply.[19] For they defined superficially, and thought that the first thing to which a given definition belonged was the substance of the thing—as if someone thought that double and the number two were the same, because double belongs first to two. But what it is to be double and what it is to be two are presumably not the same; otherwise the one will be many—a consequence they in fact had to face. This, then, is as much as we can learn from the earlier thinkers and the others.

19 "The Italians": the philosophers of southern Italy, chiefly the Pythagoreans.

## PLATO AND THE FORMS

*Plato, following Heraclitus and Socrates, posits Forms, mathematical objects, the One and the great and small.*

After the philosophies we have described came the work of Plato, which in most respects followed these thinkers, but also had features of its own, apart from the philosophy of the Italians. From his youth he had first become familiar with Cratylus and with the Heraclitean opinions that all perceptible things are always flowing and that there is no knowledge of them; and he held these views later as well. 987b Socrates, however, was occupied with ethical matters and not at all with nature as a whole, but in ethics he sought the universal and was the first to fix his thought on definitions. Plato accepted him, and because of this he supposed that defining concerned other things and not perceptible ones; for it was impossible, he thought, for the common definition to be of any perceptible thing, since these are always changing.[20] Things of this other sort, then, he called Forms, and he said that perceptible things are apart from these and are all named after them; for the many things that share a name with the Forms exist by participation in them. With "participation" he changed only the word: the Pythagoreans say that things exist by imitation of numbers, Plato by participation, changing the name. But what this participation in, or imitation of, the Forms might be, they left to be inquired into in common. Further, besides perceptible things and Forms, he says there are the objects of mathematics, which are intermediate, differing from perceptible things in being eternal and unchanging, and from Forms in that there are many alike, whereas the Form itself is in each case unique. And since the Forms are the causes of other things, he thought their elements were the elements of all the

20 Cratylus: a follower of Heraclitus, for whom Plato's dialogue *Cratylus* is named.

things that are.[21] As matter, then, the great and the small are principles; as substance, the One. For from the great and the small, by participation in the One, come the numbers. In saying that the One is substance, and not that something else is said to be one, he spoke much as the Pythagoreans did; and like them he said that the numbers are the causes of the substance of other things. But to posit a dyad in place of the unlimited taken as one, and to make the unlimited out of the great and the small —this is peculiar to him. Further, he places the numbers apart from perceptible things, while they say that the things themselves are numbers, and they do not place the objects of mathematics between the two.[22] His making the One and the numbers apart from things, and not as the Pythagoreans did, and his introduction of the Forms, came about because of his inquiry into definitions (for the earlier thinkers had no share in dialectic). His making the other nature a dyad was because the numbers, except the primes, could be neatly generated out of it as out of a kind of mold. 988a Yet what happens is the opposite; the theory is not reasonable. For they make many things out of the matter, while the Form generates only once; but evidently from one matter comes one table, while the one who applies the form, being one, makes many tables. The male is similarly related to the female: the female is impregnated by one mating, while the male impregnates many. And yet these are imitations of those principles. This, then, is how Plato settled the questions we are inquiring into. It is evident from what has been said that he used only two causes, that of the what-it-is and that which accords with matter (for the Forms are the causes of the what-it-is for other things, and the One for the Forms). It is evident too what the underlying matter is, of which the Forms are predicated in the case of perceptible things, and the One in the case of the Forms: it is a dyad, the great and the small. Further, he

21 Plato's Forms: eternal, unchanging realities such as Beauty itself or Justice itself, grasped by thought rather than the senses; perceptible things are said to "participate" in them.

22 Dyad: a "twoness" or pair; elsewhere Aristotle calls this Platonic principle the "indefinite dyad."

assigned the cause of good and of bad to the elements, one to each—as we say some earlier philosophers also sought to do, such as Empedocles and Anaxagoras.

### NO CAUSE BEYOND THE FOUR

*The earlier thinkers touched only on the four causes, and only dimly.*

We have gone over, concisely and in summary, who has spoken about the principles and the truth, and in what way. Still, we have gained this much from them: of those who speak about principle and cause, none has mentioned any beyond those we distinguished in our works on nature; all of them evidently touch on these in some way, though dimly. Some speak of the principle as matter, whether they suppose one or more, and whether they posit it as body or as incorporeal. (Plato, for example, speaks of the great and the small; the Italians of the unlimited; Empedocles of fire, earth, water and air; Anaxagoras of the infinity of things made of like parts. All of these have grasped this sort of cause, as have all who speak of air or fire or water, or of something denser than fire and finer than air; for some have said the primary element is like that.)—These thinkers, then, grasped only this cause; but certain others grasped the source from which motion begins (for instance, those who make Love and Strife, or intellect, or Eros a principle). The essence and the substance no one has clearly set out, 988b but those who posit the Forms come closest to it. (For they do not suppose that the Forms are the matter of perceptible things, and the One the matter of the Forms, nor that the beginning of motion comes from them—they say rather that they are causes of motionlessness and of being at rest; but they offer the Forms as the essence of each of the other things, and the One as that of the Forms.) That for the sake of which actions and changes and motions take place they do in a way call a cause, but not in this way, nor in the way in which it is a cause by nature. For those who speak of intellect or Love posit these causes as good; but they do not speak as though anything that is either is or comes

to be for their sake, but as though motions come from them. In the same way, those who say that the one or being is such a nature say that it is the cause of substance, but not that anything is or comes to be for its sake. So it turns out that in a way they both do and do not say that the good is a cause; for they say it not without qualification but incidentally.—That we have correctly determined how many the causes are and of what kind, all these thinkers seem to bear witness, since they are unable to touch on any other cause. In addition, it is clear that the principles must be sought either all in this way or in some such way. Next, let us go through the puzzles that may be raised about how each of these thinkers has spoken, and how things stand with the principles.

## CRITICISM OF THE EARLY THINKERS

*Aristotle finds faults in the monists, Empedocles, Anaxagoras and the Pythagoreans.*

Those, then, who posit that the universe is one, and that there is some one nature as matter, and this bodily and possessing magnitude, clearly go wrong in many ways. For they posit elements only of bodies, not of incorporeal things, though there are incorporeal things too. And in attempting to state the causes of coming-to-be and perishing, and giving a natural account of everything, they do away with the cause of motion. Further, they go wrong in not positing substance, or the what-it-is, as the cause of anything; and in addition, in readily calling any of the simple bodies except earth a principle, without examining how they are produced out of one another—I mean fire, water, earth and air. For some of these come to be out of one another by combination and others by separation, and this makes the greatest difference to their being prior or posterior. In one way, the most elementary of all would seem to be that out of which, as first, things come to be by combination; [989a] and such would be the finest-grained and subtlest of bodies. (That is why those who posit fire as the principle would be speaking most in agreement

with this argument. Each of the others too agrees that the element of bodies is of this sort. At any rate, none of those who speak of one element thought fit to make earth the element, clearly because of the coarseness of its parts; whereas each of the other three elements has found some judge in its favor—some say fire is the element, others water, others air. Yet why on earth do they not say earth too, as most people do? For people say that everything is earth; and Hesiod too says that earth was the first of bodies to come to be—so ancient and popular this belief turns out to be.)—By this argument, then, anyone who names any of these except fire would not be speaking correctly, nor would anyone who posits something denser than air but finer than water. But if what is later in coming-to-be is prior in nature, and what is concocted and compounded is later in coming-to-be, the opposite would hold: water would be prior to air, and earth to water.—Concerning those who posit one cause of the kind we described, let this suffice. The same applies if someone posits more than one, as Empedocles says that matter is four bodies. For the same consequences must follow for him, and some peculiar to him. For we see them coming to be out of one another, so that the same body does not always remain fire or earth (we have spoken about these matters in our works on nature). And on the cause of things' being moved—whether one or two should be posited—we must think he has spoken neither correctly nor altogether reasonably. In general, those who speak this way must do away with alteration; for hot will not come from cold, nor cold from hot. For there would have to be something that itself undergoes these contraries, some one nature that becomes fire and water—which he denies. As for Anaxagoras, if one were to suppose that he speaks of two elements, one would be supposing it very much in accordance with an argument that he did not himself articulate, but that he would necessarily have accepted if someone had led him to it. For it is absurd in other respects to say that at the beginning all things were mixed— [989b] both because it follows that they must first have existed unmixed, and because it is not natural for just

anything to be mixed with just anything, and also because attributes and accidents would then be separable from substances (for the same things that are mixed can be separated). Nevertheless, if one were to follow him, articulating what he means, he would perhaps appear to be speaking in a more up-to-date way. For when nothing had been separated out, clearly nothing could truly be said of that substance. I mean, for instance, that it was neither white nor black nor gray nor any other color, but was necessarily colorless; otherwise it would have had one of these colors. Likewise, by the same argument, it was flavorless, and had no other such attribute either. For it could not be of any quality or any quantity, or be a what. Otherwise one of the particular Forms would have belonged to it; and this is impossible when all things are mixed together, for then it would already have been separated out. But he says that all things are mixed except intellect, and that this alone is unmixed and pure. From this it follows that he says the principles are the one (for this is simple and unmixed) and the other, which is like what we posit as the indeterminate before it is determined and comes to share in some form. So he speaks neither correctly nor clearly, but he means something close to what later thinkers say and to what is now more evident.—But these thinkers are at home only in discussions of coming-to-be, perishing and motion; for it is pretty much only for this sort of substance that they seek the principles and causes. But those who make their study about all the things that are, and posit that among the things that are some are perceptible and others not perceptible, clearly examine both kinds. That is why one might spend more time on them, asking what they say well or badly with a view to the inquiry now before us. The so-called Pythagoreans use principles and elements stranger than those of the natural philosophers. (The reason is that they did not take them from perceptible things; for the objects of mathematics are without motion, except those studied in astronomy.) Yet all their discussions and investigations are about nature. They generate the heaven, 990a and they observe what happens to its parts, attrib-

utes and activities, and they use up their principles and causes on these—as if they agreed with the other natural philosophers that what is, is just so much as is perceptible and is enclosed by what is called the heaven. But the causes and principles they speak of are, as we said, sufficient to lead up even to the higher kinds of beings, and better suited to these than to accounts of nature. Yet how there will be motion, if only limit and unlimited, odd and even, are posited as underlying, they do not say at all; nor how, without motion and change, there can be coming-to-be and perishing, or the activities of the bodies that travel through the heavens. Further, even if one granted them that magnitude is made out of these, or even if this were proved, still, how will some bodies be light and others have weight? For from what they posit and say, they are speaking no more about perceptible bodies than about mathematical ones. That is why they have said nothing whatever about fire or earth or the other such bodies—since, I suppose, they say nothing peculiar to perceptible things. Further, how are we to understand that the attributes of number, and number, are the causes of what is and comes to be in the heaven, both from the beginning and now, and yet that there is no other number besides this number of which the world is composed? For when in their view opinion and the right moment are in one particular region, and a little above or below are injustice and separation or mixture, and they offer as proof that each of these is a number—and that in this place there already happens to be a plurality of the magnitudes composed of number, because these attributes go with their respective places—is this number in the heaven, which we must take each of these things to be, the same number, or is it another besides this one? Plato says it is a different one; and yet he too thinks that both these things and their causes are numbers—but that the causal numbers are intelligible, while these are perceptible.

## AGAINST THE FORMS

*A series of objections to Plato's theory of Forms and Form-numbers.*

Let us leave the Pythagoreans for now; it is enough to have touched on them this far. [990b] As for those who posit the Forms as causes: first, in seeking to grasp the causes of the things around us, they introduced others equal to them in number—as if someone who wanted to count things thought he could not do it while they were fewer, but counted them after making them more. (For the Forms are about equal to—or not fewer than—the things in seeking whose causes these thinkers proceeded from them to the Forms. For corresponding to each thing there is something with the same name, apart from the substances; and for the other things there is a one over many, both for things here and for eternal things.) Further, none of the ways in which we show that the Forms exist is convincing. From some no deduction necessarily follows; from others there arise Forms even of things of which we think there are none.[23] For according to the arguments from the sciences, there will be Forms of all the things of which there are sciences; according to the one-over-many argument, Forms even of negations; and according to the argument from thinking of something after it has perished, Forms of perishable things, since there is an image of these. Further, of the more precise arguments, some make Forms of relatives, of which we deny there is a class in its own right, and others introduce the "third man."[24] In general, the arguments for the Forms do away with things whose existence we who speak of Forms care about more than the existence of the Forms. For it follows that what is first is not the dyad but number, and that the relative is prior to what is in its own right, and all the other conclusions by which some, following out the

23 Aristotle says "we" here because he writes as a member of Plato's school.
24 The "third man": the objection that if a form of man is needed to explain what men have in common, another is needed for men and that form together, and so on without end.

opinions about the Forms, have come into conflict with the principles.—Further, according to the assumption on which we say there are Forms, there will be Forms not only of substances but of many other things too. (For the single thought is not only of substances but also of other things, and there are sciences not only of substance but also of other things, and countless other such consequences follow.) But according to what necessarily follows, and to the opinions about them, if the Forms can be participated in, there must be Forms only of substances. For they are not participated in incidentally; rather, a thing must participate in each Form in so far as the Form is not said of an underlying subject. (I mean, for instance, that if something participates in the double itself, it also participates in the eternal, but incidentally; for it is incidental to the double to be eternal.) So the Forms will be substance. But the same terms signify substance here and there; [991a] otherwise, what will it mean to say that there is something apart from these, the one over many? And if the Forms and the things that participate in them have the same form, there will be something common to them. (For why should "two" be one and the same in the case of the perishable twos and the twos that are many but eternal, any more than in the case of the two itself and a particular two?) But if the form is not the same, they would share only the name, as if someone were to call both Callias and a piece of wood "human" without observing anything common to them.—Above all, one might be puzzled as to what on earth the Forms contribute either to the eternal things among perceptibles or to those that come to be and perish. For they are not the cause of any motion or change in them. Nor, again, do they help at all toward knowledge of the other things (for they are not even their substance; if they were, they would be in them), nor toward their being, since they are not present in the things that participate in them. If they were, they might perhaps be thought to be causes, as white is a cause by being mixed into a white thing. But this argument, which Anaxagoras first and Eudoxus later, and certain others, put forward, is very easily upset; for it is easy to collect many

impossibilities against such a view. Nor, again, do the other things come from the Forms in any of the usual senses of "from." And to say that the Forms are patterns and that the other things participate in them is to speak emptily and use poetic metaphors. For what is it that does the work, looking to the Forms?[25] Anything can both be and come to be like something else without being copied from it; so whether Socrates exists or not, someone like Socrates might come to be—and clearly the same would hold even if Socrates were eternal. There will also be several patterns of the same thing, and so several Forms: of human being, for instance, animal and two-footed, and at the same time also the human itself. Further, the Forms will be patterns not only of perceptible things but also of Forms themselves—the genus, for instance, as genus of species—so that the same thing will be both pattern and image. [991b] Further, it would seem impossible for the substance and that of which it is the substance to be separate; so how could the Forms, being the substances of things, be separate? In the *Phaedo* it is said that the Forms are causes both of being and of coming-to-be. Yet even if the Forms exist, the things that participate in them do not come to be unless there is something to set them in motion; and many other things come to be—a house or a ring, for instance—of which we say there are no Forms. So clearly the other things too can both be and come to be through causes of the same kind as those of the things just mentioned.—Further, if the Forms are numbers, how will they be causes? Is it because the things that are are other numbers—this number, say, a human being, this one Socrates, this one Callias? Then why are those numbers the causes of these? It will make no difference even if the ones are eternal and the others not. But if it is because things here are ratios of numbers, as a musical consonance is, clearly there is some one thing of which they are ratios.[26] If, then, there is something—the matter—it is evident that the numbers them-

25 Eudoxus of Cnidus: a mathematician and astronomer associated with Plato's Academy.

26 The *Phaedo*: Plato's dialogue on the last day and death of Socrates.

selves too will be ratios of one thing to another. I mean, for instance, if Callias is a numerical ratio of fire, earth, water and air, the Form too will be a number of certain other underlying things; and the human itself, whether it is a number of some sort or not, will still be a numerical ratio of certain things and not a number, nor will it be a number on that account. Further, from many numbers one number comes to be, but how does one Form come from Forms? And if it comes not from the Forms themselves but from the units in the number—in ten thousand, for instance—how do the units stand? If they are of the same kind, many absurd consequences will follow; and so too if they are not of the same kind—neither the units in a given number alike with one another, nor all the others alike with all the others. For in what will they differ, since they are without attributes? These views are neither reasonable nor consistent with our conception. Further, they must construct another kind of number, with which arithmetic is concerned, and all the things that some call intermediates. How do these exist, or from what principles? And why will they be intermediate between the things here and the things themselves? Further, each of the units in the two will come from some prior two; yet that is impossible. 992a Further, why is a number, taken together, one? Further, in addition to what has been said, if the units are different, they should have spoken as those do who say the elements are four or two. Each of these thinkers names as the element not the common thing, body, but fire and earth—whether or not there is something common, body. But as it is, the one is spoken of as if it were made of like parts, like fire or water. If so, the numbers will not be substances. But clearly, if there is a one itself and this is a principle, "one" is said in more than one way; otherwise it is impossible.—When we wish to reduce substances to their principles, we derive lengths from the short and long, a kind of small and great; the plane from the wide and narrow; and body from the deep and shallow. Yet how will the plane contain a line, or the solid a line and a plane? For the wide and narrow is a different genus from the deep and shallow. So just as

number is not present in these either, because the many and few are different from them, clearly none of the other higher things will belong to the lower either. Nor, again, is the wide a genus of which the deep is a species; for then body would be a kind of plane. Further, from what will the points be derived that are present in lines? Plato actually fought against this genus as a mere geometrical fiction, but he called the indivisible lines the principle of a line—and he often posited these. Yet these must have some limit; so by the same argument by which there is a line, there is a point too.—In general, though wisdom seeks the cause of evident things, we have neglected this (for we say nothing about the cause from which change begins); and thinking we are stating their substance, we say that there are other substances, but how those are the substances of these, we state emptily. For "participating," as we said before, is nothing. Nor do the Forms have any bearing on what we see is a cause in the sciences, that because of which all intellect and all nature act—nor on this cause, which we say is one of the principles. Instead, mathematics has become philosophy for people today, though they say it should be pursued for the sake of other things. 992b Further, one might suppose that the substance they posit as underlying, as matter, is too mathematical, and is a predicate and differentia of the substance and the matter rather than matter itself—I mean the great and the small, just as the natural philosophers speak of the rare and the dense, saying that these are the primary differentiae of the underlying subject; for these are a kind of excess and deficiency. And as for motion, if these are motion, clearly the Forms will be moved; but if not, where did motion come from? The whole study of nature has been done away with. And what seems easy—to show that all things are one—does not come off. For by the method of setting out, not all things become one, but some one itself, if one grants all the premises; and not even this, unless one grants that the universal is a genus, and in some cases that is impossible. Nor is there any account of the things that come after the numbers—lengths, planes and solids—either of how they are or will be, or of what

power they have. For these can be neither Forms (since they are not numbers), nor intermediates (for those are the objects of mathematics), nor perishable things; rather, this appears to be yet another, fourth kind. In general, if one seeks the elements of the things that are without distinguishing the many ways in which things are said to be, it is impossible to find them, especially when one seeks in this way what sort of elements they consist of.[27] For surely one cannot grasp what acting or being acted on or the straight consist of; if it is possible at all, it is possible only for substances. So it is not true either to seek the elements of all the things that are, or to think one has them. And how could one even learn the elements of all things? Clearly one could not begin by already knowing anything. For just as someone learning geometry may know other things beforehand, but knows beforehand nothing of what the science is about and what he is going to learn, so it is in other cases. So if there is a science of all things, as some say, the one learning it would begin by knowing nothing beforehand. Yet all learning proceeds through things known beforehand, either all or some of them—both learning through demonstration and learning through definitions (for one must know beforehand the things the definition is composed of, and these must be familiar); and similarly learning through induction. But then, if this science were actually innate, [993a] it is astonishing that we should be unaware of having the most powerful of the sciences. Further, how will one come to know what things consist of, and how will it be made clear? This too involves a puzzle; for one might dispute the matter as with certain syllables. Some say that *za* consists of *s*, *d* and *a*, while others say it is a distinct sound and none of the familiar ones. Further, how could someone come to know the objects of a sense without having that sense?[28] Yet one ought to be able to,

27 "Setting out" (*ekthesis*): picking out what many things share and treating it as a single separate item.

28 The Greek letter zeta (ζ) was pronounced roughly "zd," so it could be analyzed as a compound sound.

if the elements of which all things consist are the same, as complex sounds consist of their own elements.

### EARLY PHILOSOPHY LISPS

*All earlier thinkers sought the four causes, but only vaguely.*

It is clear, then, even from what was said earlier, that all seem to seek the causes named in our *Physics*, and that we could not name any cause beyond these. But they seek them dimly; and in one way all of them have been stated before, in another way not at all. For the earliest philosophy seems to lisp about everything, since it is young and at its beginnings. Even Empedocles says that bone exists by its ratio, and this is the essence and the substance of the thing. But then flesh too, and each of the other things, must likewise be the ratio, or else none of them must be; for it is because of this that flesh and bone and each of the other things will be, and not because of the matter, which he says is fire, earth, water and air. Had someone else said this, he would necessarily have agreed; but he has not said it clearly. These matters, then, have been made clear already. But let us return to whatever puzzles one might raise about these same questions; for perhaps from them we may find a way through our later puzzles.

# Book Little Alpha (II)

*Truth, and why causes cannot go on forever.*

### THE STUDY OF TRUTH

*Truth is both hard and easy to grasp, and philosophy is rightly called knowledge of truth.*

The study of truth is in one way hard and in another easy. A sign of this is that no one can grasp it adequately, yet not everyone misses it; [993b] each says something about the nature of things, and while individually they contribute little or nothing to it, from all of them put together a considerable amount results. So if it seems to be as the proverb we like to quote has it—"who could miss the door?"—in this respect it would be easy; but that we can have some grasp of the whole and yet be unable to grasp the part shows its difficulty. And perhaps, since difficulty is of two kinds, its cause lies not in the things but in us. For as the eyes of bats are to the light of day, so is the intellect in our soul to the things that are by nature most evident of all.[1] It is just to be grateful not only to those whose opinions we might share, but also to those who expressed more superficial views; for these too contributed something, by training our capacity beforehand. If there had been no Timotheus, we would lack much of our lyric music; but if there had been no Phrynis, there would have been no Timotheus. It is the same with those who have expressed views about the truth: from some we have inherited certain opinions, while others were responsible for these

1 This begins Book α ("little alpha"), a short book placed second in the traditional order.

thinkers' coming to be. It is right, too, that philosophy should be called knowledge of the truth. For the end of theoretical knowledge is truth, while that of practical knowledge is action; for even if practical people examine how things stand, they study not what is eternal but what is relative to something and to the present.[2] We do not know the truth without its cause. And a thing has a quality to the highest degree when it is that in virtue of which the same quality belongs to other things too (fire, for instance, is hottest, since it is the cause of heat in the other things). So that too is truest which is the cause of the truth of the things that depend on it. That is why the principles of things that always are must always be truest; for they are not true only at some times, nor is anything the cause of their being, but they are the cause for the other things. So as each thing stands with respect to being, so it stands with respect to truth.

### CAUSES CANNOT GO ON FOREVER

*Chains of material, moving, final and formal causes must each have a first term.*

994a But clearly there is a principle, and the causes of things are not infinite, either in a straight series or in kind. Neither can one thing come from another, as from matter, to infinity (flesh from earth, say, earth from air, air from fire, and this never stopping), nor can the source from which motion begins (a human being moved by the air, this by the sun, the sun by Strife, and no limit to this). Likewise, that for the sake of which cannot go on to infinity—walking for the sake of health, health for the sake of happiness, happiness for the sake of something else, and so always one thing for the sake of another. And the same holds for the essence.[3] For in the case of intermediate terms, where there is something last and something before it, the earlier term must be the cause of those after it. If we had to say which of the three

2 Timotheus of Miletus and his predecessor Phrynis of Mytilene were innovative composers of the fifth century BC.

3 "Happiness" renders *eudaimonia*: flourishing, a whole life going well.

is the cause, we would say the first: certainly not the last, since what comes at the end is the cause of nothing; nor the middle either, since it is the cause of only one thing (and it makes no difference whether the middle is one or more, or whether they are infinite or finite). But in series that are infinite in this way, and in the infinite generally, all the parts down to the present one are alike intermediates; so if there is nothing first, there is no cause at all.—Nor, again, can the series go on to infinity downward, when it has a starting point above, so that water comes from fire, earth from water, and so on, with some other kind always coming to be. For one thing comes to be "from" another in two ways—not in the sense of "after," as the Olympic games come "from" the Isthmian, but either as a man comes from a boy when the boy changes, or as air comes from water. We say a man comes to be from a boy in the way that what has come to be comes from what is coming to be, or what has been completed from what is being completed (for there is always something in between: just as coming-to-be is between being and not being, so what is coming to be is between what is and what is not; the learner is someone becoming a knower, and that is what we mean when we say a knower comes to be from a learner). But water comes from air in the other way, by the destruction of the one.[4] That is why changes of the first kind do not turn back into each other: [994b] a boy does not come to be from a man (for what comes to be does not come from the coming-to-be, but is what exists after the coming-to-be; so too day comes "from" dawn in the sense that it comes after it, which is why dawn does not come from day); but changes of the other kind do turn back. In neither way is it possible to go on to infinity. In the first case the intermediates must have an end; in the second the terms turn back into each other, for the destruction of one is the generation of the other.—At the same time, it is impossible for the first cause, being eternal, to be destroyed. For since coming-to-be is not infinite in the upward direction, the

4 The Isthmian and Olympic games were two of the great Panhellenic athletic festivals; in the festival calendar the one followed the other.

first thing whose destruction brought something into being cannot be eternal. Further, that for the sake of which is an end, and an end is the sort of thing that is not for the sake of something else, but other things are 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 that for the sake of which. Those who make the series infinite don't notice that they are doing away with the nature of the good (and yet no one would set about doing anything if he were not going to reach a limit). Nor would there be intellect among the things that are; for anyone who has intellect always acts for the sake of something, and this is a limit—the end is a limit. Nor can the essence be traced back to another definition, fuller in its wording. The earlier definition is always more of a definition, and the later one is not; and where the first is not what it should be, neither is what follows it. Further, those who talk this way do away with scientific knowledge, since it is impossible to know anything until one arrives at what cannot be further divided. And knowing becomes impossible too: how can one think of things that are infinite in this way? It is not like the line, whose divisions never come to a stop, but which one cannot think of without stopping (which is why someone running through the infinitely divisible line will not be counting its sections); even the whole line must be thought of by something that is not moving along it. And nothing can have infinite being; or if it can, at least what it is to be infinite is not itself infinite.—Again, even if the kinds of causes were infinite in number, knowing would still be impossible. For we think we know when we have become acquainted with the causes, and what is infinite by addition cannot be gone through in a finite time.

### METHODS SUITED TO THE SUBJECT

*Habit shapes what listeners accept, and mathematical precision does not suit every subject.*

How a lecture goes over depends on the listeners' habits. We expect things to be said the way we are used to, [995a] and what departs from this seems not the same but less intelligible and more foreign, because it is unfamiliar; for what is habitual is intelligible. How much power habit has is shown by the laws, in which mythical and childish elements carry more weight, through habit, than knowing about them does. Some people won't accept what a speaker says unless he speaks mathematically, others unless he gives examples, while others expect him to call a poet as a witness. And some want everything done precisely, while others are annoyed by precision, either because they can't follow the chain of reasoning or because it seems like hair-splitting. For precision does have something of this about it, so that, as in business dealings, in arguments too some people think it petty. So one must already have been trained in how to take each kind of argument, since it is absurd to be looking for knowledge and at the same time for the method of knowledge; and neither is easy to get. The mathematician's exactness is not to be demanded in all cases, but only for things that have no matter. That is why this method is not suited to natural science, since presumably all of nature has matter. So we must first examine what nature is; in that way it will also become clear what natural science is about.

# Book Beta (III)

*The puzzles of first philosophy.*

### WHY BEGIN WITH PUZZLES

*Inquiry must first work through the puzzles; Aristotle lists those of first philosophy.*

With a view to the science we are seeking, we must first go over the things we need to be puzzled about first. These are the views that some people have held about these matters differently from us, and anything besides these that happens to have been overlooked. For those who want to find a way through, it pays to work through the puzzles well; for the way through that comes later is the resolution of what was puzzling before, and one cannot untie a knot one is unaware of. The puzzlement of our thinking reveals this knot in the subject matter: insofar as thought is puzzled, it is in much the same state as someone tied up, since in either case it is impossible to go forward. That is why one must have surveyed all the difficulties beforehand, both for these reasons and because people who inquire without first working through the puzzles are like those who don't know where they are supposed to be walking. Besides, such a person does not even know whether he has found what he is looking for or not; [995b] for the end is not clear to him, whereas to someone who has first worked through the puzzles it is clear. Further, someone who has heard all the arguments, like the opposing parties in a lawsuit, is bound to be in a better position to judge.—The first puzzle concerns the questions we raised in our introductory remarks: whether it belongs to one science or to many to study the causes. And whether it belongs to this science to

consider only the first principles of substance, or also the principles from which everyone conducts proofs—for instance, whether or not it is possible to assert and deny one and the same thing at the same time—and other such principles. And if the science is concerned with substance, whether there is one science of all substances or several; and if several, whether they are all akin, or whether some of them should be called wisdom and the others something else. And this too is one of the things we must investigate: whether we should say that only perceptible substances exist, or others besides these; and whether there is only one kind of substance or several, as those hold who posit both the Forms and the mathematical objects, between the Forms and perceptible things. These, then, as we say, are questions to be examined. So is whether our study concerns only substances or also the attributes that belong to substances in their own right. In addition, there are same and other, like and unlike, and contrariety, and prior and posterior, and all the other such things that the dialecticians try to examine, conducting their inquiry from reputable opinions alone: whose task is it to study all of them? Further, we must examine the attributes that belong to these very things in their own right—not only what each of them is, but also whether one thing has one contrary. And whether the principles and elements are the genera, or the constituents present in each thing into which it is divided; and if the genera, whether they are the ones predicated last of the individuals or the first ones—for instance, whether animal or human being is a principle and exists more fully apart from the particular. Above all, we must inquire and work at the question whether there is or is not some cause in its own right besides matter, and whether this is separable or not, and whether it is one or more in number; and whether there is something besides the composite (by "the composite" I mean when something is predicated of the matter) or nothing, or whether there is in some cases and not in others, and what sort of beings these are. [996a] Further, whether the principles are limited in number or in kind, both those in the accounts and those

in the underlying subject; and whether the principles of perishable and imperishable things are the same or different; and whether they are all imperishable, or those of perishable things are perishable. Further—the hardest question of all and the one that holds the most puzzlement—whether the one and being, as the Pythagoreans and Plato said, are not something else but are the substance of the things that are. Or not, but the underlying subject is something else—Love, as Empedocles says, while another says fire, and another water or air. And whether the principles are universal or like particular things; and whether they exist potentially or actually; further, whether potentially or actually in some other sense than with respect to motion—for these questions too would present much puzzlement. In addition, whether numbers, lengths, figures, and points are substances of some kind or not; and if they are substances, whether they are separate from perceptible things or present in them. About all of these, it is not only hard to find a way through to the truth; it is not easy even to work through the puzzles well in argument.

### ONE SCIENCE OR MANY?

*Puzzles about whether one science studies all the causes, the axioms, all substances and their attributes.*

First, then, about the question we mentioned first: whether it belongs to one science or to several to study all the kinds of causes. How could it belong to one science to know the principles, when they are not contraries? Further, many beings do not have all of them. In what way can there be a principle of motion, or the nature of the good, in unmovable things—if everything that is good in its own right and by its own nature is an end, and is a cause in the sense that for its sake the other things both come to be and are; and if the end, that for the sake of which, is the end of some action, and all actions involve motion? So in unmovable things there could not be this principle, nor could there be any good-itself. That is why in mathem-

atics nothing is proved through this kind of cause, nor is there any demonstration on the grounds that something is better or worse; in fact no one even mentions anything of the kind. For this reason some of the sophists, such as Aristippus, used to scorn mathematics: in the other crafts, even the manual ones such as carpentry and shoemaking, everything is explained by its being better or worse, whereas the mathematical sciences take no account of goods and evils. 996b —But if there are several sciences of the causes, a different one for each principle, which of these should we say is the one we are seeking? Or which of the people who possess them has the most scientific knowledge of the matter we are seeking?[1] For the same thing can have all the kinds of causes. In a house, for instance, the source of motion is the craft and the builder; that for the sake of which is the product; the matter is earth and stones; and the form is the account. Now on the basis of what we determined earlier about which of the sciences should be called wisdom, there is reason to give the name to each of them. Insofar as wisdom is the most authoritative and commanding science, the one that the other sciences, like slaves, may not justly even contradict, the science of the end and of the good is of this kind (for the other things are for the sake of this). But insofar as it was determined to be the science of the first causes and of what is most knowable, the science of substance would be of this kind. For although the same thing may be known in many ways, we say that someone who recognizes what a thing is by what it is knows it more than someone who recognizes it by what it is not; and among the former, one knows more than another, and most of all the one who knows what it is, rather than the one who knows how much it is, or of what quality, or what it naturally does or undergoes. Further, in other cases too, we think we know each thing, even things of which there are demonstrations, when we know what it is (for instance, what squaring a rectangle is: that it is the finding of a mean proportional; and similarly in other cases). But with regard to comings-to-be and actions and every change, we

1 Aristippus of Cyrene, a companion of Socrates, held that pleasure is the good.

think we know when we know the source of the motion; and this is different from the end, and its opposite. So it would seem to belong to a different science to study each of these causes.—But about the principles of demonstration too, it is disputed whether they belong to one science or to several (by principles of demonstration I mean the common beliefs from which everyone conducts proofs), such as that everything must be either affirmed or denied, and that it is impossible for something at the same time to be and not to be, and all other such premises: is there one science of these and of substance, or a different one? And if not one, which of the two should we call the one we are now seeking? It isn't reasonable that they should belong to one science. Why should understanding these matters be peculiar to geometry rather than to any other science whatever? If, then, it belongs equally to any science, but cannot belong to all of them, [997a] then, just as it is not peculiar to the others, neither is knowing about them peculiar to the science that knows substances. At the same time, in what way will there be a science of them? For even now we know what each of them is (other crafts, at any rate, use them as known). But if there is a demonstrative science of them, there will have to be some underlying genus, and some of them will be its attributes and others axioms (for there cannot be demonstration of everything); for demonstration must proceed from certain things, be about something, and be of certain things. So it turns out that everything demonstrated belongs to some one genus, since all the demonstrative sciences use the axioms.—But if the science of substance and the science of these axioms are different, which of them is by nature more authoritative and prior? The axioms are the most universal and are principles of all things; and if it does not belong to the philosopher, to whom else will it belong to study what is true and false about them?—And in general, is there one science of all substances, or more than one? If not one, what sort of substance should we assign this science to? But it is not reasonable that there should be one science of all of them; for then there would also be one demonstrative science of all the attributes, since

every demonstrative science studies, concerning some underlying subject, the attributes that belong to it in their own right, starting from the common beliefs. So it belongs to the same science to study the attributes that belong in their own right to the same genus, starting from the same beliefs. For the subject belongs to one science, and the starting points belong to one science, whether the same or another; and so do the attributes, whether these sciences study them or one science made up of them.—Further, is our study concerned only with substances, or also with their attributes? I mean, for instance: if the solid is a kind of substance, and so are lines and planes, does it belong to the same science to know these and also the attributes of each genus about which the mathematical sciences prove things, or to another? If to the same, then the science of substance too would be a demonstrative science; but it seems there is no demonstration of the what-it-is. If to another, what will the science be that studies the attributes of substance? That is extremely hard to say.—Further, should we say that only perceptible substances exist, or others besides these? And is there only one kind of substance, or are there in fact several kinds, 997b as those say who posit both the Forms and the intermediates, which they say the mathematical sciences are about? The way in which we say the Forms are causes and substances in their own right has been stated in our first discussions of them. They present difficulties in many respects, but nothing is more absurd than to say that there are certain natures besides those in the universe, and yet to say that these are the same as perceptible things, except that the former are eternal and the latter perishable. For they say there is a human being itself, and a horse itself, and health itself, and nothing more—doing much the same as those who say there are gods, but in human form. Those people made the gods nothing but eternal human beings, and these people make the Forms nothing but eternal perceptible things. Further, if someone posits the intermediates besides the Forms and perceptible things, he will face many puzzles. Clearly there will likewise be lines besides the lines themselves

and the perceptible lines, and so with each of the other kinds. So, since astronomy is one of these mathematical sciences, there will also be a heaven besides the perceptible heaven, and a sun and moon, and likewise all the other things in the heaven. Yet how are we to believe this? It isn't reasonable for this heaven to be unmoving, and for it to move is completely impossible. It is the same with the things that optics deals with, and mathematical harmonics: these too cannot exist besides perceptible things, for the same reasons. For if there are intermediate perceptible objects and perceptions, clearly there will also be animals intermediate between the animals themselves and the perishable ones. One might also be puzzled about what kind of beings we should look to as the objects of these sciences. If geometry differs from land-surveying only in that the latter is about things we perceive and the former about things that are not perceptible, clearly there will also be a science besides medicine, and besides each of the others, intermediate between medicine itself and this medicine here. Yet how is that possible? For then there would be healthy things besides the perceptible ones and besides the healthy itself. At the same time, it isn't even true that land-surveying is about perceptible and perishable magnitudes; for then it would perish when they perished.—But neither would astronomy be about perceptible magnitudes, nor about this heaven here. [998a] For perceptible lines are not the sort the geometer speaks of (no perceptible thing is straight or round in that way: a circle touches a ruler not at a point, but in the way Protagoras used to say when refuting the geometers); nor are the motions and spirals of the heavens like those that astronomy gives accounts of; nor do points have the same nature as the stars. There are some who say that these so-called intermediates between the Forms and perceptible things do exist, though not separate from perceptible things but in them. To go through all the impossible consequences of this view would take a longer discussion, but it is enough to consider the following.[2] It isn't

2 Protagoras of Abdera, a leading sophist of the fifth century BC, held that "man is the measure of all things."

reasonable that this should hold only for these things; clearly the Forms too could be in perceptible things (for both views rest on the same argument). Further, there would have to be two solids in the same place; and the intermediates could not be unmoving, since they would be in perceptible things, which move. And in general, why would anyone posit that they exist, but exist in perceptible things? The same absurdities will follow as those already mentioned: there will be a heaven besides the heaven, only not separate from it but in the same place—which is even more impossible.

### ARE GENERA THE PRINCIPLES?

*Are the principles genera or constituents, and if genera, the highest or the lowest?*

About these matters, then, there is much puzzlement as to what one should posit in order to hit on the truth. And about the principles too: should one take the genera to be elements and principles, or rather the primary constituents present in each thing? For instance, the elements and principles of spoken sound are thought to be the primary things of which spoken sounds are composed, not the common genus, sound. And in geometry we call those propositions elements whose proofs are contained in the proofs of the others, either of all or of most. Further, in the case of bodies, both those who say there are several elements and those who say there is one call principles the things of which bodies are composed and made up. Empedocles, for instance, says that fire and water and the rest are elements, constituents from which the things that are come, but he does not speak of them as genera of the things that are. Besides, if anyone wants to look into the nature of other things too—a bed, for instance— [998b] he knows its nature when he knows what parts it is made of and how they are put together.—On these arguments, then, the principles would not be the genera of the things that are. But if we know each thing through its definitions, and the genera are principles of definitions, the genera must also be

principles of the things defined. And if getting knowledge of the things that are is getting knowledge of the species by which things are named, the genera are at any rate principles of the species. Some of those who say that the elements of the things that are are the one, or being, or the great and small, also appear to treat them as genera.—But it is not possible to speak of the principles in both ways. For the account of a substance is one; but the definition through the genera will be different from the account that states the constituents a thing is made of.—Further, even granting that the genera are principles as much as can be, should we regard the first genera as principles, or the last ones, predicated of the individuals? This too is disputed. If the more universal is always more a principle, clearly it will be the highest genera, since these are said of all things. There will then be as many principles of the things that are as there are primary genera, so that being and the one will be principles and substances; for these above all are said of all things that are. But neither the one nor being can be a single genus of the things that are. For the differentiae of each genus must each both be and be one; but it is impossible for the species of a genus to be predicated of their own differentiae, or for the genus to be predicated of them without its species. So if the one or being is a genus, no differentia will be either a being or one. But if they are not genera, they will not be principles either, if the genera are the principles. Further, the intermediate kinds, taken together with their differentiae, will be genera all the way down to the individuals (but as it is, some are thought to be genera and others are not). Moreover, the differentiae are principles even more than the genera are; but if they too are principles, the principles become, so to speak, infinite in number—especially if one takes the first genus as a principle. [999a] But then again, if the one is more of the nature of a principle, and the one is what is indivisible, and everything indivisible is so either in quantity or in species, and what is indivisible in species is prior, and genera are divisible into species, then the last thing predicated would be more one; for "human being" is not the genus of particular

human beings. Further, where things stand as prior and posterior, what is predicated of them cannot be something besides them. (For instance, if two is the first of the numbers, there will not be a number besides the kinds of numbers; likewise there will not be a figure besides the kinds of figures. And if there are no genera besides the species in these cases, there will hardly be in others, for these are thought to have genera most of all.) But among individuals, one is not prior and another posterior. Further, where one thing is better and another worse, the better is always prior; so there could be no genus of these either.—From these considerations, then, the things predicated of individuals seem to be principles rather than the genera. But then again, it is not easy to say in what sense one should take these to be principles. For the principle and the cause must exist besides the things whose principle it is, and must be capable of existing separated from them. But why would anyone suppose that anything of this sort exists besides the particular, except that it is predicated universally and of all? But if that is the reason, the more universal things must be posited as principles to a higher degree; so the principles would be the first genera.

### UNIVERSALS, PARTICULARS AND THE ONE

*Puzzles about knowledge of particulars, perishable and imperishable principles, and whether being and the one are substances.*

Connected with these is a puzzle that is the hardest of all and the most necessary to study, the one our discussion has now arrived at. If there is nothing besides particulars, and particulars are infinite, how is it possible to get scientific knowledge of what is infinite? For it is insofar as things are something one and the same, and insofar as something universal belongs to them, that we know anything at all.—But if this is necessary, and there must be something besides the particulars, then the genera must exist besides the particulars, either the last ones or the first; and we have just gone through the puzzle showing that this is impossible.—Further, even granting as fully as possible that

there is something besides the composite, when something is predicated of the matter: if there is, must there be something besides all composites, or besides some but not others, or besides none? [999b] If there is nothing besides particulars, nothing would be intelligible; everything would be perceptible, and there would be no scientific knowledge of anything, unless one says that perception is scientific knowledge. Further, nothing would be eternal or unmoving (for all perceptible things perish and are in motion). But if nothing is eternal, coming-to-be is not possible either. For there must be something that comes to be and something from which it comes to be, and the last of these must be ungenerated, if the series stops and if it is impossible for anything to come to be from what is not. Further, if there is coming-to-be and motion, there must also be a limit (for no motion is infinite; every motion has an end, and what cannot finish coming to be cannot be coming to be; and what has come to be must exist as soon as it has come to be). Further, if matter exists because it is ungenerated, it is still more reasonable that the substance should exist—that which the matter comes to be at any given time. For if neither this nor the matter is to exist, nothing will exist at all; and if that is impossible, there must be something besides the composite, namely the shape and form.—But if someone posits this, there is a puzzle about which cases he will posit it in and which not. That it cannot be in all cases is evident: we would not posit that there is a house besides the particular houses. In addition, will there be one substance for all of them—for all human beings, for instance? That is absurd, for all things whose substance is one are one. Many different substances, then? That too is unreasonable. And at the same time, how does the matter become each of these things, and how is the composite both of them?—Further, one might raise the following puzzle about the principles as well. If they are one in kind, nothing will be one in number, not even the one itself and being itself; and how will there be scientific knowledge, if there is not to be something that is one over all cases?—But suppose each of the principles is one in number and single, and not, as

with perceptible things, different for different things (for instance, when this syllable is the same in kind as another, its principles too are the same in kind; for they too are different in number). If it is not like that, but the principles of the things that are are one in number, there will be nothing else besides the elements. For there is no difference between saying "one in number" and saying "particular": this is what we mean by the particular, what is one in number, and by the universal, what is over these. 1000a It would be just as, if the elements of spoken sound were limited in number, all the letters there are would have to be exactly as many as the elements, since there could not be two or more of the same one.

A puzzle second to none has been neglected both by thinkers of the present and by those before them: whether the principles of perishable and imperishable things are the same or different. If they are the same, how is it that some things are perishable and others imperishable, and for what reason? Hesiod and his followers, and all the theologians, cared only for what was convincing to themselves, and paid no attention to us. (Making the principles gods, or born from gods, they say that the beings that did not taste nectar and ambrosia became mortal—clearly using these words in a sense they themselves understood; and yet what they have said about the very way these causes are applied is beyond us. For if the gods take them for the sake of pleasure, nectar and ambrosia are in no way causes of their being; and if for the sake of their being, how could they be eternal if they need nourishment?)—But those who philosophize cleverly in the form of myth are not worth examining seriously. It is those who speak by way of demonstration that we must question, cross-examining them as to why, if things are made of the same elements, some of them are eternal by nature while others perish.

Since they state no cause, and it isn't reasonable that things should be so, clearly the principles and causes of these things could not be the same. Even the thinker whom one might suppose to speak most consistently, Empedocles, is in the same position. He posits Strife as a principle, a cause of destruction; yet Strife would seem no less to generate everything except the One, since everything else comes from it except the god. At any rate he says: "From these came all that was, and is, and will be hereafter:

trees sprang up, and men and women,
beasts and birds and water-nourished fish,
and long-lived gods."

And this is clear even apart from these lines. [1000b] For if Strife were not present in things, all things would be one, as he says: "for when they came together, then Strife stood at the outermost edge." That is why it follows for him that the most blessed god is less wise than the others; for he does not know all things, since he does not have Strife in him, and knowledge is of like by like. "For by earth," he says, "we see earth, by water water,

by air bright air, by fire consuming fire,
affection by affection, and strife by grievous strife." But to return to where the argument began, this much is evident: it follows for him that Strife is no more a cause of destruction than of being. Nor, likewise, is Love a cause of being; for by bringing things together into the One it destroys everything else.

> At the same time, he gives no cause of the change itself, except that this is how things naturally are: "But when great Strife had grown strong in the limbs
> and leapt up to claim its honors, as the time was fulfilled
> that is fixed for them in turn by a broad oath"—implying that the change is necessary; but he points to no cause of the necessity. Still, to this extent at least he alone speaks consistently: he does not make some of the things that are perishable and others imperishable, but makes all things perishable except the elements.

The puzzle now being raised is why some things are perishable and others not, if they are made of the same things.—Let that much be said to show that the principles could not be the same. But if the principles are different, one puzzle is whether they too will be imperishable or perishable. If perishable, clearly they too must come from certain things (for everything perishes into the things it comes from), so it turns out that there are other principles prior to the principles. And this is impossible, whether the series stops or goes on to infinity. Further, how will perishable things exist, if their principles are to be done away with? And if the principles are imperishable, why will perishable things come from these imperishable principles, while imperishable things come from the others? That is not reasonable; either it is impossible, or it needs a long argument. Further, no one has even tried to say that there are different principles; they say that all things have the same principles. [1001a] But they just nibble at the first puzzle, as if they took it to be something trivial.

Hardest of all to study, and most necessary for knowing the truth, is this: whether being and the one are the substances of the things that are, each of them being nothing else but, respectively, one and being; or whether we must ask what being and the one are, on the assumption that some other nature underlies them. For some think their nature is of the first sort, and others of the second. Plato and the Pythagoreans hold that being and the one are not something else, but that this is their nature, as

though their substance just were being one and being. The natural philosophers, on the other hand—Empedocles, for instance—say what the one is by referring it to something more intelligible. He would seem to say that it is Love (at any rate Love is the cause of all things' being one). Others say that this one and being, from which things are and have come to be, is fire; others that it is air. And it is the same with those who posit more elements; for they too must say that the one and being are as many as the principles they say there are. It follows that if one does not posit that the one and being are some substance, none of the other universals is a substance either (for these are the most universal of all, and if there is no one itself and no being itself, there could hardly be any of the others besides what are called particulars). Further, if the one is not a substance, clearly number too could not exist as a nature separate from things (for number is units, and a unit is precisely something one). But if there is a one itself and a being itself, their substance must be the one and being; for it is not something else that is predicated universally of them, but just these.—But then, if there is to be a being itself and a one itself, there is much puzzlement as to how there will be anything else besides these—I mean, how things will be more than one. For what is other than being is not; so it must follow, according to Parmenides' argument, that all things are one and that this is being. [1001b] Either way there is difficulty. Whether the one is not a substance or there is a one itself, number cannot be a substance. If the one is not a substance, we have already said why. And if it is, the same puzzle arises as with being: from what, besides the one itself, will there be another one? It must be not one; but all things are either one or many, each of which is one. Further, if the one itself is indivisible, by Zeno's axiom it would be nothing. For what makes a thing neither larger when added to it nor smaller when taken from it is not, he says, one of the things that are—evidently assuming that what is is a magnitude; and if a magnitude, a bodily one, since that has being in every dimension. The other magnitudes, when added, will make a thing larger in one way but not in

another, as a plane and a line do; but a point and a unit will do so in no way. But since Zeno's approach is crude, and something indivisible can exist, so that there is a defense even against him (for such a thing, when added, will make a thing not larger but more)—still, how will magnitude come from one such thing, or from several? That would be like saying that a line is made of points.[3] But even if someone supposes, as some do, that number comes to be from the one itself and something else that is not one, we must still ask why and how what comes to be will sometimes be a number and sometimes a magnitude, if the not-one was inequality and the same nature in both cases. For it is not clear how magnitudes could come to be either from the one and this nature, or from some number and this nature.

### ARE NUMBERS AND FIGURES SUBSTANCES?

*Puzzles about whether bodies, surfaces, lines and points are substances.*

Connected with these is the puzzle whether numbers, bodies, planes, and points are substances of some kind or not. If they are not, it escapes us what being is and what the substances of the things that are are. For attributes, motions, relations, dispositions, and ratios do not seem to signify the substance of anything, since they are all said of some underlying subject, and none of them is a "this." And as for the things that would seem most of all to signify substance—water, earth, fire, and air, of which composite bodies are made up— [1002a] their heat and cold and other such features are attributes, not substances, and only the body that has these attributes persists as something that is, and as a substance. Yet body is less a substance than surface is, and surface less than line, and line less than unit and point; for body is bounded by these, and they seem capable of existing without body, whereas body cannot exist without them. That is why most people, and the earlier thinkers, thought that sub-

3 Zeno of Elea, a follower of Parmenides, was famous for paradoxes about plurality and motion.

stance and being were body, and the other things were attributes of it, so that the principles of bodies were the principles of the things that are; whereas later thinkers, with a greater reputation for wisdom, thought they were numbers. So, as we said, if these are not substance, nothing at all is substance, and nothing is a being; for surely their incidental attributes do not deserve to be called beings. —But if it is agreed that lengths and points are more substance than bodies are, but we do not see to what sort of bodies they would belong (for they cannot be in perceptible things), there would be no substance at all. Further, all of these appear to be divisions of body, one in breadth, another in depth, another in length. Besides, any shape whatever is equally present in the solid. So if Hermes is not in the stone, neither is the half of the cube in the cube as something marked off. Nor, then, is a surface in it (for if any surface were, so would be the one that marks off the half); and the same argument applies to line, point, and unit. So if body is substance most of all, and these are more substance than body, but these do not exist and are not substances of any kind, it escapes us what being is and what the substance of the things that are is. For besides what has been said, the consequences concerning coming-to-be and perishing also turn out to be unreasonable.[4] For substance, if it now is when it was not before, or later is not when it was before, seems to undergo this by coming to be and perishing. But points, lines, and surfaces cannot come to be or perish, even though they sometimes are and sometimes are not. For when bodies come into contact or are divided, 1002b at that very moment one surface comes to be when they touch, and two when they are divided. So when the bodies have been put together the surface does not exist but has perished, and when they have been divided surfaces exist that did not exist before (for the indivisible point was certainly not divided into two). And if they do come to be and perish, from what do they come to be? It is much the same with the "now" in time: this too can-

4 That is, the statue of Hermes a sculptor could carve from a block is not actually present in the uncarved stone.

not come to be and perish, and yet it always seems to be different, not being a substance of any kind. Clearly the same holds of points, lines, and planes, for the same argument applies: they are all alike either limits or divisions.

### WHY POSIT FORMS?

*Why posit Forms at all, and are principles potential or actual, universal or particular?*

In general, one might be puzzled as to why we need to look for other things besides both perceptible things and the intermediates—the Forms we posit, for instance. If it is because the mathematical objects, while they differ from the things here in some other respect, do not differ at all in there being many of the same kind, so that their principles will not be limited in number (just as the principles of all the letters here are not limited in number but in kind—unless one takes the principles of this particular syllable or this particular spoken sound, and these will be limited in number too; and similarly with the intermediates, since there too things of the same kind are infinite)—then if there are not, besides perceptible and mathematical things, certain other things such as some people call Forms, there will be no substance that is one in number, but only one in kind; nor will the principles of the things that are be of some definite number, but only of some definite number of kinds.—If this is necessary, then for this reason it is also necessary to posit that there are Forms. For even if those who say this do not articulate it well, this is what they mean, and they must say it: that each of the Forms is a substance, and none of them is so incidentally.—But if we posit both that the Forms exist and that the principles are one in number and not in kind, we have stated the impossible consequences that must follow.—Closely connected with these is the puzzle whether the elements exist potentially or in some other way. If in some other way, there will be something else prior to the principles (for potentiality 1003a is prior to that sort of cause, and not everything that is potential need be in

that way). But if the elements exist potentially, it is possible that none of the things that are exists; for even what is not yet is capable of being. What is not comes to be, but nothing comes to be that is incapable of being.—These, then, are the puzzles we must raise about the principles; and also whether they are universal or like what we call particulars. If they are universal, they will not be substances. (For nothing common signifies a "this," but a "such," whereas substance is a "this." And if what is predicated in common can be posited as a "this" and one, Socrates will be several animals—himself, and human being, and animal—if each of these signifies a "this" and one.)—These are the consequences if the principles are universal. But if they are not universal but are like particulars, they will not be knowable (for scientific knowledge of anything is universal); so there will be other principles prior to the principles, predicated universally, if there is to be scientific knowledge of them.

# Book Gamma (IV)

*Being qua being and the principle of non-contradiction.*

### THE SCIENCE OF BEING QUA BEING

*There is a science that studies being as being and what belongs to it in its own right.*

There is a science that studies being qua being, and the attributes that belong to it in its own right. It is not the same as any of the so-called special sciences; for none of the others examines being qua being universally, but each cuts off some part of it and studies the attributes of that part, as the mathematical sciences do, for instance. Now since we are seeking the principles and the highest causes, clearly they must belong to some nature in its own right. If, then, those who sought the elements of the things that are were also seeking these principles, the elements too must be elements of being, not incidentally but qua being. That is why we too must grasp the first causes of being qua being.[1]

### BEING IS SAID IN MANY WAYS

*Being is always said with reference to substance, so one science studies being, unity and their opposites.*

Being is said in many ways, but always with reference to one thing, a single nature, and not by mere coincidence of name. It is like the way everything healthy is related to health—one thing

1 "Qua" means "as" or "insofar as it is": being studied simply as being, not as number, living thing, and so on.

by preserving it, another by producing it, another by being a sign of it, another by being capable of receiving it— [1003b] and the way the medical is related to medicine: one thing is called medical because it possesses the art of medicine, another because it is naturally suited to it, another because it is a work of medicine. And we will find other words used in a way similar to these. In just this way, being too is said in many ways, but all with reference to one principle. Some things are called beings because they are substances, others because they are attributes of substance, others because they are a route to substance, or destructions or privations or qualities of substance, or productive or generative of substance or of things said with reference to substance, or negations of one of these or of substance. That is why we even say that what is not *is* what is not. Just as there is one science of all healthy things, so too in the other cases. For it belongs to one science to study not only things said according to one common meaning, but also things said with reference to one nature; for these too are in a way said according to one meaning. Clearly, then, it belongs to one science to study the things that are qua things that are. But in every case a science is chiefly of what is primary, that on which the other things depend and through which they get their names. If, then, this is substance, it is of substances that the philosopher must grasp the principles and the causes.—For every genus there is one perception and one science, of one thing: grammar, for instance, being one science, studies all spoken sounds. That is why it belongs to a science one in genus to study all the species of being qua being, and the species of those species. Now suppose that being and the one are the same, a single nature, in that they go together as principle and cause do, though not in that they are made clear by a single account (though it makes no difference even if we take them to be alike in this too; that would rather help our task). For "one human being" and "human being" are the same, and so are "existing human being" and "human being"; and doubling the phrase to "one human being" and "one existing human being" does not make clear anything

different (clearly they are not separated either in coming-to-be or in perishing), and similarly with "one." So it is evident that the addition in these cases makes clear the same thing, and that the one is nothing different besides being. Further, the substance of each thing is one, and not incidentally; and likewise it is precisely something that is.—It follows that there are as many species of being as there are of the one; and it belongs to the same science, one in genus, to study what these are—I mean, for instance, same and similar and the other such things. Nearly all contraries are traced back to this principle; [1004a] let us take these matters as having been studied in our *Selection of Contraries*. And there are as many parts of philosophy as there are kinds of substance, so that there must be a first philosophy and one that follows it. For being falls directly into genera; that is why the sciences too will correspond to these.[2] For the philosopher is like the one we call the mathematician: mathematics too has parts, and within mathematics there is a first science and a second, and others following in order.—Now it belongs to one science to study opposites, and plurality is opposed to the one. And it belongs to one science to study negation and privation, because in both cases one is studying the one thing of which there is negation or privation. (For we say either simply that that thing does not belong, or that it does not belong to some genus; in the latter case a differentia is added, over and above what the negation contains; for negation is just the absence of that thing, whereas in privation there is also some underlying nature of which the privation is asserted.) It follows that the opposites of the things mentioned—the other, the unlike, the unequal, and whatever else is said either with reference to these or with reference to plurality and the one—belong to the science we have mentioned to know. Contrariety is one of these; for contrariety is a kind of difference, and difference is a kind of otherness.[3] So, since "one" is said in many ways, these too will be said in many ways; but all the same it belongs to one science to know them all. For things

2 The *Selection of Contraries* is a lost work of Aristotle's.

3 The Greek of this clause is corrupt; the translation gives the probable sense.

do not belong to different sciences if they are said in many ways, but only if their accounts are neither according to one thing nor referred to one thing. And since everything is referred to what is primary—for instance, whatever is called one is referred to the primary one—we must say that the same holds for same and other and the contraries. So, having distinguished in how many ways each is said, we must then explain, with reference to what is primary in each category, how each is said in relation to it: some things will be so called because they possess it, others because they produce it, others in other such ways.—It is evident, then, that it belongs to one science to give an account of these things and of substance (this was one of the questions raised in the puzzles), and that it is the philosopher's task to be able to study all things. [1004b] For if it is not the philosopher's, who will be the one to examine whether Socrates and Socrates seated are the same, or whether one thing has one contrary, or what a contrary is, or in how many ways it is said? And similarly with other such questions. Since, then, these are attributes in their own right of the one qua one and of being qua being, and not qua numbers or lines or fire, clearly it belongs to that science to know both what they are and their attributes. Those who inquire into these things do not go wrong by not doing philosophy, but because substance, of which they understand nothing, is prior. For just as number qua number has its own distinctive attributes—oddness and evenness, commensurability and equality, excess and deficiency—and these belong to numbers both in themselves and in relation to one another (and similarly the solid, the unmoving and the moving, the weightless and the heavy, have other distinctive attributes), so too being qua being has certain distinctive attributes, and it is about these that it is the philosopher's task to investigate the truth. Here is an indication. Dialecticians and sophists put on the same guise as the philosopher. For sophistry is wisdom in appearance only; and dialecticians argue about everything, and being is common to everything; clearly they argue about these matters because they properly belong to philosophy. Sophistry and dialectic are

concerned with the same genus as philosophy, but philosophy differs from dialectic in the kind of capacity it has, and from sophistry in its decision about how to live. Dialectic puts to the test what philosophy knows; sophistry seems to be philosophy, but is not.

Further, one of the two columns of contraries is privation, and all contraries are traced back to being and not-being, and to the one and plurality—rest, for instance, to the one, and motion to plurality. And nearly everyone agrees that the things that are, and substance, are composed of contraries; at any rate they all say the principles are contraries—some say odd and even, some hot and cold, some limit and unlimited, some Love and Strife. And all the other contraries too are evidently traced back to the one and plurality (let us take the reduction as given), [1005a] and the principles put forward by the others fall entirely under these as their genera. So it is evident from these considerations too that it belongs to one science to study being qua being. For all things are either contraries or composed of contraries, and the principles of the contraries are the one and plurality. These belong to one science, whether they are said according to one common meaning or not—and perhaps the truth is that they are not. Yet even if "one" is said in many ways, the other senses will be said with reference to the primary one, and so will the contraries—even if being or the one is not a universal, the same over all things, or separable, as perhaps it is not, but some things are called so by reference to one thing and others by being next in a series. That is why it is not the geometer's task to study what the contrary is, or the complete, or one, or being, or same, or other, except on the basis of a hypothesis. It is clear, then, that it belongs to one science to study being qua being and the attributes that belong to it qua being; and that the same science studies not only substances but also what belongs to them—both the things mentioned and prior and posterior, genus and species, whole and part, and the others of this kind.

## THE PRINCIPLE OF NON-CONTRADICTION

*The philosopher studies the axioms, the most certain being that nothing can both be and not be.*

We must say whether it belongs to one science or to different ones to deal with what in mathematics are called axioms and with substance. Evidently the inquiry into these too belongs to one science, the philosopher's. For they hold of all things that are, not of some one genus separately, apart from the others. Everyone uses them, because they belong to being qua being, and each genus is a being. But people use them only as far as suits their purpose—that is, as far as the genus extends about which they are carrying out their proofs. So since it is clear that they belong to all things qua beings (for this is what is common to them), the study of them too belongs to the one who knows about being qua being. That is why none of those whose inquiry is limited to a special field—neither the geometer nor the arithmetician—tries to say anything about them, whether they are true or not. Some of the natural philosophers do, and understandably so, since they alone thought they were inquiring about the whole of nature and about being. But since there is someone still higher than the natural philosopher (for nature is only one genus of being), the inquiry into these axioms too would belong to the one who studies the universal and primary substance. [1005b] Natural science is also a kind of wisdom, but not the first. The attempts that some of those who discuss truth make to say how it should be accepted are due to their lack of training in analytics; people should come to these matters already knowing about them, not inquire into them while listening to lectures.—It is clear, then, that it belongs to the philosopher, the one who studies all substance in its nature, to investigate the principles of deduction as well. It is fitting that the one who knows most about each genus should be able to state the most certain principles of that subject, so that the one who knows about the things that are qua things that are should be

able to state the most certain principles of all. This is the philosopher. And the most certain principle of all is the one about which it is impossible to be mistaken. Such a principle must be the best known (for people are always deceived about things they do not know) and not hypothetical.[4] For a principle that anyone must have who understands anything at all is not a hypothesis; and what anyone must know who knows anything at all, he must already have when he comes to the inquiry. Clearly, then, such a principle is the most certain of all. What it is, let us say next. It is impossible for the same thing at the same time both to belong and not to belong to the same thing in the same respect (and let whatever further qualifications we might add be taken as added, to meet logical objections). This, then, is the most certain of all principles, since it fits the description we gave. For it is impossible for anyone to believe that the same thing is and is not, as some think Heraclitus says.[5] For it is not necessary that what a person says he also believes. And if it is not possible for contraries to belong to the same thing at the same time (let the usual qualifications be added to this premise too), and the belief contrary to a belief is the belief in its contradiction, evidently it is impossible for the same person at the same time to believe that the same thing is and is not; for someone who was mistaken on this point would hold contrary beliefs at the same time. That is why everyone who carries out a demonstration traces it back to this as an ultimate belief; for this is by nature the starting point of all the other axioms as well.

4 "Analytics" is Aristotle's name for the study of logical inference, set out in his *Prior* and *Posterior Analytics*.

5 Heraclitus of Ephesus (around 500 BC) was known for riddling sayings on the unity of opposites.

### DEFENDING NON-CONTRADICTION

*The principle cannot be demonstrated, but it can be defended by refutation if the opponent says anything.*

There are some who, as we said, both say themselves that it is possible for the same thing to be and not to be, [1006a] and say that one can believe this. Many of the writers on nature, too, make use of this claim. But we have just now taken it that it is impossible at the same time to be and not to be, and by means of this we have shown that this is the most certain of all principles. Some people, through lack of training, even demand that this be demonstrated; for it is lack of training not to know what one should seek demonstration of and what one should not. It is altogether impossible for there to be demonstration of everything (it would go on to infinity, so that even so there would be no demonstration); and if there are some things of which one should not seek demonstration, these people could not say what principle they think has more claim to be such than this one. But it is possible to demonstrate by way of refutation that even this view is impossible, if only the opponent says something. If he says nothing, it is ridiculous to look for an argument against someone who has no argument about anything, insofar as he has none; such a person, as such, is already like a plant. I say that demonstrating by way of refutation differs from demonstrating, because someone demonstrating would seem to be begging the question, whereas if the other person is responsible for it, there would be refutation and not demonstration. The starting point for all such arguments is not to demand that the opponent say that something is or is not (for one might take that to be begging the question), but that he at least signify something, both to himself and to another; this is necessary, if he is to say anything at all. If he does not, such a person would have no discourse, either with himself or with anyone else. If someone grants this, there will be demonstration, for there will already be something definite. But the one responsible is not the

one demonstrating but the one who stands his ground; for in doing away with discourse he relies on discourse. Further, whoever has granted this has granted that something is true apart from demonstration.—First, then, this at least is clearly true: that a word signifies that something is, or is not, this particular thing; so not everything could be so and not so. Further, if "human being" signifies one thing, let this be two-footed animal. By "signifying one thing" I mean this: if this is what a human being is, then if anything is a human being, this will be what being a human being is. (It makes no difference even if someone said that a word signifies several things, provided they are limited in number; 1006b for a different word could be assigned to each account. I mean, for instance, if someone said that "human being" signifies not one thing but many, of which one has the single account "two-footed animal," but there are also several others, limited in number: a distinct word could be assigned for each account. But if no word were assigned, and he said it signifies infinitely many things, evidently there could be no account. For not to signify one thing is to signify nothing; and if words do not signify, conversation with one another is done away with—and in truth conversation with oneself as well. For it is impossible to think of anything if one does not think of one thing; and if it is possible, one word could be assigned to this thing.)—Let it be granted, then, as was said at the start, that the word signifies something, and signifies one thing. Then it cannot be that being a human being signifies precisely not being a human being, if "human being" signifies not only something about one subject but one thing. (For we do not count signifying something about one subject as signifying one thing, since in that way "musical," "pale," and "human being" would signify one thing, so that all things would be one; for they would all be synonymous.) And it will not be possible for the same thing to be and not to be, except by coincidence of name—as if what we call a human being others were to call a not-human-being. But the puzzle is not whether the same thing can at the same time be and not be a human being in name, but whether it can in fact. If

"human being" and "not human being" do not signify something different, clearly not being a human being will not signify anything different from being a human being either, so that being a human being will be not being a human being; for they will be one. For this is what being one means, as with "cloak" and "mantle": that the account is one. And if they are to be one, being a human being and not being a human being will signify one thing. But it had been shown that they signify something different. So if it is true to say of something that it is a human being, it must be a two-footed animal (for that was what "human being" signified). And if this is necessary, it is not possible for the same thing not to be a two-footed animal at that time (for this is what "being necessary" means: that it is impossible for it not to be). So it is not possible for it to be true at the same time to say that the same thing is a human being and is not a human being. The same argument applies to not being a human being. 1007a For being a human being and being not a human being signify different things, given that even being pale and being a human being are different; for the former are far more opposed, and so signify different things. And if he says that "pale" too signifies one and the same thing, we shall again say what was said before: that all things will be one, and not only opposites. If this is not possible, then what we said follows—provided he answers the question asked. But if, when simply asked the question, he adds the negations as well, he is not answering the question asked. For nothing prevents the same thing from being a human being and pale and countless other things besides. Still, when asked whether it is true to say that this is a human being or not, one must give the answer that signifies one thing, and not add that it is also pale and large. After all, it is impossible to go through the accidents, since they are infinite. So let him go through either all of them or none. In the same way, then, even if the same thing is a human being and not a human being ten thousand times over, one should not, when asked whether it is a human being, add in reply that it is at the same time also not a human being—unless one must also add in reply all the other

things that are accidental to it, everything it is or is not. And if he does that, he is not engaged in discussion. —In general, those who say this do away with substance and essence. For they are bound to claim that everything is accidental, and that there is no such thing as precisely being a human being or being an animal. For if there is to be something that is precisely being a human being, this will not be being not a human being or not being a human being (and yet these are its negations). For what it signified was one thing, and this was the substance of something; and to signify the substance of something is to signify that its being is nothing other than this. But if precisely being a human being is, for it, also precisely being not a human being or precisely not being a human being, then its being will be something other than this. So they must say that there will be no such account of anything, but that everything is accidental. For this is what distinguishes substance from accident: pale is accidental to the human being because he is pale, but is not precisely pale. And if everything is said accidentally, there will be nothing primary of which things are said, since the accidental always signifies a predication about some underlying subject. [1007b] So the series must go on to infinity. But that is impossible; for not even more than two are combined. For an accident is not an accident of an accident, except in that both are accidental to the same thing. I mean, for instance, that the pale is musical and the musical is pale because both are accidental to the human being. But Socrates is not musical in this way, because both are accidental to something else. Since, then, some things are called accidental in this way and others in that, those called so in the way that pale is accidental to Socrates cannot form an infinite series upward—there cannot, for instance, be some further accident of pale Socrates, since no single thing comes to be out of them all. Nor, again, will anything else be accidental to the pale —the musical, for example. For this is no more accidental to that than that to this; and at the same time we have distinguished that some things are accidental in this way, and others in the way the musical is to Socrates. In cases of the latter kind the

accident is not accidental to an accident; it is only in cases of the former kind. So not everything will be said accidentally. There will, then, even so be something that signifies substance. And if so, it has been shown that contradictories cannot be predicated at the same time. —Further, if all contradictory statements about the same thing are true at the same time, clearly all things will be one. For the same thing will be a trireme and a wall and a human being, if it is possible either to affirm or to deny anything of everything—as those who put forward Protagoras' doctrine are compelled to hold. For if someone thinks that the human being is not a trireme, clearly he is not a trireme; and so he also is one, if the contradictory statement is true. And so we get Anaxagoras' "all things together," with the result that nothing truly exists. They seem, then, to be talking about the indeterminate, and while they think they are talking about what is, they are talking about what is not. For the indeterminate is what exists potentially and not in actuality. Yet they are bound to hold that of everything either the affirmation or the negation of anything is true. For it would be absurd if each thing's own negation were to belong to it, while the negation of something else that does not belong to it were not to belong to it. I mean, for instance: if it is true to say of the human being that he is not a human being, clearly it is also true to say that he is either a trireme or not a trireme. If, then, the affirmation holds, the negation must hold too; and if the affirmation does not hold, the negation at any rate will hold more than the thing's own negation. [1008a] If, then, even that negation holds, the negation of "trireme" will hold too; and if this holds, so will the affirmation. —These, then, are the consequences for those who hold this doctrine; and a further one is that it is not necessary either to assert or to deny. For if it is true that he is a human being and not a human being, clearly he will also be neither a human being nor not a human being. For to the two statements there are two negations; and if the former is a single statement made up of both, the latter too would be a single statement, opposed to it. —Further, either it is like this in every case, and a thing is both white and

not white, and being and not being, and similarly with all other assertions and denials; or it is not, but holds in some cases and not in others. And if not in all cases, these would be agreed exceptions. But if in all cases, then again either one can deny whatever one can assert, and assert whatever one can deny; or one can deny whatever one can assert, but cannot assert everything one can deny. And if it is the latter, there would be something that firmly is not, and this would be a secure belief; and if not being is something secure and knowable, the opposite assertion would be more knowable still. But if one can equally assert whatever one can deny, then either it is true to speak dividing the two—saying, for instance, that it is white, and then again that it is not white—or it is not. And if it is not true to speak dividing them, then he does not say these things, and nothing exists (and how could things that do not exist speak or walk?); and all things would be one, as was said before, and a human being and a god and a trireme and their contradictories will be the same. (For if contradictories hold alike of each thing, one thing will not differ from another; for if it does differ, this difference will be true of it and distinctive.) Likewise, if it is possible to speak truly while dividing them, the consequence we mentioned follows; and besides, everyone would be speaking truly and everyone would be speaking falsely, and he himself admits that he is speaking falsely. At the same time it is evident that an inquiry addressed to this person is about nothing at all; for he says nothing. For he says neither "so" nor "not so," but "so and not so"; and then again he denies both of these, saying "neither so nor not so." For if he did not, there would already be something definite. —Further, if when the assertion is true the denial is false, and when the denial is true the affirmation is false, it would not be possible to assert and deny the same thing truly at the same time. [1008b] But perhaps they would say that this is the very point laid down at the start. —Further, is the person who supposes that a thing is some way, or is not, mistaken, while the one who supposes both is right? If he is right, what could be meant by saying that the nature of things is of this

kind? And if he is not right, but more right than the one who supposes things are one way or the other, then things would already be some definite way, and this would be true, and not at the same time also not true. And if everyone alike both speaks falsely and speaks truly, a person like that will be unable to utter or say anything; for he says these things and at the same time not these things. And if he supposes nothing, but equally thinks and does not think, how would he be any different from a plant? This is what makes it most evident that no one is really in this condition—neither anyone else nor those who put forward this argument. For why does such a person walk to Megara rather than stay put, when he thinks he ought to be walking there? Why doesn't he walk straight into a well or over a cliff first thing in the morning, if he happens to come to one? Instead he is evidently careful, as if he did not think that falling in is equally not good and good.[6] It is clear, then, that he supposes one thing to be better and another not better. And if so, he must also suppose one thing to be a human being and another not a human being, and one thing to be sweet and another not sweet. For he does not seek and suppose all things equally when, thinking it better to drink water and to see a human being, he then goes looking for them; yet he ought to, if a human being and not a human being were equally the same. But, as was said, there is no one who is not evidently careful of some things and not of others. So, it seems, everyone supposes that things are some way without qualification—if not about everything, then at least about what is better and worse. And if they do this not from knowledge but from belief, they should care about the truth all the more—just as a sick person should care more about health than a healthy one does; for someone who merely believes, compared with someone who knows, is not in a healthy condition with respect to the truth. —Further, however much all things may be so and not so, still the more and the less are present in the nature of things. For we would not say that two and three are equally even; nor is someone who thinks four is five as badly mistaken

6 Megara was a city about twenty-five miles west of Athens.

as someone who thinks it is a thousand. If, then, they are not equally mistaken, clearly one is less so, and so is more right. If, then, what is more true is nearer to the truth, [1009a] there would be some truth to which the more true is nearer. And even if there is not, at least there is already something more certain and more true, and we would be rid of that untempered doctrine which prevents us from determining anything in thought.

### PROTAGORAS AND APPEARANCES

*The claim that every appearance is true is traced to its sources and answered.*

Protagoras' doctrine, too, stems from the same opinion, and both must alike either hold or not hold. For if all things that are believed and that appear are true, then all things must be at once true and false (for many people hold beliefs contrary to one another, and think that those who do not share their opinions are mistaken; so the same thing must both be and not be); and if this is the case, all beliefs must be true (for those who are mistaken and those who are right hold opposite beliefs to one another; if, then, things are like this, everyone will be right). That both doctrines stem from the same way of thinking, then, is clear. But the same way of engaging with them does not suit everyone: some need persuasion, others force. For those who have come to this view through being genuinely puzzled have an ignorance that is easily cured (since one responds not to their argument but to their thinking). But for those who say it for argument's sake, the cure is to refute the argument as it is expressed in speech and in words. Those who are genuinely puzzled have come to this opinion from perceptible things. The view that contradictories and contraries hold at the same time came from seeing contraries come to be out of the same thing. If, then, what is not cannot come to be, the thing must have existed beforehand as both alike—as Anaxagoras says that everything is mixed in everything, and Democritus too. For he too says that the void and the full are present alike in any part,

though one of these is what is and the other what is not. To those, then, whose belief rests on these grounds, we shall say that in a way they are right and in a way they are ignorant. For "what is" is said in two ways, so that there is a way in which something can come to be from what is not, and a way in which it cannot; and the same thing can at the same time be and not be, but not in the same respect. For potentially the same thing can be contraries at the same time, but in actuality it cannot. Further, we shall ask them to accept that among the things that are there is also another kind of substance, to which neither motion nor destruction nor generation belongs at all. [1009b] —Similarly, the view that what appears is true has come to some people from perceptible things. For they think that the truth ought not to be decided by large or small numbers, and that the same thing seems sweet to some who taste it and bitter to others; so that if everyone were sick or everyone out of their minds, and two or three were healthy or in their right minds, it is these who would seem sick and out of their minds, and the others not. Further, to many of the other animals the same things appear contrary to how they appear to us; and even to each individual things do not always seem the same by perception. Which of these impressions are true or false, then, is unclear; for these are no more true than those, but equally so. That is why Democritus, for one, says that either nothing is true or it is at least unclear to us.

> In general, it is because they suppose that thought is perception, and that perception is a kind of alteration, that they say that what appears in perception is necessarily true. For it is on these grounds that Empedocles and Democritus and, one might say, every one of the others have become caught up in opinions of this kind. Empedocles, for instance, says that when people change their condition they change their thinking: "for wisdom grows in humans in relation to what is present." And elsewhere he says: "as far as they changed and became other, so far always
> did other thoughts present themselves to them."
> Parmenides, too, declares the same thing: "For as at each time is the mixture of the much-bent limbs,
> so mind comes to humans; for the same thing
> is what thinks—the nature of the limbs—in humans,
> in all and in each; for what predominates is thought."[7]

A saying of Anaxagoras to some of his companions is also recorded: that things would be for them such as they supposed them to be. And they say that Homer too evidently held this opinion, since he made Hector, when he was knocked senseless by the blow, lie "thinking other thoughts"—as if even those out of their minds were thinking, only not the same thoughts. Clearly, then, if both are forms of thinking, things too are at the same time so and not so. And here the consequence is at its hardest. For if those who have seen as much of the truth as is possible—and these are the people who most seek it and love it—hold such opinions and make such declarations about the truth, how could those who set out to do philosophy not rightly lose heart? For seeking the truth would be chasing birds on the wing.[8] 1010a —The reason for their opinion is that, while they were investigating the truth about the things that are, they supposed that the things that are were only perceptible things. And in

7 The lines are quoted from the verse writings of Empedocles and Parmenides.
8 Hector is the Trojan champion of Homer's *Iliad*; in our text of Homer the phrase is not in fact used of him.

these the nature of the indeterminate is very much present, and the nature of being in the way we described. So what they say is plausible, but it is not true (it is more fitting to put it this way than as Epicharmus put it against Xenophanes). Further, seeing that the whole of this natural world is in motion, and that nothing true can be said of what is changing, they concluded that one cannot say anything true about what is changing in every way and in every respect.[9] For it was from this supposition that the most extreme of the views we have mentioned blossomed: the view of those who claim to follow Heraclitus, and the sort that Cratylus held. In the end he thought one should say nothing, and merely moved his finger; and he criticized Heraclitus for saying that you cannot step into the same river twice, since he himself thought you could not do it even once. But to this argument too we shall reply that they do have some reason for thinking that what is changing, when it is changing, is not—though even this is disputable. For what is losing something still has something of what is being lost, and something of what is coming to be must already be. And in general, if something is perishing, there will be something that is; and if something is coming to be, there must be something from which it comes to be and something by which it is generated, and this cannot go on to infinity. But let us leave these points aside and say this: changing in quantity and changing in quality are not the same. Let it be granted that in quantity a thing does not stay the same; but it is by its form that we know each thing. Further, those who hold this view deserve criticism because, having seen that this is how things are with perceptible things—and even among these, only with a minority—they made the same claim about the whole universe. For only the region of the perceptible world around us is continually subject to destruction and generation, and this is, so to speak, no part at all of the whole. So it would have been fairer to acquit this region for the sake of those other things than to condemn those for the sake of this. Further, it is

9 Epicharmus: a Sicilian comic poet of around 500 BC; his gibe against Xenophanes is lost.

clear that to these people too we shall say the same things we said long ago: we must show them, and persuade them, that there is a nature that is unchanging. And yet those who say that things at once are and are not end up having to say that all things are at rest rather than in motion; for there is nothing into which anything could change, since everything already belongs to everything. [1010b] —As for truth, and the claim that not everything that appears is true: first, even if perception, at least of its own proper object, is not false, still appearance is not the same thing as perception. Then again, it is surprising that they should be puzzled over whether magnitudes and colors are such as they appear to people at a distance or to people close by, and whether they are such as they appear to the healthy or to the sick, and whether things are heavier as they seem to the weak or as they seem to the strong, and whether things are true as they seem to those asleep or to those awake. For it is evident that they don't really think so. At any rate, no one who supposes at night that he is in Athens, when he is in Libya, sets off for the Odeion. Further, about the future, as Plato too says, the opinion of a doctor and that of someone ignorant are surely not equally authoritative—about whether someone is going to be healthy or not, for instance. Further, among the senses themselves, a sense's verdict about an object foreign to it is not as authoritative as its verdict about its own object, nor is its verdict about a neighboring object as authoritative as about its own. About color it is sight, not taste, that has authority, and about flavor it is taste, not sight. And none of these ever says, at the same time and about the same thing, that it is at once so and not so. Nor even at different times does a sense disagree about the quality itself, but only about the thing to which the quality belongs.[10] I mean, for instance, that the same wine might seem sweet at one time and not sweet at another, either because it has changed or because one's body has changed. But the sweet itself, such as it is when it is present, has never changed; one is always right about it, and

**10** The Odeion was a concert hall in Athens; the reference to Plato is to his *Theaetetus*.

whatever is going to be sweet is necessarily of this kind. Yet all these arguments do away with this: just as they deny that anything has a substance, so they deny that anything is necessary. For what is necessary cannot be now one way and now another; so if anything is necessary, it will not be both so and not so. — And in general, if only the perceptible exists, nothing would exist if there were no living things; for there would be no perception. Now it is perhaps true that there would then be neither perceptible qualities nor sensations (for these are an affection of the one who perceives). But that the underlying subjects which produce the perception should not exist even without perception is impossible. For perception is certainly not perception of itself; there is also something else besides the perception, which must be prior to the perception. [1011a] For what moves is by nature prior to what is moved—and this is no less so even if they are said relative to each other.

### WHO IS TO JUDGE?

*Against those who demand proof of everything and hold that whatever appears is true.*

There are some—both among those genuinely convinced of these views and among those who merely put forward these arguments—who raise a puzzle. They ask who is to judge who is healthy, and in general who is to judge rightly on each question. But puzzles like this are like being puzzled over whether we are now asleep or awake, and all such puzzles come to the same thing. For these people demand that there be an argument for everything: they are looking for a starting point, and they want to get it by demonstration—since it is evident from their actions that they are not actually convinced. But, as we said, this is their trouble: they seek an argument for things for which there is no argument. For the starting point of demonstration is not a demonstration. These people, then, could easily be persuaded of this (for it is not hard to grasp). But those who seek only to force their way in argument are seeking the impossible; for they

demand the right to say contrary things, and in doing so they immediately say contrary things. But if not all things are relative, and some things also exist in their own right, not everything that appears would be true. For what appears appears to someone; so whoever says that all things that appear are true makes all things that are relative. That is why those who seek to force their way in argument, while also agreeing to submit to argument, must take care to say, not that what appears is, but that what appears is for the one to whom it appears, and when it appears, and in the respect and in the way in which it appears. And if they submit to argument but not in this way, they will soon find themselves saying contrary things. For the same thing can appear to be honey to sight but not to taste; and since we have two eyes, things may not appear the same to the sight of each eye, if the two are unlike. So much for these. As for those who, for the reasons given long ago, claim that what appears is true, and that therefore all things are alike false and true—since things do not appear the same to everyone, nor always the same to the same person, but often appear contrary at the same time (touch says there are two objects when the fingers are crossed, but sight says one)—to them we reply: but surely not to the same sense, and in the same part of it, and in the same way, and at the same time; so that this, at least, would be true. [1011b] But perhaps this is why those who argue not from puzzlement but for argument's sake must say, not that this is true, but that it is true for this person. And, as was said before, they must make everything relative—relative to opinion and perception—so that nothing has come to be or will be unless someone has first formed an opinion about it. But if something has come to be or will be without that, clearly not everything would be relative to opinion. Further, if a thing is one, it is relative to one thing, or to something definite; and even if the same thing is both half and equal, still the equal is not relative to the double. If, then, relative to the one who opines, "human being" and "what is opined" are the same, then the human being will not be the one who opines but what is opined. And if each thing is to be relative to the one who

opines, the one who opines will be relative to things infinite in kind. That the most certain of all beliefs is that opposed assertions are not true at the same time, what follows for those who say otherwise, and why they say so—let that be enough on these points. And since it is impossible for contradictories to be true of the same thing at the same time, it is evident that contraries cannot belong to the same thing at the same time either. For of two contraries, one is no less a privation—a privation of substance; and a privation is a denial from some definite genus. If, then, it is impossible to affirm and deny truly at the same time, it is also impossible for contraries to belong at the same time—except either both in some respect, or one in some respect and the other without qualification.

### NOTHING BETWEEN CONTRADICTORIES

*There is nothing between assertion and denial, as the definition of true and false shows.*

Nor, again, can there be anything in between contradictories: of any one thing we must either assert or deny any one thing. This is clear, first of all, once we define what the true and the false are. To say of what is that it is not, or of what is not that it is, is false; to say of what is that it is, and of what is not that it is not, is true. So whoever says of anything that it is, or that it is not, will speak either truly or falsely. But on the view in question, neither what is nor what is not is said either to be or not to be. Further, what is between the contradictories will be in between either as gray is between black and white, or as what is neither is between a human being and a horse. If it is in the second way, there could be no change (for change is from not good to good, or from good to not good); but in fact change is always evidently occurring (for there is no change except into opposites and what is between them). And if there is an intermediate in the first way, then here too there would be a coming to be white that was not from not-white; but in fact this is not observed. [1012a] Further, thought either affirms or denies every object of thought and

understanding—this is clear from the definition—whenever it is right or wrong. When it puts things together in one way, in asserting or denying, it is right; when in another, it is wrong. Further, there would have to be an intermediate alongside every pair of contradictories, unless one is talking just for argument's sake. So one would be neither right nor not right; and there will be something besides what is and what is not, so that there will also be some change besides generation and destruction. Further, in those genera in which the negation brings in the contrary, there will be an intermediate too—in numbers, for instance, a number that is neither odd nor not odd. But that is impossible, as is clear from the definition. Further, the process will go on to infinity, and the things that are will be not only half again as many but more. For again it will be possible to deny this intermediate with reference both to the assertion and to the denial, and this will be something; for its substance is something distinct. Further, when someone asked whether a thing is white says "no," he has denied nothing but its being; and not being is a denial. This opinion has come to some people in the same way as other paradoxes: when they cannot refute contentious arguments, they give in to the argument and agree that the conclusion is true. Some, then, say it for this reason, others because they seek an argument for everything. The starting point in dealing with all these people is definition. And a definition results from their having to signify something; for the account of which the name is a sign will be a definition. Heraclitus' doctrine, in saying that all things are and are not, seems to make everything true, while Anaxagoras', in saying that there is something between contradictories, seems to make everything false. For when things are mixed, the mixture is neither good nor not good, so that one can say nothing true.

### NOT EVERYTHING TRUE, NOT EVERYTHING FALSE

*Claims that everything is true or false, or at rest or in motion, refute themselves.*

With these points settled, it is evident that the one-sided claims made about everything cannot hold, as some assert they do—some saying that nothing is true (for they say nothing prevents every statement from being like the statement that the diagonal is commensurable), others that everything is true. For these arguments are practically the same as Heraclitus'. Whoever says that all things are true and all things false also says each of these claims separately, [1012b] so that if the combined claims are impossible, these must be impossible too. Further, there are evidently contradictories that cannot be true at the same time—nor, for that matter, all false; although, from what has been said, that would seem more possible.[11] But against all such arguments one must demand, as was also said in the discussion above, not that they say that something is or is not, but that they signify something. So one must argue from a definition, having grasped what "false" and "true" signify. And if what it is true to assert is nothing other than what it is false to deny, it is impossible for everything to be false; for one part of the contradiction must be true. Further, if it is necessary either to assert or to deny everything, it is impossible for both to be false; for one part of the contradiction is false. And so all such arguments meet the much-repeated fate of refuting themselves. For whoever says that everything is true makes the statement contrary to his own true as well, and so his own not true (for the contrary statement says that his is not true); and whoever says that everything is false makes himself false as well. And if they make exceptions—the one saying that the contrary statement alone is not true, the other that his own alone is not false—they are nonetheless led to posit infinitely many true and false statements. For the state-

**11** That the diagonal of a square is commensurable with its side was the standard example of an impossible falsehood.

ment that says the true statement is true is true, and this will go on to infinity. —It is evident, too, that neither those who say all things are at rest nor those who say all things are in motion speak truly. For if all things are at rest, the same statements will always be true and false; but this evidently changes (for the one who says it himself once was not, and again will not be). And if all things are in motion, nothing will be true; everything, then, will be false; but it has been shown that this is impossible. Further, what changes must be something that is; for change is from something into something. Nor, again, are all things sometimes at rest and sometimes in motion, with nothing always so; for there is something that always moves the things that are moved, and the first mover is itself unmoved.

# Book Delta (V)

*A dictionary of philosophical terms.*

### CHAPTER 1

"Principle" (archē) means, in one sense, the part of a thing from which one would first move: of a line or a road, for instance, this is the starting point from this end, and a different one from the opposite end. 1013a In another sense it is that from which each thing would best come to be—as with learning, where sometimes one should begin not from what is first, the starting point of the subject, but from where one would learn most easily. In another sense it is that from which, as a part present within it, a thing first comes to be—as the keel of a ship and the foundation of a house; and in animals some suppose it is the heart, others the brain, others whatever other such part they happen to pick. In another sense it is that from which, not as a part present within it, a thing first comes to be, and from which motion and change naturally first begin—as the child comes from its father and mother, and the fight from the abuse. In another sense it is that by whose decision the things that are moved are moved and the things that change change—in the way that the ruling offices in cities, and dynasties, kingships and tyrannies, are called archai, and so are the crafts, above all the master crafts.[1] Further, that from which a thing is first known is also called its principle—as the hypotheses are of demonstrations. "Cause" is said in as many ways; for all causes are principles. What is com-

1 Book Δ is a philosophical lexicon: each chapter sets out the different senses of a key term.

mon to all principles, then, is to be the first thing from which something either is or comes to be or is known; and of these some are present within the thing and others are outside it. That is why nature is a principle, and so is the element, and thought, and decision, and substance, and that for the sake of which; for the good and the fine are the principle both of knowing and of motion for many things.

### FOUR KINDS OF CAUSE

*A cause is the matter, the form, the source of change, or the end, and causes combine in many ways.*

"Cause" means, in one way, that out of which, as something present within it, a thing comes to be—for instance, the bronze of the statue and the silver of the bowl, and the genera of these. In another way it means the form and the pattern: that is, the account of the essence, and the genera of this (for instance, of the octave, the ratio of two to one, and number in general), and the parts in the account. Further, it means that from which the first beginning of change or of rest comes—for instance, the person who has deliberated is a cause, and the father is the cause of the child, and in general the maker of what is made and what brings about change of what changes. Further, it means the end, that is, that for the sake of which—as health is the cause of walking. For why does he walk? "To be healthy," we say; and in saying this we think we have given the cause.[2] And so too with all the things that come in between, once something else has set the motion going, on the way to the end— 1013b as slimming, purging, drugs or instruments come before health. All these are for the sake of the end, but they differ from one another in that some are instruments and others are actions. Causes, then, are said in roughly this many ways. And since causes are said in many ways, it follows that there are several causes of the same thing, and not accidentally—of the statue, for instance, both the

2 In music an octave corresponds to the ratio two to one (for instance, of the lengths of two strings).

sculptor's craft and the bronze, not in virtue of anything else but as a statue. But they are not causes in the same way: one is a cause as matter, the other as that from which the motion comes. Things can also be causes of each other—exercise, for instance, of fitness, and fitness of exercise. But again not in the same way: one as end, the other as principle of motion. Further, the same thing is the cause of contraries. For what by its presence is the cause of one thing, we sometimes blame by its absence for the contrary—for instance, we blame the pilot's absence for the capsizing, when his presence was the cause of the ship's safety. And both of these, the presence and the privation, are causes as movers. —All the causes just mentioned fall into four most evident types. The letters of syllables, the matter of manufactured things, fire and earth and all such elements of bodies, the parts of the whole, and the premises of the conclusion are causes as that out of which. Of these, some are causes as the underlying subject, such as the parts; others as the essence—the whole, the composition and the form. The seed, the doctor, the person who has deliberated, and in general the maker—all these are causes as that from which the beginning of change or of rest comes. The rest are causes as the end and the good of the other things; for that for the sake of which tends to be what is best and the end of the other things. Let it make no difference whether we call it the good or the apparent good. —These, then, are the causes, and this is how many kinds there are. The modes of causes are many in number, but these too become fewer when summed up. For causes are spoken of in many ways, and even among those of the same kind one is prior and another posterior —for instance, of health the doctor and the expert, and of the octave the double and number, and always the classes that include any of the particulars. Further, there are causes as accident, and the genera of these—for instance, of a statue Polyclitus is a cause in one way and the sculptor in another, because it is accidental to the sculptor to be Polyclitus. [1014a] And so are the classes that include the accident—for instance, man is a cause of the statue, or even animal in general, because Polyclitus is a

man and man is an animal. Among accidents, too, some are more remote and some nearer—as if the pale man or the musician were called the cause of the statue, and not merely Polyclitus or man. And besides all these, both those called causes in the proper sense and those called causes accidentally, some are called causes as having a capacity, and others as actively at work—of a house's being built, for instance, the builder, or the builder building.[3] The things of which the causes are causes will be spoken of in the same way as the causes just mentioned—for instance, this statue, or a statue, or an image in general; and this bronze, or bronze, or matter in general; and likewise with accidents. Further, both these and those will be spoken of in combination—for instance, not Polyclitus, nor the sculptor, but Polyclitus the sculptor. Still, all these come to six in number, each spoken of in two ways: either as the particular or as the genus; either as the accident or as the genus of the accident; either in combination or said simply; and all of them either as actively at work or in virtue of capacity. The difference is this much: causes that are actively at work, and particular causes, exist and cease to exist at the same time as the things of which they are causes—this person healing, for instance, with this person being healed, and this builder with this thing being built—whereas causes in virtue of capacity do not always do so. For the house and the builder do not perish at the same time.

### THE SENSES OF "ELEMENT"

*An element is the first indivisible constituent of a thing, as letters are of speech.*

"Element" means the first constituent, indivisible in kind into another kind, out of which a thing is composed. For instance, the elements of spoken sound are those out of which the sound is composed and into which it is ultimately divided, while they themselves are no longer divided into other sounds different in kind from them; even if they are divided, the parts are of the

3 Polyclitus was a celebrated sculptor of the fifth century BC.

same kind, as a part of water is water—whereas a part of a syllable is not a syllable. Similarly, those who speak of the elements of bodies mean the things into which bodies are ultimately divided, while these are no longer divided into other things differing in kind; and whether there is one such thing or more, they call these elements. In much the same way we speak of the elements of geometrical proofs, and in general of demonstrations. For the primary demonstrations, which are present within many demonstrations, [1014b] are called the elements of demonstrations; and such are the primary syllogisms, made up of three terms by means of one middle term. People also transfer the word from this sense and call an element whatever, being one and small, is useful for many purposes. That is why what is small and simple and indivisible is called an element. Hence the idea has arisen that the most universal things are elements, because each of them, being one and simple, is present in many things—in all, or in as many as possible; and hence some think that the one and the point are principles. Since, then, the so-called genera are universal and indivisible (for there is no account of them), some say that the genera are elements, and more so than the differentia, because the genus is more universal: where the differentia belongs, the genus follows too, but the differentia does not belong to everything the genus belongs to. What is common to all these senses is that the element of each thing is what is first present within it.

### THE SENSES OF "NATURE"

*Nature is growth, matter, and above all the form of things that move themselves.*

"Nature" means, in one way, the coming to be of growing things—as if one were to pronounce the u long. In another, it means that first constituent out of which a growing thing grows. Further, it means that from which the first motion in each natural thing is present in it as such. Things are said to grow when they gain increase through something else by touching it and by hav-

ing grown together with it or grown onto it, as embryos do. Growing together differs from touching: in touching there need be nothing besides the contact, while in things that have grown together there is some one and the same thing in both which makes them grow together instead of merely touching, and be one in continuity and quantity, though not in quality.[4] Further, "nature" means that first thing, unshaped and incapable of changing by its own capacity, out of which some natural thing either is or comes to be—as bronze is called the nature of a statue and of bronze vessels, and wood of wooden ones; and likewise with other things. For each thing is made of these, with the first matter persisting. It is in this way that people also say that the elements of natural things are their nature—some saying fire, some earth, some air, some water, some something else of the kind, some several of these, and some all of them.

> Further, in another way "nature" means the substance of natural things—as with those who say that nature is the primary composition, [1015a] or as Empedocles says: "Of none of the things that are is there nature,
> but only mixing and exchange of what has been mixed
> there is; and 'nature' is a name humans give to these." That is why, of things that are or come to be by nature, even when that from which they naturally come to be or are is already present, we say that they do not yet have their nature unless they have their form and shape.

What is by nature, then, is what is made of both of these—animals, for instance, and their parts. And nature is both the first matter (and this in two senses, either first relative to the thing or first in general: of bronze works, for instance, bronze is first relative to them, but in general perhaps water, if everything that can be melted is water) and the form, that is, the substance; and this is the end of the coming to be. And by an extension of meaning, every substance in general is now called a nature on

4 The Greek for "nature", physis, is related to the verb "to grow"; pronounced with a long u, it would sound like a word for "growing".

account of this, since nature too is a kind of substance. From what has been said, then, nature in the primary and proper sense is the substance of things that have a principle of motion in themselves as such. For the matter is called nature because it is able to receive this, and processes of coming to be and of growing are called nature because they are motions proceeding from this. And this is the principle of motion of natural things, present in them in some way, either potentially or in actuality.[5]

### THE SENSES OF "NECESSARY"

*The necessary is what is needed, what is forced, and what cannot be otherwise.*

"Necessary" means that without which, as a contributing cause, it is not possible to live (breathing and food, for instance, are necessary for an animal, since it cannot exist without them); and the conditions without which the good cannot be or come to be, or the bad cannot be got rid of or kept away (drinking the medicine, for instance, is necessary in order not to be ill, and sailing to Aegina is necessary in order to recover one's money). Further, it means what is forced, and force. This is what hinders and impedes, contrary to impulse and decision. For what is forced is called necessary—which is also why it is painful, as Evenus says: "For every necessary thing is by nature grievous." And force is a kind of necessity, as Sophocles too says: "But force compels me to do these things." And necessity is thought to be something that cannot be persuaded—rightly, for it is contrary to motion that follows decision and reasoning.[6] Further, when something cannot be otherwise, we say that it is necessary for it to be so. And it is in virtue of this sense of "necessary" that all the others are, in a way, called necessary. For what is forced is said to be necessary—to do or to undergo something— [1015b] when, because of what is forcing it, it cannot act on its impulse; the

5 "Actuality" here renders *entelecheia,* literally "being-at-completion."
6 Evenus of Paros was a fifth-century BC poet and teacher; the line of Sophocles is from his *Electra*.

assumption being that this is necessity, that because of which a thing cannot be otherwise. And the same goes for the contributing causes of living and of the good: when it is not possible without certain things, in the one case for the good, in the other for living and being, then these things are necessary, and this cause is a kind of necessity. Further, demonstration is among the necessary things, because what has been demonstrated without qualification cannot be otherwise. And the cause of this is the first premises, if the things from which the syllogism proceeds cannot be otherwise. For some things, then, something else is the cause of their being necessary; for others nothing is, but it is because of them that other things are necessarily. So what is necessary in the primary and proper sense is the simple; for this cannot be in more ways than one, and so it cannot be now one way and now another—for then it would already be in more ways than one. If, then, there are some things that are eternal and unchanging, nothing forced or contrary to nature belongs to them.

### THE SENSES OF "ONE"

*Things are one accidentally, by continuity, by kind, by genus, or by account.*

"One" is said in one way accidentally, in another in its own right. Accidentally—for instance, Coriscus and the musical, and musical Coriscus (for to say "Coriscus and the musical" is the same as to say "musical Coriscus"), and the musical and the just, and musical Coriscus and just Coriscus. For all these are called one accidentally: the just and the musical because they are accidental to one substance, the musical and Coriscus because one is accidental to the other. Similarly, in a way, musical Coriscus is one with Coriscus because one of the parts in the phrase is accidental to the other—the musical to Coriscus. And musical Coriscus is one with just Coriscus because a part of each is acci-

dental to the same one thing.[7] It is the same too if the accident is said of a genus or of any universal term—for instance, that man is the same as musical man. This is either because the musical is accidental to man, which is one substance, or because both are accidental to some particular, such as Coriscus. But they do not both belong in the same way: one belongs, presumably, as genus and within the substance, the other as a state or affection of the substance. —Things that are called one accidentally, then, are called so in this way. Of things called one in their own right, some are called so because they are continuous—as a bundle is made one by a binding, and pieces of wood by glue; 1016a and a line, even if it is bent, provided it is continuous, is called one, as is each of the body's parts, such as a leg or an arm. And among these, things continuous by nature are more one than things continuous by craft. A thing is called continuous if its motion is one in its own right and cannot be otherwise; and motion is one when it is indivisible—indivisible, that is, in time. Things are continuous in their own right when they are one not merely by contact; for if you set pieces of wood touching one another, you will not say that they are one piece of wood or one body or any other one continuous thing. Things that are continuous at all, then, are called one even if they have a bend, and those without a bend still more so—as the shin or the thigh is more one than the leg, since the motion of the leg need not be one. And the straight line is more one than the bent line. A line that is bent and has an angle we call both one and not one, because its motion can be either not simultaneous or simultaneous; but the motion of the straight line is always simultaneous, and no part of it that has magnitude is at rest while another moves, as with the bent line. Further, in another way things are called one because their underlying subject does not differ in form; and things do not differ in form when their form is indivisible to perception. The underlying subject is either the first or the last, reckoning back from the end. For wine is called one and water

7 Coriscus of Scepsis, a member of Plato's circle and later an associate of Aristotle, is his stock example of an individual.

one, insofar as each is indivisible in form; and all liquids are called one (oil and wine, for instance), and so are all things that can be melted, because the ultimate underlying subject of all of them is the same: all these are water or air. Things are also called one whose genus is one, though distinguished by opposed differentiae. These are all called one because the genus that underlies the differentiae is one (horse, man and dog, for instance, are one thing because they are all animals), in much the same way as the matter is one. Sometimes these are called one in this way; but sometimes it is their higher genus that is said to be the same—if they are the lowest species of their genus—namely the genus above these. The isosceles and the equilateral triangle, for instance, are one and the same figure because both are triangles; but they are not the same triangles. Further, things are called one when the account stating the essence of one is indivisible from another account that shows the essence of the other (for every account, taken by itself, is divisible). For this is how what has grown or shrunk is one: because its account is one—just as with plane figures the account of the form is one. [1016b] In general, things are most of all one when the thinking that grasps their essence is indivisible and cannot separate them either in time or in place or in account; and among these, most of all those that are substances. For in general, whatever admits no division is called one insofar as it admits none: if something admits no division as man, it is one man; if as animal, one animal; if as magnitude, one magnitude. Most things, then, are called one because some other thing that is one is what they do, or have, or undergo, or are related to; but the things called one in the primary sense are those whose substance is one—one either by continuity or in form or in account. For we count as more than one either things that are not continuous, or things whose form is not one, or things whose account is not one. Further, in one way we say that anything at all is one if it is a quantity and continuous; but in another way we do not, unless it is some whole, that is, unless it has one form. We would not, for instance, equally call it one if we saw

the parts of a shoe put together anyhow (except by reason of their continuity), but only if they are put together so as to be a shoe and to have, by then, some one form. That is why the line of the circle is the most one of all lines, because it is whole and complete. —To be one is to be a kind of principle of number; for the first measure is a principle. For that by which we first come to know each genus is the first measure of that genus; the one, then, is the principle of what is knowable about each thing. But the one is not the same in all genera. In one genus it is the diesis, in another the vowel or consonant; in weight it is one thing, and in motion another. But everywhere the one is indivisible either in quantity or in form. Of what is indivisible in quantity, then: what is indivisible in every direction and has no position is called a unit; what is indivisible in every direction and has position, a point; what is divisible in one direction, a line; in two, a plane; and what is divisible in quantity in every direction, that is, in three, a body. And, reversing the order, what is divisible in two directions is a plane, in one a line, and what is in no way divisible in quantity is a point or a unit—the one without position a unit, the one with position a point.[8] Further, some things are one in number, some in species, some in genus, some by analogy: in number, those whose matter is one; in species, those whose account is one; in genus, those that fall under the same figure of predication; by analogy, those related as one thing is to another. The later kinds always follow the earlier: things one in number are also one in species, but not all things one in species are one in number; [1017a] but all things one in species are one in genus, while not all things one in genus are one in species, though they are one by analogy; and not all things one by analogy are one in genus. It is evident too that "many" will be said in ways opposed to "one". Some things are many because they are not continuous; others because their matter—either the first or the last—is divisible in form; others because the accounts stating their essence are more than one.

8 In Greek music theory the diesis, roughly a quarter-tone, was the smallest interval.

## THE SENSES OF "BEING"

*Being is said accidentally, by the categories, as truth, and as potential or actual.*

"Being" is said in one sense accidentally, in another in its own right. Accidentally—for instance, we say that the just person is musical, and that the man is musical, and that the musical one is a man, speaking much as when we say that the musician builds, because it is accidental to the builder to be musical or to the musician to be a builder (for "this is that" signifies that this is accidental to that). So too with the cases just mentioned. When we say that the man is musical and that the musical one is a man, or that the pale one is musical or that this one is pale: the last pair because both are accidental to the same thing; "the man is musical" because being musical is accidental to something that is; and "the musical one is a man" because being musical is accidental to this man. (In this way even the not-pale is said to be, because the thing to which it is accidental is.) Things said to be accidentally, then, are said so either because both belong to the same thing, which is; or because the attribute belongs to something that is; or because the very thing is, to which there belongs that of which it is itself predicated. Things are said to be in their own right in as many ways as are signified by the figures of predication; for "to be" has as many meanings as there are ways in which these are said. Since, then, some predicates signify what a thing is, others its quality, others quantity, others relation, others acting or being acted on, others place, others time, "to be" signifies the same as each of these. For there is no difference between "a man is keeping well" and "a man keeps well", nor between "a man is walking" or "is cutting" and "a man walks" or "cuts"; and likewise with the others. Further, "to be" and "is" signify that something is true, and "not to be" that it is not true but false—alike with affirmation and denial. For instance, "Socrates is musical" signifies that this is true, and "Socrates is not-pale" that this is true; while "the diagonal is not

commensurate" signifies that it is false that it is. [1017b] Further, "to be" and "being" signify, in the cases mentioned, that one thing is said to be potentially and another in actuality. For we say that something is seeing both if it sees potentially and if it sees in actuality; and likewise that something knows both if it is able to use its knowledge and if it is using it; and that something is at rest both if rest already belongs to it and if it is able to be at rest. And likewise with substances: we say that Hermes is in the stone, and the half of the line is in the line, and we call grain what is not yet ripe. When something is potentially, and when it is not yet, must be determined elsewhere.[9]

## THE SENSES OF "SUBSTANCE"

*Substance is the ultimate subject, and the separable form of each thing.*

"Substance" means the simple bodies—earth, fire, water and the like—and in general bodies and the things composed of them, both animals and divine beings, and their parts. All these are called substance because they are not said of an underlying subject, but other things are said of them. In another way it means whatever, being present within such things as are not said of an underlying subject, is the cause of their being—as the soul is of the animal. Further, it means all the parts present within such things that define them and signify a "this", and with whose removal the whole is removed—as body is removed with the removal of the plane, as some say, and the plane with the removal of the line; and in general number seems to some to be of this kind (for if it is removed, they say, nothing exists, and it defines everything). Further, the essence, whose account is a definition, is also called the substance of each thing. It follows, then, that substance is spoken of in two ways: the ultimate underlying subject, which is no longer said of anything else; and whatever, being a "this", is also separable—and such is the shape and form of each thing.

9 That is, the statue of Hermes that could be carved from the block.

### SAME, OTHER, DIFFERENT, LIKE

*Sameness is a kind of oneness; other, different and like are defined from it.*

"The same" is said in some cases accidentally. For instance, the pale and the musical are the same because they are accidental to the same thing; and man and musical, because one is accidental to the other; and the musical is a man, because it is accidental to the man. And the combination is the same as each of these, and each of these as it; for both the man and the musical are said to be the same as the musical man, and it the same as them. (That is why none of these statements is made universally: it is not true to say that every man is the same as the musical. For universals belong in their own right, whereas accidents do not belong in their own right; [1018a] they are said without qualification only of particulars.

### CHAPTER 9

For Socrates and musical Socrates are thought to be the same; but "Socrates" is not said of many things, which is why we do not say "every Socrates" as we say "every man".) —Some things, then, are called the same in this way; others are the same in their own right, in as many ways as things are one. For things whose matter is one, either in form or in number, are called the same, and so are things whose substance is one. So it is evident that sameness is a kind of oneness in the being either of more than one thing, or of one thing treated as more than one—as when one says that a thing is the same as itself; for one treats it as two. —Things are called other whose forms, or matter, or account of substance, are more than one; and in general "other" is said in ways opposed to "the same".

Things are called different that are other while being the same in some respect—not only in number, but in species or genus or by analogy; further, things whose genus is other, and contraries, and things that have their otherness in their sub-

stance. Things are called like that have the same attributes in every respect, or more of their attributes the same than different, or whose quality is one. And whatever shares more of the contraries in respect of which a thing can be altered, or the more important of them, is like that thing. Things unlike are those called so in ways opposed to the like.

### OPPOSITES AND CONTRARIES

*The kinds of opposition, and what it is to differ in species.*

Things called opposite are contradictories, contraries, relatives, privation and possession, and the extremes from which and into which generation and destruction proceed. And things that cannot be present together in what is receptive of both are said to be opposed—either they themselves or the things they are made of. For grey and white do not belong to the same thing at the same time; that is why the things they are made of are opposed. Things called contrary are: those differing in genus that cannot be present in the same thing at the same time; those differing most among things in the same genus; those differing most among things in the same receptive subject; those differing most among things that fall under the same capacity; and those whose difference is greatest, either without qualification or in genus or in species. Other things are called contrary because they have such contraries, or because they are receptive of them, or because they are able to produce or to undergo them, or are actually producing or undergoing them, or are losses or acquisitions, or possessions or privations, of them. Since "one" and "being" are said in many ways, the other terms said with reference to them must follow suit, and so must "the same", "other" and "contrary", so that they differ in each category. — Things are called other in species that belong to the same genus but are not subordinate to one another, [1018b] and those that are in the same genus and have a differentia, and those that have a contrariety in their substance. Contraries, too, are other in species from one another—either all of them, or those so called in

the primary sense—and so are things whose accounts differ in the lowest species of the genus (man and horse, for instance, are indivisible in genus, but their accounts are different), and things that are in the same substance but have a difference. Things the same in species are those called so in ways opposed to these.

### PRIOR AND POSTERIOR

*Things are prior in place, time, motion, capacity, order, knowledge, and nature.*

Things are called prior and posterior in some cases—on the assumption that there is something first, a principle, in each genus—by being nearer to some determinate principle, either without qualification and by nature, or relative to something, or in some place, or in the judgment of certain people. Some things, for instance, are prior in place, by being nearer either to some place determined by nature (such as the middle or the extremity) or to some chance point; what is further away is posterior. Others are prior in time. Some are so by being further from the present, as with past events: the Trojan War is prior to the Persian Wars, because it is further removed from the present. Others by being nearer to the present, as with future events: the Nemean games are prior to the Pythian, because they are nearer the present, when we treat the present as principle and starting point.[10]

### CHAPTER 11

Others are prior in motion; for what is nearer the first mover is prior, as the boy is prior to the man—and this too is a principle, without qualification. Others are prior in capacity; for what exceeds in capacity is prior, that is, the more capable. Such is that according to whose decision the other, posterior thing must follow, so that when it does not move the other, the other is not

10 The Nemean and Pythian games were Panhellenic athletic festivals; the Persian Wars were fought in 490–479 BC.

moved, and when it does, it is—and the decision is a principle. Others are prior in order: these are things placed at intervals on some principle with reference to some one determinate thing. The leader's neighbor in a chorus, for instance, is prior to the third in line, and the next-to-highest string to the highest; for in the one case the leader is the principle, in the other the middle string. —These, then, are called prior in this way. In another way, what is prior in knowledge is treated as prior without qualification.[11] Among these, things prior in account and things prior in perception are prior in different ways. In account universals are prior, in perception particulars. And in account the accident is prior to the whole—the musical, for instance, to the musical man; for the account will not be whole without the part. And yet there cannot be anything musical unless someone is musical. Further, the attributes of prior things are called prior—straightness, for instance, is prior to smoothness; for the one is an attribute of the line in its own right, the other of the surface. 1019a Some things, then, are called prior and posterior in this way; others in respect of nature and substance, namely those that can exist without other things while the others cannot exist without them—a distinction that Plato used. (Since "to be" has many senses, first the underlying subject is prior, which is why substance is prior; and second, in a different way, things are prior with respect to potentiality and with respect to actuality. Some things are prior in potentiality, others in actuality: in potentiality, for instance, the half is prior to the whole line, the part to the whole, and the matter to the substance; but in actuality they are posterior, since only when the whole has been dissolved will they exist in actuality.) In a way, then, everything called prior and posterior is so called in these senses. For some things can exist without the others with respect to coming-to-be, as the whole can without its parts; others with respect to passing away, as the part can without the whole. And the same holds for the rest.

11 The leader stood first in a chorus line; on the lyre the nētē was the highest-pitched string and the mesē the middle one.

## CAPACITY AND POTENTIALITY

*A capacity is a principle of change in another thing or in the thing as other.*

"Potentiality" (or "capacity") means, first, a principle of motion or change that is in something other than the thing changed, or in the same thing but as other. The craft of building, for instance, is a capacity that is not present in the thing being built; the craft of medicine, on the other hand, which is a capacity, might be present in the person being healed, but not insofar as he is being healed. So "capacity" means the principle of change or motion in general, in something other or in the thing as other; and it also means the principle of being changed by something other, or by the thing itself as other. (For it is in virtue of this principle that what is acted on is acted on in some way: sometimes we say it is capable of being acted on if it can be affected in any way at all, and sometimes not with respect to every affection but only if it can be affected for the better.) Further, it means the capacity to accomplish this well, or as one intends. For sometimes, when people could merely walk or speak, but not well or not as they intended, we say they are not able to speak or walk. And similarly in the case of being acted on. Further, all states in virtue of which things are altogether unaffected, or unchangeable, or not easily moved for the worse, are called capacities. For things get broken, crushed, bent, and in general destroyed not because they are capable but because they are incapable and lack something; whereas things are unaffected by such processes when they are barely and slightly affected by them, because of a capacity—because they are capable and are in a certain condition. Since "capacity" has this many senses, "capable" too will be said in one way of what has a principle of motion or change in something other or in itself as other (for even what can bring something to a halt is capable of something); in another way, of that over which something else has such a capacity; [1019b] and in another way, of what has a capa-

city to change in any direction at all, whether for the worse or for the better. (For even what is perishing seems to be capable of perishing; otherwise it would not have perished, if that were impossible for it. As it is, it has a certain disposition and cause and principle of such an affection. Sometimes it seems to be so by having something, sometimes by being deprived of something. But if privation is in a way a having, then everything will be capable by having something. So a thing is capable both by having a certain state and principle and by having the privation of it, if it is possible to have a privation; if not, "capable" is used homonymously in the two cases.) And in another way a thing is called capable because nothing else, or itself as other, has a capacity or principle for destroying it. Further, all these are so called either because the thing might merely happen to come about or not come about, or because it might do so well. For even inanimate things have a capacity of this sort, instruments for example: people say one lyre is able to sound and another not at all, if it does not have a good tone. Incapacity is the privation of capacity—of such a principle as has been described—either altogether, or in what would naturally have it, or even at the time when it would naturally already have it; for people would not say in the same sense that a boy, a man, and a eunuch are incapable of begetting. Further, corresponding to each kind of capacity there is an opposite incapacity: both to the capacity for merely producing motion and to the capacity for producing it well. Some things, then, are called incapable, or impossible, in virtue of this sort of incapacity, and others in another way, namely as the possible and the impossible are so called. The impossible is that whose contrary is necessarily true. (For example, that the diagonal is commensurable is impossible, because such a statement is false and its contrary is not only true but necessary; so its being commensurable is not only false but necessarily false.) The contrary of this, the possible, is when it is not necessary that the contrary be false: for example, that a man is sitting is possible, since that he is not sitting is not necessarily false. So "possible" in one sense, as has been said, means

what is not necessarily false; in another, what is true; in another, what may be true. And it is by metaphor that we speak of a "power" in geometry.[12] These, then, are senses of "possible" that do not refer to a capacity. But all the things said with reference to a capacity are said in relation to the primary sense; 1020a and this is a principle of change in something other or in the thing as other. For other things are called capable because something else has such a capacity over them, or because it does not, or because it has it in a particular way. The same holds for things called incapable. So the governing definition of capacity in the primary sense would be: a principle of change in something other or in the thing as other.

## QUANTITY

*Quantity is what can be divided into countable or measurable parts.*

"Quantity" means what is divisible into constituents, each or every one of which is by nature some one thing and a "this." A plurality is a quantity if it is countable, a magnitude if it is measurable. A plurality is what is divisible potentially into parts that are not continuous, a magnitude what is divisible into continuous parts. Of magnitudes, what is continuous in one dimension is length, in two breadth, in three depth. Of these, limited plurality is number, limited length a line, breadth a surface, depth a body. Further, some things are called quantities in their own right, others accidentally: a line, for example, is a quantity in its own right, the musical accidentally. Of the things that are quantities in their own right, some are so by their substance—a line, for instance, is a quantity, since "quantity" is present in the account that says what it is—while others are affections and states of this sort of substance, such as much and little, long and short, broad and narrow, deep and shallow, heavy and light, and the rest of this kind. Large and small, too, and larger and smaller, whether said in their own right or in relation to one another, are affections of quantity in its own right; these names are, how-

12 In Greek geometry *dunamis* ("power") was used for a square, e.g. of a line.

ever, also transferred to other things. Of things called quantities accidentally, some are so called in the way it was said that the musical and the white are quantities, because that to which they belong is a quantity; others in the way that motion and time are. For these too are called quantities of a sort, and continuous, because the things of which they are affections are divisible. I mean not the thing moved but that over which it was moved: because that is a quantity, the motion is a quantity too, and time is a quantity because motion is.

### QUALITY

*Quality is the differentia of a substance, or an affection of things in motion.*

"Quality" means, in one sense, the differentia of the substance. A human being, for example, is an animal of a certain quality because it is two-footed, a horse because it is four-footed; and a circle is a figure of a certain quality because it has no angles—the differentia with respect to substance being a quality. [1020b] In one sense, then, quality means the differentia of substance; in another, it is said in the way that unmoved and mathematical things are qualified: numbers, for instance, have certain qualities—the composite ones, which are not in one dimension only but of which the plane and the solid are copies (these are the numbers that are so many times so much, or so many times so many times so much)—and in general what is present in the substance besides the quantity. For the substance of each number is what it is once: that of six, for example, is not what it is twice or three times, but what it is once, since six is once six. Further, quality means the affections of substances in motion, such as heat and cold, whiteness and blackness, heaviness and lightness, and all such things, in virtue of which bodies are said to alter when they change. Further, it is said with respect to excellence and badness, and in general of bad and good. Quality, then, may be said in roughly two ways, and of these one is the most proper. The primary quality is the differentia of the sub-

stance (and the quality in numbers is a part of this, since it is a differentia of substances, but of substances either not in motion or not insofar as they are in motion). The other is the affections of things in motion insofar as they are in motion, and the differentiae of motions. Excellence and badness belong among these affections, for they indicate differentiae of the motion and activity by which things in motion act or are acted on well or badly: what can be moved or act in this way is good, and what can do so in that, contrary way is bad. Good and bad signify quality most of all in living things, and among these most of all in those that have the power of decision.

### RELATIVES

*Things are relative numerically, by capacity to act or be acted on, or as measure to measured.*

Things are called "relative" in some cases as double is to half and triple to a third, and in general multiple to submultiple and exceeding to exceeded; in others as what can heat is to what can be heated, what can cut to what can be cut, and in general what can act to what can be acted on; and in others as the measurable to the measure, the knowable to knowledge, and the perceptible to perception. Those of the first kind are said numerically, either indefinitely or definitely, in relation to the numbers themselves or to one. (Double in relation to one, for instance, is a definite number; multiple is numerically related to one, but not definitely—not this number or that. [1021a] One and a half in relation to its reciprocal is related numerically to a definite number; the superparticular to the subsuperparticular by an indefinite number, as multiple is to one; and exceeding in relation to exceeded is numerically quite indefinite. For number is commensurable, and number is not predicated of what is not commensurable; but the exceeding is, in relation to the exceeded, so much and something more, and this is indefinite, since it can be whatever it happens to be, equal or not equal.)[13] All these relatives, then,

13 A "superparticular" ratio is one of the form (n+1):n, such as 3:2 or 4:3.

are said numerically and are affections of number, and so, in a different way, are the equal, the like, and the same. (All of these are said with reference to one: things are the same whose substance is one, like whose quality is one, equal whose quantity is one; and one is the principle and measure of number. So all these are called relative numerically, but not in the same way.) Things that act and are acted on are relative with respect to a capacity for acting and being acted on and to the activities of these capacities: what can heat, for instance, is relative to what can be heated because it is able to, and again what is heating is relative to what is being heated, and what is cutting to what is being cut, as things that are active. But of numerical relatives there are no activities, except in the way described elsewhere; activities with respect to motion do not belong to them. Of relatives with respect to capacity, some are further said to be relative with respect to times, such as what has made to what has been made and what will make to what will be made. For this is the way a father is called father of a son: the one is something that has acted, the other something that has been acted on. Further, some things are relative by privation of a capacity, such as the incapable and things so described, like the invisible. Things called relative numerically or with respect to capacity, then, are all relative because what they are is said to be of something else, not because something else is relative to them. But the measurable, the knowable, and the thinkable are called relative because something else is said in relation to them. For "thinkable" signifies that there is thinking of it; but thinking is not relative to that of which it is thinking (for then the same thing would have been said twice). Similarly, sight is sight of something—not of that of which it is sight (although it would be true to say this), but relative to color or something else of that kind. Said the other way, the same thing would be said twice: that sight is of that of which it is sight. [1021b] Things called relative in their own right, then, are some of them so called in this way; others if their genera are of this kind—medicine, for instance, is among the relatives because its genus, knowledge, is thought to

be relative. Further, there are the things in virtue of which what has them is called relative: equality, for example, because the equal is relative, and likeness because the like is. Others are relative accidentally, as a human being is relative because he happens to be double, and double is among the relatives; or the white is, if the same thing happens to be both double and white.

## COMPLETE

*The complete lacks no part, cannot be surpassed in its kind, and has reached its end.*

"Complete" means, in one sense, that outside which it is not possible to find even a single one of its parts. The complete time of each thing, for example, is the time outside which it is not possible to find any time that is part of it. It also means what, with respect to excellence and doing well, cannot be surpassed in its kind: as we call a doctor or a flute-player complete when they lack nothing with respect to the form of their proper excellence. (In this way, transferring the word to bad things too, we speak of a complete slanderer and a complete thief, since we call them good as well—a good thief, a good slanderer. And excellence is a kind of completion.

## CHAPTER 16

For each thing is complete, and every substance complete, when with respect to the form of its proper excellence it lacks no part of its natural magnitude.) Further, things that have attained their end, when the end is something worthwhile, are called complete; for they are complete in virtue of having their end. So, since the end is something ultimate, we transfer the word to bad things too and say that something has been completely ruined or completely destroyed, when nothing is lacking to its destruction and badness but it is at the last extreme. This is why death is also called an end by metaphor: both are ultimate. And that for the sake of which is an end and something ultimate. Things called complete in their own right, then, are so called in

all these ways: some because, with respect to doing well, they lack nothing, cannot be surpassed, and have nothing outside them; others because in general they cannot be surpassed in their particular kind and nothing is outside them. 1022a Other things are called complete, in turn, with reference to these, by producing something of this kind, or having it, or fitting it, or being related in one way or another to the things called complete in the primary sense.

### LIMIT

*A limit is the boundary, form, end, or essence of a thing.*

"Limit" means the last point of each thing, the first point outside which nothing can be found and the first inside which everything is; and whatever is the form of a magnitude or of something that has magnitude; and the end of each thing (that is, what the motion and action are toward, not what they are from—though sometimes it is both, what they are from and what they are toward and that for the sake of which); and the substance of each thing, and the essence of each thing, for this is the limit of knowledge, and if of knowledge, of the thing too. So it is clear that "limit" has as many senses as "principle," and still more; for a principle is a limit, but not every limit is a principle.

### "IN VIRTUE OF WHICH" AND "IN ITS OWN RIGHT"

*The senses of these phrases, from form and essence to position.*

"That in virtue of which" has many senses. In one sense it is the form and substance of each thing: that in virtue of which someone is good, for instance, is the good itself. In another, it is that in which, as primary, something naturally comes to be, as color comes to be in a surface. In the primary sense, then, "that in virtue of which" is the form; in a secondary sense it is, as it were, the matter of each thing and the primary underlying subject of each. In general, "that in virtue of which" will have as many senses as "cause." For we say "in virtue of what has he

come?" or "for the sake of what has he come?", and "in virtue of what has he reasoned fallaciously, or reasoned validly?" or "what is the cause of the reasoning or the fallacy?" Further, "that in virtue of which" is said with respect to position: that by which he is standing or along which he is walking; for all these signify place and position. So "in its own right" too must have many senses.[14] In one sense, what a thing is in its own right is the essence of each thing: Callias, for instance, is in his own right Callias and the essence of Callias. In another sense, whatever is present in the what-it-is: Callias, for instance, is in his own right an animal, since "animal" is present in his account; Callias is a particular animal. Further, if something has been received in the thing itself as primary, or in one of its parts: a surface, for instance, is white in its own right, and a human being lives in his own right, since the soul, in which living primarily resides, is a part of the human being. Further, what has no other cause: a human being has many causes—animal, two-footed—but all the same a human being is a human being in his own right. Further, whatever belongs to a thing alone and insofar as it is alone; hence what is separated is so in its own right.

### DISPOSITION

*Disposition is the arrangement of a thing's parts.*

1022b "Disposition" means the arrangement of something that has parts, either in place or in capacity or in form. For there must be a certain position, as the very name "dis-position" shows.

### HAVING, OR STATE

*A state is a having, or a disposition by which a thing is well or badly disposed.*

"Having" (or "state") means, in one sense, a sort of activity of the haver and of what is had, like an action or a motion. (For when

14 "In virtue of which" (*kath' ho*) and "in its own right" (*kath' hauto*) share the same Greek preposition, hence the transition.

one thing makes and another is made, there is a making between them; so too between someone who has a garment and the garment that is had there is a having.) Clearly one cannot have this sort of having, for it would go on to infinity if one could have the having of what is had. In another sense, a "state" means a disposition in virtue of which what is disposed is well or badly disposed, either in its own right or in relation to something else: health, for instance, is a state, since it is such a disposition. Further, something is called a state if it is a part of such a disposition; this is why the excellence of the parts is a kind of state.[15]

### AFFECTION

*An affection is an alterable quality, an alteration, or a misfortune.*

"Affection" means, in one sense, a quality in virtue of which a thing can be altered, such as white and black, sweet and bitter, heaviness and lightness, and all others of this kind; in another, the activations of these, the alterations already taking place. Further, among these it means more particularly harmful alterations and motions, and above all painful harms. Further, great misfortunes and distresses are called affections.

### PRIVATION

*Privation is the lack of something a thing, or its kind, would naturally have.*

"Privation" means, in one sense, a thing's not having one of the attributes that are naturally had, even if the thing itself would not naturally have it: a plant, for example, is said to be deprived of eyes. In another sense, a thing's not having something that it, or its genus, would naturally have: a blind man and a mole, for example, are deprived of sight in different ways, the mole with respect to its genus, the man in his own right. Further, a thing's

15 *Hexis* ("state") is formed from *echein*, "to have," so Aristotle plays on "having" here.

not having something when it would naturally have it and at the time it would naturally have it: blindness is a privation, but one is not blind at every age, only if one lacks sight at the age at which one would naturally have it. Similarly, a thing is deprived if it does not have something in the respect, in virtue of the thing, in relation to the thing, and in the way in which it would naturally have it. Further, the forcible removal of anything is called privation. And privations have as many senses as there are negations formed with the prefix "un-" or "a-." A thing is called unequal because it does not have the equality it would naturally have; invisible both because it has no color at all and because it has only a poor one; footless both because it has no feet at all and because it has poor ones. Further, something may be so called because it has only a little of something, like a "stoneless" fruit; [1023a] and this is a way of having it poorly. Further, because it is not done easily or not well: "uncuttable," for instance, is said not only of what is not cut but also of what is not cut easily or well. Further, because the thing lacks it entirely: a one-eyed man is not called blind, only one who lacks sight in both eyes. This is why not everyone is good or bad, or just or unjust; there is also the intermediate.[16]

### TO HAVE AND TO HOLD

*The senses of having: controlling, receiving, containing, and holding together.*

"To have" or "to hold" has many senses. In one sense it means to direct something according to one's own nature or impulse; this is why a fever is said to have a person, tyrants to hold their cities, and those who wear clothes to have them on. In another sense, it is said of that in which something is present as in a receptacle: bronze, for instance, has the form of the statue, and the body has the disease. In another sense, as the container holds what it contains; for what something is in as its container

16 The Greek privative prefix *a-* (as in *a-horatos*, "in-visible") corresponds to English "un-," "in-," or "a-."

is said to be held by it. We say, for instance, that the vessel holds the liquid, the city holds people, and the ship holds sailors; and in this way also the whole holds the parts. Further, what prevents something from moving or acting according to its own impulse is said to hold it, as pillars hold up the weights placed on them, and as the poets make Atlas hold up the heavens, since otherwise they would fall down upon the earth, as some of the natural philosophers also say. In this way too what holds things together is said to hold what it holds together, since otherwise each would separate according to its own impulse. And "being in something" is said in similar ways, corresponding to "having."

### COMING FROM SOMETHING

*Things come from their matter, their mover, their whole, their parts, or what precedes them.*

"To be from something" means, in one sense, to be from something as from matter, and this in two ways: either with respect to the first genus or with respect to the last species. In one way, for instance, everything that can be melted is from water; in another, the statue is from bronze. In another sense, it means from the first moving principle: from what, for instance, did the fight arise? From abuse, because this was the starting point of the fight. In another sense, from the composite of matter and shape, as the parts are from the whole, the verse from the *Iliad*, and the stones from the house; for the shape is an end, and what has an end is complete. Some things are from something as the form is from its part: human being, for instance, from two-footed, and the syllable from the letter. For this is a different sense from the one in which the statue is from bronze; [1023b] the composite substance is from perceptible matter, but the form, too, is from the matter of the form. Some things, then, are so called in these ways; others if one of these senses applies to a part of the thing: the child, for instance, is from father and mother, and plants from the earth, because they come from

some part of them. In another sense, it means what comes after something in time, as night comes from day and a storm from fair weather, because the one comes after the other. Of these, some are so called because they change into one another, like those just mentioned; others merely because they are successive in time: the voyage took place "from" the equinox, for instance, because it took place after the equinox, and the Thargelia comes "from" the Dionysia, because it comes after the Dionysia.[17]

### PART

*A part is what a quantity, a form, or a whole can be divided into.*

"Part" means, in one sense, that into which a quantity can be divided in any way whatever; for what is taken away from a quantity, as a quantity, is always called a part of it—two, for instance, is in a sense called a part of three. In another sense, it means only those among such things that measure the whole exactly; which is why two is in one sense called a part of three and in another not. Further, the things into which a form can be divided apart from quantity are also called its parts; this is why species are said to be parts of the genus. Further, the things into which a whole is divided or of which it is composed, whether the whole is the form or what has the form: of a bronze sphere or bronze cube, for instance, both the bronze (that is, the matter in which the form is) and the angle are parts. Further, the items in the account that makes each thing clear are also parts of the whole; this is why the genus is called a part of the species, although in another sense the species is part of the genus.

### WHOLE AND ALL

*A whole lacks none of its parts; position separates a whole from an all.*

"Whole" means that from which no part is missing of those from which it is by nature called a whole; and that which contains the

17 The Dionysia and Thargelia were Athenian festivals held in spring, the Thargelia about two months after the City Dionysia.

things contained in such a way that they are some one thing. This last is so in two ways: either as each of them is one, or as the unity is made of them. For the universal—what is said generally, as being some sort of whole—is universal in the sense that it contains many things by being predicated of each and by all of them being one, each individually, as human being, horse, and god are, since all are animals. The continuous and limited is a whole when it is some one thing made of several constituents, above all when these are present potentially, but if not, then actually. Of these themselves, things of this kind by nature are wholes more than those by craft, as we said in the case of the one too, since wholeness is a kind of oneness. 1024a Further, of quantities that have a beginning, middle, and end, those in which position makes no difference are called "all," and those in which it does, "whole." Those that admit of both are called both wholes and all: these are the things whose nature remains the same when they are rearranged, but whose shape does not, such as wax or a cloak; they are called both whole and all, since they have both characteristics. Water, and liquids generally, and number are called "all," but we do not speak of "the whole number" or "the whole water," except by metaphor. Things of which "all" is said as of one thing have "all" said of them in the plural as of things divided: "all this number," "all these units."[18]

### MUTILATED

*Only a continuous whole whose parts have position can be mutilated.*

"Mutilated" is not said of just any quantity: the thing must be divisible into parts and also a whole. Two is not mutilated if one of its two units is taken away (for the part cut off and the remainder are never equal), nor in general is any number. For the substance must also remain: if a cup is mutilated, it must still be a cup; but the number is no longer the same. Besides this, even if things have unlike parts, not all of these can be

18 Greek *pan* (singular, "all") and *panta* (plural, "all things") are being distinguished here.

mutilated either (for a number has, in a way, unlike parts too, such as two and three); but in general nothing in which position makes no difference, such as water or fire, is mutilated. Things must be of such a kind as to have position in virtue of their substance. Further, they must be continuous: a musical scale is made of unlike parts and has position, but it does not become mutilated. Besides this, not even wholes are mutilated by the privation of just any part. The parts removed must be neither those that are governing for the substance nor those located just anywhere. If a cup is pierced, for instance, it is not mutilated, but it is if its handle or some projecting part is removed; and a human being is not mutilated if he loses flesh or his spleen, but if he loses some extremity, and not every extremity, but one that does not grow back when removed entirely. This is why bald people are not mutilated.

## GENUS

*A genus is a race, a stock with a first ancestor, or the subject of differentiae.*

"Genus" (or "race") is used, in one sense, when there is continuous generation of things that have the same form: for example, "as long as the human race exists" means "as long as their generation is continuous." In another sense, it refers to that from which, as first mover, things derive their being: this is how some are called Hellenes by race and others Ionians, because the ones descend from Hellen and the others from Ion as first begetter. And the term applies more to those descended from the begetter than from the matter, though people are also said to be of a race from the female side, like the descendants of Pyrrha. [1024b] Further, it is used as the plane is the genus of plane figures and the solid of solids; for each of the figures is either a plane of such-and-such a kind or a solid of such-and-such a kind, and this is what underlies the differentiae.[19] Further, in accounts, the first

19 Hellen and Ion were legendary ancestors of the Greeks and the Ionians; Pyrrha, wife of Deucalion, was mother of the human race repopulated after the Flood.

constituent, which is stated in the what-it-is, is the genus, and the qualities are called its differentiae. "Genus," then, is used in this many ways: with respect to continuous generation of the same form; with respect to the first mover of the same form; and as matter. For that of which the differentia and quality are is the underlying subject, which we call matter. Things are called "other in genus" when their primary underlying subjects are different and neither can be analyzed into the other nor both into the same thing: form and matter, for instance, are other in genus, and so are things said according to a different figure of the categories of being (for some beings signify what a thing is, some a quality, and some the other things distinguished earlier); for these too cannot be analyzed either into each other or into some one thing.

### FALSE

*Things, accounts, and people are false; Antisthenes and the Hippias go wrong about this.*

"False" is said, in one way, of a thing as false. Of this, one kind is false because it is not combined or cannot be combined (as we say that the diagonal's being commensurable, or your sitting, is false: the first is always false, the second sometimes; for in these senses they are not). Other things exist but are naturally such as to appear either of a kind they are not or things that do not exist (for example, shadow-painting and dreams: these are something, but not the things of which they produce an impression). Things, then, are called false in these ways: either because they themselves do not exist, or because the impression that comes from them is of something that does not exist. A false account, insofar as it is false, is an account of what is not. This is why every account is false of something other than that of which it is true: the account of a circle, for example, is false of a triangle.[20] Of each thing there is in one sense one account, that of its

20 "Shadow-painting" (*skiagraphia*) was a painting technique using shading to create an illusion of depth, convincing only from a distance.

essence; but in another sense there are many, since the thing itself and the thing with an attribute are in a way the same—Socrates, for example, and musical Socrates. (The false account, taken without qualification, is an account of nothing.) This is why Antisthenes naively thought that nothing could properly be spoken of except by its own proper account, one account for one thing. From which it followed that contradicting was impossible, and, more or less, that saying anything false was impossible too. But each thing can be spoken of not only by its own account but also by that of something else—falsely, and altogether so, but in a way also truly, as eight is double by the account of two.[21] 1025a Things, then, are called false in these ways. A false person is one who readily and deliberately chooses such accounts, not for the sake of anything else but for their own sake, and one who produces such accounts in others, just as we also say that things are false which produce a false impression. This is why the argument in the *Hippias* is misleading when it says that the same person is false and true. For it takes the false person to be the one who is able to deceive, that is, the one who knows and understands; and further, it takes the person who is bad willingly to be better. It gets this falsehood by induction—for the person who limps willingly is better than the one who does so unwillingly—meaning by "limping" imitating a limp. For if someone were lame willingly, he would presumably be worse, just as in the case of character.[22]

## ACCIDENT

*An accident belongs to something neither necessarily nor for the most part.*

"Accident" means what belongs to something and is true to say of it, but neither necessarily nor for the most part: if, for

21 Antisthenes, a companion of Socrates, held that each thing has only its own proper account.

22 Plato's dialogue *Hippias Minor* argues that the liar and the truthful person are the same, and that one who does wrong willingly is better than one who does it unwillingly.

instance, someone digging a hole for a plant finds treasure. This, then, finding treasure, is an accident for the one digging the hole; for the one does not come necessarily from the other or after it, nor does someone who plants a tree find treasure for the most part. And a musical person might be pale; but since this happens neither necessarily nor for the most part, we call it an accident. So, since there are things that belong, and they belong to something, and some of them belong at a certain place and time, whatever belongs to something, but not because it was this thing or it was now or here, will be an accident. Nor, then, is there any definite cause of an accident, but only a chance one, and this is indefinite. It was an accident for someone to go to Aegina, if he arrived there not in order to get there but because he was driven off course by a storm or captured by pirates. The accident has come about or exists, then, but not as itself, only as something else; for the storm was the cause of his coming where he was not sailing to, and that was Aegina. "Accident" is also used in another way: of whatever belongs to each thing in its own right without being in its substance, as having angles equal to two right angles belongs to the triangle. And accidents of this kind can be eternal, whereas none of the others can. The account of this is given elsewhere.[23]

23 Aegina is an island in the Saronic Gulf, near Athens.

# Book Epsilon (VI)

*The divisions of theoretical science; accidental being.*

## CHAPTER 1

1025b We are seeking the principles and causes of the things that are, and clearly of them as things that are. For there is a cause of health and of fitness, and there are principles and elements and causes of mathematical objects, and in general every science that involves thinking, or has some share in thinking, deals with causes and principles, whether more precise or simpler ones. But all these sciences mark off some particular being, some genus, and busy themselves with that, not with being without qualification, nor as being. Nor do they give any account of the what-it-is; rather, starting from it—some making it clear by perception, others taking the what-it-is as a hypothesis—they go on to demonstrate, more rigorously or more loosely, the attributes that belong in their own right to the genus they deal with. It is clear, then, that from such an induction there is no demonstration of substance or of the what-it-is, but some other way of making it clear. Similarly, they say nothing about whether the genus they deal with exists or does not, since it belongs to the same kind of thinking to make clear both what it is and whether it is. Now natural science, too, happens to deal with one genus of being: it deals with the kind of substance that has the principle of motion and rest in itself. So it is clear that it is neither practical nor productive. (For in things produced the principle is in the producer—intellect or craft or some capacity—and in things done it is in the doer, namely decision; for what is done and what is decided on are the same.) So if all thinking is either prac-

tical or productive or theoretical, natural science would be a theoretical science, but theoretical about the kind of being that is capable of being moved, and about substance in the sense of the account only as, for the most part, not separable. But we must not overlook how the essence and the account are, since without this, inquiry accomplishes nothing. Of things defined, of things that are what they are, some are like the snub and some like the concave. They differ in that the snub is taken together with matter (for the snub is a concave nose), whereas concavity is without perceptible matter. [1026a] Now if all natural things are spoken of like the snub—nose, eye, face, flesh, bone, animal in general, leaf, root, bark, plant in general (for the account of none of these is without motion; it always includes matter)—then it is clear how we should seek and define the what-it-is in natural things, and why it belongs to the natural scientist to study even some of the soul, so much of it as is not without matter. From this it is evident that natural science is theoretical. But mathematics too is theoretical. Whether it deals with things that are unmoving and separate is at present unclear; but it is clear that some branches of mathematics study their objects insofar as they are unmoving and insofar as they are separate. If there is something eternal and unmoving and separate, it is evident that knowing it belongs to a theoretical science—not, however, to natural science (for natural science deals with certain things that move), nor to mathematics, but to a science prior to both. For natural science deals with things that are separate but not unmoving, and some branches of mathematics with things that are unmoving but presumably not separate, but as in matter; but the first science deals with things that are both separate and unmoving. All causes must be eternal, but these most of all; for they are the causes of the divine things that are manifest to us.[1] So there would be three theoretical philosophies: mathematics, natural science, and theology. (For it is quite clear that if the divine is present anywhere, it is present in this sort of nature.) And the most honor-

1 "The divine things that are manifest" are probably the heavenly bodies.

able science must deal with the most honorable genus. The theoretical sciences, then, are more choiceworthy than the others, and this one more than the other theoretical sciences. For one might raise the puzzle whether first philosophy is universal, or deals with one particular genus and one nature. (For it is not the same even in the mathematical sciences: geometry and astronomy deal with a particular nature, while universal mathematics is common to all.) If, then, there is no other substance besides those constituted by nature, natural science would be the first science; but if there is some unmoving substance, the science of this is prior and is first philosophy, and it is universal in this way, because it is first. And it would belong to this science to study being as being, both what it is and the attributes that belong to it as being.

### NO SCIENCE OF ACCIDENTAL BEING

*Accidental being has no science, because it is neither always nor for the most part.*

But being, said without qualification, is said in many ways. One of these, as we saw, was accidental being, another being as the true (and not-being as the false); besides these there are the figures of the categories (the what, quality, quantity, where, when, and anything else that signifies in this way); [1026b] and further, besides all these, there is being potentially and actually. Since being is said in many ways, then, we must first say about accidental being that there is no study of it. A sign of this is that no science concerns itself with it—not practical, productive, or theoretical. For the one who makes a house does not make all the things that happen to go along with the house as it comes to be (they are unlimited: nothing prevents the house once made from being pleasant for some people, harmful to others, and beneficial to others, and different, so to speak, from all the things that exist; and the craft of building produces none of these). In the same way the geometer does not study the attributes that belong accidentally to figures in this way, nor whether

a triangle is different from a triangle whose angles equal two right angles. And this happens reasonably enough, for the accidental is, as it were, a mere name. This is why Plato was in a way not wrong to assign sophistry to the domain of not-being.[2] For the arguments of the sophists deal, one might say, with the accidental more than anything else: whether the musical and the literate are different or the same, and musical Coriscus and Coriscus; and whether everything that is, but is not always, has come to be, so that if someone who is musical has become literate, he has also, being literate, become musical; and all the other arguments of this sort. For the accidental appears to be something close to not-being. This is clear from arguments like the following: of things that are in the other senses there is coming-to-be and passing away, but of things that are accidentally there is not. Still, we must say something more about the accidental, as far as possible: what its nature is and through what cause it exists. At the same time it will perhaps become clear why there is no science of it. Among the things that are, some are always in the same state and of necessity—not necessity in the sense of force, but the necessity we speak of when something cannot be otherwise—while others are neither of necessity nor always, but for the most part. This is the principle and this the cause of there being the accidental. For whatever is neither always nor for the most part, that we call accidental. If there is wintry, cold weather in the dog days, for instance, we say this is an accident, but not if there is stifling heat, because the latter is so always or for the most part, and the former is not.[3] And it is an accident that a human being is pale (for this is neither always nor for the most part), but not an accident that he is an animal. It is an accident, too, that the builder produces health, 1027a because it is not the builder's nature to do this but the doctor's; it just happened that the builder was a doctor. And a cook aim-

2 The reference is to Plato's *Sophist*, where the sophist is located in the realm of not-being and falsehood.

3 The "dog days" are the hottest part of summer, named after the rising of the Dog Star, Sirius.

ing at pleasure might produce something healthy, but not by virtue of the craft of cooking. This is why we say it happened incidentally: in a way he produces it, but not without qualification. For of other things there are capacities that produce them, but of accidents there is no definite craft or capacity; for the cause of things that are or come to be accidentally is itself accidental. So, since not all things are or come to be of necessity and always, but most things are for the most part, there must be accidental being. A pale person, for example, is not musical always or for the most part; but since this sometimes happens, it will be accidental (otherwise everything would be of necessity). So the cause of the accidental will be matter, which is capable of being otherwise than it usually is. We must take this as our starting point: is there nothing that is neither always nor for the most part? Or is this impossible? There is, then, besides these, what happens either way by chance, and accidentally. But is there only what is for the most part, and nothing that is always? Or are there some eternal things? These questions must be examined later. But that there is no science of the accidental is evident. For all science is either of what is always or of what is for the most part—how else will one learn it or teach it to another? It must be defined by "always" or by "for the most part": that honey-water is beneficial to someone with a fever for the most part, for example. But it will not be able to state the exception, when it is not beneficial—at the new moon, say—since even what happens at the new moon happens either always or for the most part; and the accidental is contrary to these. What the accidental is, then, and through what cause, and that there is no science of it, has been stated.

### NOT EVERYTHING HAPPENS OF NECESSITY

*Causal chains trace back to a starting point that simply comes about.*

That there are principles and causes that are generable and destructible without being in the process of coming to be and being destroyed is evident. For if this were not so, everything

would be of necessity, since there must be some cause, and not an accidental one, of what comes to be and is destroyed. Will this be or not? It will if this other thing happens, and if not, not; and that other thing will happen if something else does. And in this way it is clear that, as time is continually subtracted from a limited time, we will arrive at the present. [1027b] So this man will die by violence, if he goes out; and he will go out if he gets thirsty; and he will get thirsty if something else happens. And in this way we will arrive at what is present now, or at something that has already happened. For example, he will go out if he gets thirsty; and this will happen if he is eating spicy food; and this is either the case or not. So of necessity he will die, or of necessity he will not. And similarly if one jumps back to past events, the argument is the same; for this—I mean what has happened—is already present in something. So everything that is going to be will be of necessity: that the living will die, for example, since something has already happened, such as the presence of contraries in the same body. But whether it will be by disease or by violence is not yet settled, but only if this thing happens. It is clear, then, that the series goes back to a certain starting point, but this no longer goes back to anything else. This, then, will be the starting point of what happens either way by chance, and nothing else is the cause of its coming to be. But to what sort of principle and what sort of cause this tracing back leads—whether to matter, or to that for the sake of which, or to what produced the motion—must be carefully examined.

### BEING AS TRUTH

*Truth and falsity lie in thought, not in things, and are set aside.*

Let us dismiss accidental being, then, since it has been sufficiently defined. As for being as the true, and not-being as the false: they depend on combination and division, and taken together they concern the apportioning of a contradiction. (For the true has the affirmation in the case of what is combined and the negation in the case of what is divided, while the false has

the contradictory of this apportionment. How it happens that we think things together or apart is another question—I mean "together" and "apart" in the sense not of succession but of some unity coming about.) For falsity and truth are not in things —as if, say, the good were true and the bad immediately false— but in thought; and concerning simple things and what-things-are, not even in thought. What we must study concerning being and not-being in this sense, then, will have to be examined later.

## CHAPTER 4

But since combination and division are in thought and not in things, and being in this sense is different from the things that are in the strict sense (for thought connects or separates either the what-it-is, or a quality, or a quantity, or something else), we must set aside both accidental being and being as the true. For the cause of the one is indefinite, and of the other some affection of thought; [1028a] and both concern the remaining genus of being, and do not reveal any nature of being existing outside. So let these be dismissed, and let us examine the causes and principles of being itself, as being. It is evident, from what we have distinguished concerning the number of ways in which each thing is said, that being is said in many ways.[4]

4 Many editors regard this sentence as a later addition.

# Book Zeta (VII)

*Substance and essence.*

## CHAPTER 1

Being is said in many ways, as we distinguished earlier in our discussion of the number of ways things are said. For it signifies, on the one hand, what a thing is and a "this," and on the other a quality or quantity or each of the other things predicated in this way. But while being is said in so many ways, it is evident that of these the primary being is the what-it-is, which signifies the substance. (For when we say what quality this thing has, we say that it is good or bad, but not that it is three cubits long or a human being; but when we say what it is, we do not say pale or hot or three cubits long, but a human being or a god.) And the other things are called beings because they are quantities of what is in this sense, or qualities of it, or affections of it, or something else of this kind.[1] This is why one might even raise the puzzle whether walking, being healthy, and sitting each signify a being, and similarly with anything else of this sort. For none of them is by nature in its own right or capable of being separated from substance; rather, if anything, it is what walks, what sits, and what is healthy that are among the beings. And these appear more to be beings because there is something definite underlying them—namely, the substance and the individual—which shows itself in a predication of this kind; for "good" or "sitting" is not said without it. Clearly, then, it is because of this that each of those also is, so that what primarily

1 The earlier discussion is Book Δ.

is—not is something, but simply is—would be substance. Now "first" is said in many ways; but substance is first in every sense: in account, in knowledge, and in time. For none of the other categories is separable, but substance alone is. And it is first in account, since in the account of each thing the account of its substance must be present. And we think we know each thing most fully when we know what it is—what a human being or fire is— 1028b rather than its quality or quantity or place; since we know each of these things themselves, too, only when we know what the quantity or the quality is. And indeed the question that was raised long ago, is raised now, and always will be, and is always a source of puzzlement—what is being?—is just this: what is substance? (For it is this that some say is one and others more than one, some limited in number and others unlimited.) This is why we too must study, most of all and first and, one might say, exclusively, what being in this sense is.

### WHICH THINGS ARE SUBSTANCES?

*Bodies are agreed to be substances; Plato and others posit Forms, numbers, and more.*

Substance is thought to belong most evidently to bodies. This is why we say that animals and plants and their parts are substances, and natural bodies such as fire, water, earth, and each thing of this kind, and whatever is either a part of these or composed of them—of some of them or of all—such as the heavens and their parts, stars, moon, and sun. But whether these alone are substances, or there are others too; or some of these and others too; or none of these but some others, must be examined. Some people think that the limits of a body—surface, line, point, and unit—are substances, and more so than the body and the solid. Further, some think there is nothing of this kind besides perceptible things, while others think there are more things, and that they are more fully beings because they are eternal. Plato, for instance, thinks the Forms and the mathematical objects are two kinds of substance, and the third is the sub-

stance of perceptible bodies. Speusippus posits still more substances, beginning from the One, and principles for each substance: one for numbers, another for magnitudes, then another for soul; and in this way he extends the substances. And some say that the Forms and the numbers have the same nature, and that the other things follow on from them—lines and planes—all the way to the substance of the heavens and to perceptible things.[2] Concerning these matters, then—what is said well or not well, which things are substances, whether there are some besides perceptible substances or not, and how these exist, and whether there is some separable substance, and if so why and how, or none, besides the perceptible ones—we must inquire, after first sketching out what substance is.

### SUBSTANCE AS THE UNDERLYING SUBJECT

*If substance is the ultimate subject, matter seems to be substance, which is impossible.*

Substance is said, if not in more ways, at least chiefly in four. For the essence, the universal, and the genus are thought to be the substance of each thing, and fourth among these the underlying subject. The underlying subject is that of which the other things are said, while it itself is no longer said of anything else. This is why we must first make distinctions about it; [1029a] for the primary underlying subject seems most of all to be substance. In one sense, matter is said to be of this kind; in another, shape; and in a third, what is composed of these. (By matter I mean, for instance, the bronze; by shape, the figure of its form; and by what is composed of these, the statue, the composite.) So if the form is prior to the matter and more fully a being, it will also, by the same argument, be prior to what is composed of both. We have now said in outline what substance is: that it is what is not said of an underlying subject, but of which the other things are said. But we must not leave it only at this, for it is not enough. This very claim is unclear, and further, matter turns out to be

2 Speusippus, Plato's nephew, headed the Academy after Plato's death in 347 BC.

substance. For if matter is not substance, what other substance there is eludes us. When everything else is stripped away, nothing appears to remain. For the other things are affections, products, and capacities of bodies, and length, breadth, and depth are quantities of a sort, not substances (for quantity is not substance); rather, what these belong to primarily is substance. But when length, breadth, and depth are taken away, we see nothing left over, unless there is something that is bounded by these; so to those who look at it this way, matter must appear to be the only substance. By matter I mean what in its own right is said to be neither a something nor a quantity nor anything else by which being is defined. For there is something of which each of these is predicated, whose being is different from that of each of the categories. (For the other categories are predicated of substance, and substance of matter.) So the ultimate subject is in its own right neither a something nor a quantity nor anything else. Nor is it the negations of these, since these too will belong to it accidentally. From these considerations, then, it follows that matter is substance. But this is impossible; for being separable and being a "this" are thought to belong most of all to substance. This is why form and what is composed of both would seem to be substance more than matter is. The substance composed of both—I mean composed of matter and shape—should be set aside, since it is posterior and clear. Matter, too, is in a way evident. But we must examine the third, since this is the most puzzling. It is agreed that some perceptible things are substances, so we should look for it first among these. [1029b] For it is useful to proceed toward what is more knowable. Learning always takes place in this way, for everyone: through what is less knowable by nature toward what is more knowable. And this is our task: just as in action the task is to start from what is good for each person and make what is good without qualification good for each, so here the task is to start from what is more knowable to oneself and make what is knowable by nature knowable to oneself. But what is knowable and primary for particular people is often barely knowable, and has little or nothing of being. All the

same, starting from what is poorly known but known to oneself, we must try to know what is knowable without qualification, proceeding, as has been said, through these very things.

## ESSENCE

*The essence of a thing is what it is said to be in its own right.*

Since at the start we distinguished the number of ways in which we define substance, and one of these was thought to be the essence, we must study it. And first let us say some things about it in the abstract: that the essence of each thing is what it is said to be in its own right. For being you is not being musical, since you are not musical in your own right. Your essence, then, is what you are in your own right. But not even all of this: not what is in its own right in the way that white belongs to a surface, since being a surface is not being white. But neither is it the combination of both, being a white surface, because the thing itself is added.[3] The account, then, in which the thing itself will not be present, but which expresses it—this is the account of the essence of each thing. So if being a white surface were the same as being a smooth surface, then being white and being smooth would be one and the same. But since there are also composites in the other categories (for there is some underlying subject for each, such as for quality, quantity, time, place, and motion), we must examine whether there is an account of the essence of each of them, and whether an essence belongs to these too—to white human being, for instance. Let the name for this be "cloak." What is being a cloak? But surely this is not among the things said in their own right either. Or is it that "not in its own right" is said in two ways, and of this one kind arises from addition and the other not? The one is said because the thing being defined is itself added to something else: if, for instance, someone defining being white were to state the account of white human being. The other because something else is added to it:

3 Aristotle uses phrases like "being you" (*to soi einai*) for the essence of a particular thing.

if, for instance, "cloak" signified white human being, and someone defined cloak as white. A white human being is white, 1030a but its essence is not being white. But is being a cloak an essence at all? Or not? For the essence is precisely a "this"; but when one thing is said of another, the result is not precisely a "this." A white human being, for instance, is not precisely a "this," if indeed "this" belongs only to substances. So there is an essence of those things whose account is a definition. And there is a definition not where a name signifies the same as an account (for then all accounts would be definitions, since there will be a name for any account whatever, so that even the *Iliad* will be a definition), but where the account is of something primary; and such things are those said not by one thing's being said of another. So essence will belong to nothing except species of a genus, and to these alone (for these are thought to be said not by participation or as an affection or as an accident). For everything else too, if it has a name, there will be an account of what it signifies—that this belongs to that—or instead of a simple account a more precise one; but there will be no definition or essence. Or is it that definition, like the what-it-is, is said in several ways? For the what-it-is in one sense signifies the substance and the "this," and in another each of the things predicated—quantity, quality, and the others of this kind. For just as "is" belongs to all things, but not in the same way—to one primarily, to the others derivatively—so too the what-it-is belongs without qualification to substance, and in a way to the other things. For we might ask of a quality too what it is, so that quality is also among the what-it-is's—but not without qualification. Rather, just as in the case of not-being some people say, speaking in the abstract, that not-being is—not without qualification, but is not-being—so too with quality. We must examine how one ought to speak about each thing, then, but no more than how things actually are. This is why now, since what is being said is evident, essence too will similarly belong primarily and without qualification to substance, and then to the other things as well, just as the what-it-is does: not essence without qualification, but the

essence of a quality or of a quantity. For we must say that these are beings either homonymously, or by adding and subtracting qualifications, in the way that the unknowable is knowable. The correct thing is to say they are neither homonymous nor the same, but as with "medical": related to one and the same thing, but not being one and the same thing, and yet not homonymous either. 1030b For a body, an operation, and an instrument are called medical neither homonymously nor in virtue of one meaning, but by relation to one thing. But it makes no difference which way one wants to speak of these things. What is evident is that definition and essence in the primary and unqualified sense belong to substances. Still, they belong similarly to the other things as well, only not primarily.[4] For if we posit this, it is not necessary that there be a definition of whatever signifies the same as an account, but only as a certain kind of account; and this is if it is an account of something one—not one by continuity, like the *Iliad*, or like things bound together by a connective, but one in one of the ways in which "one" is said. And "one" is said in the same ways as "being"; and being signifies in one sense a "this," in another a quantity, in another a quality. This is why there will also be an account and a definition of white human being, but in a different way from that of white and of substance.

### THE SNUB NOSE

*Coupled terms like "snub" resist definition, so definition belongs chiefly to substance.*

There is a puzzle, if one denies that an account arising from addition is a definition: of which things that are not simple but coupled will there be a definition? For these must be made clear by addition. I mean, for instance: there is nose and concavity, and snubness, which is said from the two by one being in the other; and neither concavity nor snubness is an affection of the nose accidentally, but in its own right—not as pale belongs to

4 "Homonymously" means by sharing a name but not a meaning, as with a pun.

Callias or to a human being, because Callias, who happens to be a human being, is pale, but as male belongs to animal and equal to quantity, and all the things said to belong in their own right. These are the things in which there is present either the account or the name of that of which this is an affection, and which cannot be made clear separately, as pale can be without human being but female cannot be without animal. So either there is no essence and definition of any of these, or, if there is, it is in another way, as we have said. And there is also another puzzle about them. For if a snub nose and a concave nose are the same, snub and concave will be the same. But if not—because it is impossible to speak of the snub without the thing of which it is an affection in its own right (for snubness is concavity in a nose)—then either it is impossible to say "snub nose," or the same thing will have been said twice, "concave nose nose" (for the snub nose will be a concave nose nose). This is why it is absurd for things of this kind to have an essence. Otherwise there will be an infinite regress, for in a snub nose nose there will be yet another nose. 1031a It is clear, then, that there is definition of substance alone. For if there is definition of the other categories as well, it must come from addition, as with the snub and the odd; for the odd is not without number, nor the female without animal. (By "from addition" I mean the cases in which one ends up saying the same thing twice, as in these.) And if this is true, there will not be definitions of coupled terms either, such as "odd number"; but it goes unnoticed that the accounts are not stated precisely. If there are definitions of these too, then either they are definitions in another way, or, as we said, definition and essence must be said to be spoken of in many ways. So in one way there will be no definition of anything, and essence will belong to nothing except substances; in another way there will be.[5] It is clear, then, that definition is the account of the essence, and that essence belongs either to substances alone or to them most of all, primarily, and without qualification.

5 The manuscripts read "the qualitative" here, probably a corruption; the argument needs an example like the snub.

### IS A THING THE SAME AS ITS ESSENCE?

*Primary things spoken of in their own right are one with their essence.*

We must consider whether each thing and its essence are the same or different. For this is of some use for our inquiry into substance, since each thing seems to be nothing other than its own substance, and the essence is said to be the substance of each thing. Now in the case of things spoken of accidentally, they would seem to be different. A pale human being, for instance, is different from being a pale human being. (For if they were the same, being a human being and being a pale human being would also be the same; for a human being and a pale human being are the same, as people say, so being a pale human being and being a human being would be the same too. Or is it not necessary that things that are accidentally the same be the same in this way, since the extremes do not become the same in the same manner? But perhaps it might seem to follow that the extremes, the accidental ones, do become the same—being pale and being musical, for instance. But it seems not.) In the case of things spoken of in their own right, on the other hand, must a thing and its essence be the same? Suppose, for instance, there are substances to which no other substances or natures are prior, such as some say the Forms are. For if the good itself is going to be different from being good, and animal from being animal, and being from being being, [1031b] there will be other substances and natures and Forms beyond those that are spoken of, and those others will be prior substances, if the essence is substance. And if they are detached from one another, there will be no knowledge of the one, and the others will not be beings. (By "detached" I mean if being good does not belong to the good itself, nor being good to this.) For we have knowledge of each thing when we know its essence. And it is the same with the good as with everything else: if being good is not good, then being being is not a being, nor being one one. And either all essences are alike or none is, so that if being being is

not a being, neither is any of the others. Further, that to which being good does not belong is not good. Necessarily, then, the good and being good are one, and the beautiful and being beautiful, and all the things that are not spoken of by reference to something else but in their own right and primarily. For this is enough, if it holds, even if there are no Forms—and perhaps all the more if there are Forms. (At the same time it is clear too that if the Forms are such as some say they are, the underlying subject will not be substance. For these must be substances, but not predicated of an underlying subject; for then they would exist by participation.)—So from these arguments each thing itself and its essence are one and the same, and not accidentally; and also because to know each thing is precisely to know its essence. So even by setting them out one by one it is necessary that both be some one thing. (But of what is spoken of accidentally, such as the musical or the pale, because it signifies two things, it is not true to say that the essence and the thing itself are the same. For both that to which pale belongs accidentally and the accident are pale, so that in one way the essence and the thing itself are the same and in another way they are not: they are not the same for the human being and the pale human being, but they are the same for the affection.) The absurdity would also be apparent if one were to give a name to each of the essences; for there will be yet another beside that one—beside the essence of horse, for instance, there will be a different essence. And yet what prevents some things from being essences straight off, right now, if the essence is substance? Moreover, not only are they one, but their account is also the same, as is clear from what has been said; [1032a] for it is not accidentally that being one and the one are one. Further, if they are to be different, there will be an infinite regress: there will be the essence of the one, and the one, so that the same argument will apply to those too. It is clear, then, that in the case of things that are primary and spoken of in their own right, being each thing and each thing are the same and one. And it is evident that the sophistical refutations brought against this thesis are resolved by the same solu-

tion as the question whether Socrates and being Socrates are the same; for there is no difference either in the premises from which someone might ask the question or in those from which one might succeed in resolving it. We have said, then, in what way the essence is the same as each thing and in what way it is not.

### HOW THINGS COME TO BE

*Everything that comes to be does so by nature, craft, or spontaneity, from matter.*

Of things that come to be, some come to be by nature, some by craft, and some spontaneously. And everything that comes to be comes to be by the agency of something, from something, and comes to be something. By "something" I mean in each of the categories: either a "this," or a quantity, or a quality, or somewhere. Natural comings-to-be are those of things whose coming to be is from nature. That from which they come to be is what we call matter; that by which they come to be is one of the things that exist by nature; and what they come to be is a human being or a plant or something else of that kind, which are just the things we say are substances most of all. (Everything that comes to be, whether by nature or by craft, has matter; for each of them is capable both of being and of not being, and this capacity is the matter in each.) In general, both that from which they come is nature and that in accordance with which they come is nature, for what comes to be has a nature, as a plant or an animal does; and that by which they come is the nature spoken of as form, the same in form as what comes to be, though present in another thing—for a human being begets a human being. This, then, is how the things that come to be through nature come to be; the other comings-to-be are called makings. All makings are from craft, or from a capacity, or from thought. Some of them also come about spontaneously and by luck, much as happens among the things that come to be from nature; for there too some of the same things come to be both from seed

and without seed. These we must examine later. [1032b] From craft come the things whose form is in the soul. (By "form" I mean the essence of each thing and its primary substance.) For in a way even contraries have the same form, since the substance of a privation is the opposed substance—health, for instance, is the substance of disease, since disease is the absence of health. And health is the account in the soul, and the knowledge. What is healthy comes to be when the doctor thinks as follows: since health is this, then if the patient is to be healthy, this must be present—evenness, for instance—and if this, then heat. And he keeps thinking in this way until he arrives at the last thing, something he can himself make. Then the motion from this point onward, toward being healthy, is called making. So it turns out that in a way health comes from health and a house from a house—the one with matter from the one without matter. For medicine and housebuilding are the form of health and of the house; and by substance without matter I mean the essence.

Of comings-to-be and motions, one part is called thinking and the other making: the part that starts from the starting point and the form is thinking, and the part that starts from the last step of thinking is making. And each of the other, intermediate things comes about in the same way. I mean, for instance: if he is to be healthy, he would have to be made even. What, then, is being made even? This; and this will come about if he is heated. And what is that? This. And this is present potentially, and it is already up to him. So the thing that makes, and from which the motion of becoming healthy begins, is the form in the soul, if it comes from craft. If it comes about spontaneously, it begins from whatever it is that begins the making for the person who makes by craft—just as in healing, perhaps, the starting point is heating, which he produces by rubbing. The heat in the body, then, is either a part of health, or something follows it which is of this kind—a part of health—either directly or through several steps. And this last thing, the thing that makes the part of health, is a part—and likewise the stones are a part of the house, and so with the other cases. So, as the saying goes, it is

impossible for anything to come to be if nothing pre-exists. It is evident, then, that some part must be present of necessity; for the matter is a part, since it is present in the thing and it is what becomes something. [1033a] But is there also a part of what is in the account? In fact we say what bronze circles are in both ways: we say of the matter that it is bronze, and of the form that it is such-and-such a figure; and this figure is the genus in which it is first placed. So the bronze circle has its matter in its account.—As for that from which, as matter, some things come to be, when they have come to be they are called not "that" but "that-en." A statue, for instance, is called not stone but stonen. But a human being who becomes healthy is not called by the name of that from which he came. The reason is that he comes to be both from the privation and from the underlying subject, which we call matter (for instance, both the human being and the sick person become healthy); but he is said to come to be from the privation rather than from the subject—healthy from sick, rather than from human being. That is why the healthy person is not called sick, but is called a human being, and the human being is called healthy.[6] But where the privation is obscure and has no name—in bronze, for instance, the privation of some particular shape, or in bricks and timbers the privation of a house—the thing seems to come to be from these in the way that, in the other case, the healthy comes from the sick. So just as there a thing is not called by the name of that from which it came, so here the statue is not called wood but by a derived word, "wooden," and "bronze" in the sense of made of bronze but not "bronze," and "stonen" but not "stone," and the house is "brick-built" but not "bricks." For if one looks closely, one would not say without qualification that a statue comes to be from wood or a house from bricks, since that from which a thing comes to be

6 Aristotle points to Greek material adjectives (like English "wooden," "golden"); "stonen" imitates the form.

must change, not remain.[7] This, then, is why we speak in this way.

### FORM DOES NOT COME TO BE

*The maker makes the composite, not the form, so separate Forms are useless for generation.*

What comes to be comes to be by the agency of something (by this I mean that from which the beginning of the coming-to-be comes), and from something (let this be not the privation but the matter, for we have already distinguished in what sense we say this), and it comes to be something (a sphere, or a circle, or whatever else it may be). Now just as the maker does not make the underlying subject, the bronze, so he does not make the sphere either, except accidentally, because the bronze sphere is a sphere and he makes that. For to make a "this" is to make a "this" out of the underlying subject in the full sense. (I mean that to make the bronze round is not to make the round or the sphere, but something else, namely this form in something else. For if one made the form, one would make it from something else, since this was assumed; [1033b] for instance, one makes a bronze sphere, and one makes it in the sense that from this, which is bronze, one makes this, which is a sphere.) So if one makes this too, clearly one will make it in the same way, and the comings-to-be will go on to infinity. It is evident, then, that the form too—or whatever one should call the shape in the perceptible thing—does not come to be, and there is no coming-to-be of it; nor does the essence come to be. For this is what comes to be in something else, whether by craft or by nature or by a capacity. But the maker does make there be a bronze sphere; for he makes it out of bronze and sphere, since he makes the form into this, and this is a bronze sphere. But if there is to be a coming-to-be of being a sphere in general, something will come from something. For what comes to be will always have to be divis-

7 Greek distinguishes *chalkos* ("bronze," the stuff) from the adjective *chalkous* ("made of bronze"), which English cannot mark.

ible, and one part will have to be this and the other that—I mean one part matter and the other form. So if a sphere is the figure whose points are equidistant from the center, one part of it will be that in which what he makes will be, another will be what is in that, and the whole will be the thing that has come to be, such as the bronze sphere. It is evident, then, from what has been said, that what is called form or substance does not come to be, whereas the composite, which is named after it, does come to be; and that in everything that is generated there is matter, and one part is this, the other that.—Is there, then, some sphere beyond these spheres here, or a house beyond the bricks? Or rather, if it were so, no "this" would ever have come to be. Instead, the form signifies a "such," and is not a "this" and determinate; but the maker makes or begets a "such" out of a "this," and when it has been begotten it is a "this such." The whole "this," Callias or Socrates, is like this bronze sphere here, while human being and animal are like bronze sphere in general. It is evident, then, that the causation by the Forms, in the way some are accustomed to speak of the Forms—if they are some things beyond the particulars—is of no use, at any rate with regard to comings-to-be and substances; nor would they be substances in their own right, at least for these reasons. In some cases it is even evident that what begets is of the same kind as what is begotten, though not the same, nor one in number, but one in form—as in natural things, for a human being begets a human being—unless something comes about contrary to nature, as when a horse begets a mule. (Even these cases are similar; for what would be common to horse and donkey, the genus immediately above them, has not been named, but it would perhaps be both, something like a mule.) 1034a So it is evident that there is no need to set up a Form as a paradigm (for these would be sought especially in these cases, since these are substances most of all). Rather, the begetter is enough to make the thing and to be the cause of the form in the matter. The whole, then—such-and-such a form in this flesh and these bones—is Callias or Socrates. And they are differ-

ent because of their matter, since that is different, but the same in form, for the form is indivisible.

### CRAFT, SPONTANEITY AND SEED

*Why some things arise both by craft and spontaneously, and how like produces like.*

One might raise the puzzle why some things come to be both by craft and spontaneously, health for instance, while others do not, a house for instance. The reason is that in some cases the matter that begins the coming-to-be in the making and coming-to-be of things produced by craft, the matter in which some part of the thing is present, is of a kind that can be moved by itself, while in other cases it is not; and of the matter that can be, some can be moved in this particular way and some cannot. For many things can move themselves, but not in this particular way—to dance, for instance. Things whose matter is of this kind, such as stones, cannot be moved in this particular way except by something else; but in that other way they can—and so with fire. This is why some things will not exist without someone who has the craft, while others will. For they will be moved by things that do not have the craft but can themselves be moved by other things that do not have the craft, or from a part. It is also clear from what has been said that in a way everything comes to be from something that shares its name, as natural things do, or from a part that shares its name (as a house comes from a house, insofar as it comes from intellect, for the craft is the form), or from something that has a part—unless it comes to be accidentally. For the cause of the making, the primary cause in its own right, is a part. For the heat in the motion produced heat in the body; and this is either health or a part of it, or some part of health follows it, or health itself does. That is also why it is said to make health: because that which heat follows and accompanies makes it. So, just as in syllogisms, substance is the starting point of everything: syllogisms proceed from the what-it-is, and here comings-to-be do. And things constituted by nature are in the

same position as these. For the seed makes things in the way the products of craft are made. It has the form potentially, [1034b] and that from which the seed comes shares its name in a way—for we must not expect everything to be as a human being comes from a human being, since a woman too comes from a man—unless there is a deformity; that is why a mule does not come from a mule. Things that come to be spontaneously, as in the other case, are those whose matter can also be moved by itself with the motion that the seed imparts; things whose matter cannot do this cannot come to be in any other way than from parents of their own kind.—And it is not only concerning substance that the argument shows that the form does not come to be; the argument applies in common to all the primary things alike, such as quantity, quality, and the other categories. For just as the bronze sphere comes to be, but not the sphere or the bronze—and so with bronze, if it comes to be, for the matter and the form must always pre-exist—so it is with the what-it-is, and likewise with quality and quantity and the other categories. For it is not the quality that comes to be but the wood of that quality, nor the quantity but the wood or the animal of that quantity. But we can gather from these points what is peculiar to substance: that there must pre-exist another substance, existing in actuality, which makes it—an animal, for instance, if an animal comes to be. With a quality or a quantity this is not necessary; it need pre-exist only potentially.

### PARTS OF THE ACCOUNT AND PARTS OF THE THING

*Parts of the form are prior to the whole; material parts are posterior.*

Since a definition is an account, and every account has parts, and as the account is to the thing, so the part of the account is to the part of the thing, the puzzle now arises whether the account of the parts must be present in the account of the whole or not. In some cases they appear to be present, in others not. The account of the circle does not contain that of the segments, but the account of the syllable contains that of the letters; and yet

the circle is divided into its segments just as the syllable is divided into its letters. Further, if the parts are prior to the whole, and the acute angle is a part of the right angle and the finger a part of the animal, then the acute angle would be prior to the right angle and the finger to the human being.[8] But the latter seem to be prior; for the former are defined in their account from the latter, and the latter are also prior in being able to exist without the former.—Or is it that "part" is said in many ways, one of which is what measures by quantity? But let us set this aside; what we must examine is what the parts are from which substance is composed. 1035a If, then, there is matter, and form, and what is composed of these, and both matter and form and what is composed of these are substance, then there is a sense in which even matter is called a part of something, and a sense in which it is not; rather, the parts are those of which the account of the form consists. For instance, flesh is not a part of concavity (for flesh is the matter in which concavity comes about), but it is a part of snubness. And the bronze is a part of the composite statue, but not of the statue spoken of as form. (For we should speak of the form, and of each thing insofar as it has form, but never of the material aspect in its own right.) That is why the account of the circle does not contain that of the segments, while the account of the syllable contains that of the letters. For the letters of the account are parts of the form and not matter, whereas the segments are parts in the way that matter is, the matter in which the form comes about—though they are closer to the form than the bronze is, when roundness comes about in bronze. But there is a sense in which not all the letters will be present in the account of the syllable either—these particular wax letters, for instance, or the ones in the air; for these too are already part of the syllable as perceptible matter. For even if a line is destroyed when divided into halves, or a human being when divided into bones and sinews and flesh, it does not follow that they are composed of these as parts of their substance, but as of matter; these are parts of the composite, but no longer of

8 *Stoicheion* means both "letter" and "element."

the form and of that of which there is an account. That is why they are not in the accounts either. So in some accounts the account of such parts will be present, but in others it need not be, unless the account is of the thing taken together with matter. For this is why some things are composed of the things into which they perish as their principles, and some are not.[9] Things in which the form and the matter are taken together, such as the snub or the bronze circle, perish into these, and matter is a part of them. But things that are not taken together with matter but are without matter, whose accounts are of the form alone, do not perish—either not at all, or at least not in this way. So these are principles and parts of the former things, but of the form they are neither parts nor principles. And that is why the clay statue perishes into clay, and the sphere into bronze, and Callias into flesh and bones, and further the circle into its segments; for there is a kind of circle that is taken together with matter. 1035b For the circle spoken of without qualification and the particular circle are called "circle" homonymously, because the particulars have no name of their own.—The truth has now been stated, but let us state it still more clearly by taking it up again. The parts of the account, into which the account is divided, are prior, either all of them or some. The account of the right angle is not divided into the account of the acute angle; rather, the account of the acute angle is divided into the right angle. For whoever defines the acute angle uses the right angle, since the acute angle is "less than a right angle." It is the same with the circle and the semicircle: the semicircle is defined by the circle, and the finger by the whole, for a finger is "such-and-such a part of a human being." So the parts that are parts as matter, and into which the thing is divided as into matter, are posterior; but those that are parts as of the account and of the substance according to the account are prior, either all of them or some. The soul of animals (for this is the substance of what is ensouled) is the substance according to the account, and the form and essence of a body of this kind. (At any rate, each part, if it is defined well,

9 Letters "in the air" are spoken sounds; wax letters are written on a wax tablet.

will not be defined without its function, which it will not have without perception.) So the parts of the soul are prior, either all of them or some, to the composite animal, and likewise in each particular case; whereas the body and its parts are posterior to this substance, and what is divided into them as into matter is not the substance but the composite. These parts, then, are in one way prior to the composite and in another way not, since they cannot even exist when separated. For it is not a finger in any state whatever that is the finger of an animal; a dead finger is a finger only homonymously. Some parts, though, are simultaneous with the whole: those that are in control, in which the account and the substance are primarily present—the heart, for instance, or the brain, whichever of the two is of this kind; it makes no difference. But human being and horse and things applied in this way to particulars, but universally, are not substance, but a kind of composite of this account and this matter, taken universally. Socrates, as a particular, is already composed of the ultimate matter, and likewise in the other cases.—There are parts, then, of the form (by form I mean the essence), and of the composite of form and matter, and of the matter itself. But only the parts of the form are parts of the account, and the account is of the universal; [1036a] for being a circle and circle, and being a soul and soul, are the same. But of the composite—this circle, say, one of the particular circles, whether perceptible or intelligible (by intelligible I mean, for instance, the mathematical ones, and by perceptible, for instance, the bronze and the wooden ones)—of these there is no definition. They are known with thought or perception, and when they pass out of actuality it is not clear whether they exist or not; but they are always spoken of and known by the universal account. Matter is unknowable in its own right. And some matter is perceptible, some intelligible: perceptible, like bronze and wood and any matter capable of motion; intelligible, the matter present in perceptible things but not insofar as they are perceptible—mathematical objects, for instance. We have said, then, how things stand with whole and part, and with prior and posterior. But when

someone asks whether the right angle and the circle and the animal are prior, or the things into which they are divided and of which they are composed, the parts, we must meet the question by saying that there is no unqualified answer. For if the soul too is the animal, or the ensouled thing—or each thing's soul is the thing—and the circle is being a circle, and the right angle is being a right angle and the substance of the right angle, then we must say that a whole is in one sense posterior to parts in one sense—to the parts in its account, for instance, and to those of a particular right angle. (For both the right angle with matter, the bronze right angle, and the one in particular lines are posterior.) The right angle without matter is posterior to the parts in its account but prior to the parts in the particular; but we must not give an unqualified answer. If, on the other hand, the soul is something different and is not the animal, then in this case too we must say that some are prior and some are not, as has been said.

### WHICH PARTS BELONG TO THE FORM?

*Whether flesh and bones belong to the form of human being, and a warning against abstracting from matter.*

It is also reasonably a puzzle which parts belong to the form and which do not, but to the thing taken together with matter. And yet if this is not clear, it is not possible to define each thing; for definition is of the universal and of the form. So if it is not evident which of the parts are parts as matter and which are not, neither will the account of the thing be evident. In the case of things that plainly come about in materials different in kind, as a circle does in bronze and stone and wood, it seems clear that the bronze and the stone are no part of the substance of the circle, because the circle is separated from them. But as for things that are not seen separated, nothing prevents them from being in the same position as these—just as if all the circles one saw were bronze; [1036b] for the bronze would be no less no part of the form, though it would be hard to remove it in thought. For

example, the form of human being always appears in flesh and bones and parts of that kind. Are these, then, also parts of the form and of the account? Or are they not, but matter—though because the form does not also come about in other materials, we are unable to separate it? Since this seems possible, but it is unclear when it is the case, some people already raise puzzles even about the circle and the triangle, on the ground that it is not appropriate to define them by lines and by the continuous, but that these too are all spoken of in the same way as flesh and bones are of the human being, and bronze and stone of the statue. And they reduce everything to the numbers, and say that the account of line is that of two. Of those who speak of the Forms, some say the dyad is line-itself, others that it is the Form of line; for in some cases, they say, the Form and that of which it is the Form are the same (the dyad and the Form of the dyad, for instance), but in the case of line this no longer holds. It follows that there is one form of many things whose form evidently differs (which is just what befell the Pythagoreans), and that it is possible to make one thing the form itself of all things and the others not forms. And yet in that way all things will be one.

We have said, then, that questions about definitions involve a certain puzzle, and for what reason. That is why reducing everything in this way and removing the matter is wasted effort; for some things, presumably, are this in that, or these things in this state. And the comparison in the case of the animal, which Socrates the Younger used to make, is not a good one. For it leads away from the truth, and makes one suppose that a human being can exist without his parts, as the circle can without the bronze. But the case is not similar. For an animal is something perceptible, and it cannot be defined without motion, and so not without its parts being in a certain state. For it is not a hand in any state whatever that is a part of a human being, but the hand that is able to perform its function, and so one that is ensouled; if it is not ensouled, it is not a part.[10] But in mathematics, why

10 Socrates the Younger was a mathematician in Plato's Academy, a participant in Plato's *Statesman*.

are the accounts of the parts not parts of the accounts of the wholes—why, for instance, are the semicircles not parts of the account of the circle? After all, these are not perceptible. Or does this make no difference? For there will be matter even of some things that are not perceptible; 1037a indeed there is matter of everything that is not an essence and a form itself by itself, but a "this." So the semicircles will not be parts of the universal circle, but they will be parts of the particular circles, as was said before; for some matter is perceptible, some intelligible. It is clear too that the soul is the primary substance and the body is matter, while human being or animal is the compound of both, taken universally. As for Socrates and Coriscus, if Socrates is also his soul, the term is twofold (for some use it of the soul, some of the composite); but if it simply means this soul and this body, then as with the universal, so with the particular. Whether there is some other substance beyond the matter of such substances, and whether we should look for some different substance, such as numbers or something of that kind, must be examined later. For it is for the sake of this that we are also trying to reach distinctions about perceptible substances, since in a way the study of perceptible substances is the work of natural philosophy, that is, of second philosophy. For the student of nature must know not only about the matter but also about the substance according to the account—and this even more. As for definitions, in what way the items in the account are parts, and why the definition is one account (for clearly the thing is one; but by virtue of what is the thing one, given that it has parts?), this must be examined later.

What the essence is, then, and how it is itself by itself, has been stated universally for every case; and also why the account of the essence of some things contains the parts of the thing defined while that of others does not; and that in the account of the substance the parts that are parts as matter will not be present—for they are not parts of that substance but of the composite substance, and of this there is in a way an account and in a way not. With the matter there is none, since matter is indefin-

ite; but according to the primary substance there is—of a human being, for instance, the account of the soul. For substance is the form present in the thing, from which, together with the matter, the composite substance is so called—concavity, for instance. (For from this and the nose come the snub nose and snubness; for nose will be present twice in these.) But in the composite substance, such as a snub nose or Callias, the matter will also be present. And we have said that the essence and the thing itself are in some cases the same, [1037b] as with primary substances—for instance, curvature and being curvature, if it is primary. (By "primary" I mean what is not spoken of by one thing's being in another, in an underlying subject as matter.) But things that are as matter, or taken together with matter, are not the same as their essence—not even if they are accidentally one, like Socrates and the musical; for these are the same accidentally.

## THE UNITY OF DEFINITION

*What makes a definition one; definition by division ends in the last differentia.*

Now let us first discuss definition to the extent that it has not been discussed in the *Analytics*. For the puzzle stated there is of use for our discussions of substance. I mean this puzzle: why on earth is that thing one whose account we call a definition—as, for instance, of human being, "two-footed animal"? Let this be its account.[11] Why, then, is this one and not many, animal and two-footed? In the case of human being and pale, there are many when the one does not belong to the other, but one when it belongs and the underlying subject, the human being, has an affection; for then they become one, and there is the pale human being. Here, however, the one does not participate in the other; for the genus does not seem to participate in its differentiae, since then the same thing would participate in contraries at once, for the differentiae by which the genus is differentiated are contraries. And even if it does participate, the same argu-

11 The *Posterior Analytics* (Book II) discusses definition.

ment applies, if the differentiae are several—footed, two-footed, featherless, for instance. Why are these one and not many? Not because they are present in one thing; for in that way one thing will be made of all of them. Yet the items in the definition must be one; for the definition is an account that is one and of substance, so it must be the account of some one thing, since substance signifies something one and a "this," as we say.—We must first examine definitions reached by divisions. For there is nothing else in the definition but the genus mentioned first and the differentiae. The other genera are the first genus together with the differentiae taken along with it: for instance, the first is animal, the next two-footed animal, and again two-footed featherless animal; and likewise if it is stated through more terms. 1038a In general, it makes no difference whether it is stated through many terms or through few, and so none whether through few or through two. Of the two, one is differentia and the other genus: in "two-footed animal," for instance, animal is the genus and the other is the differentia. If, then, the genus does not exist at all without qualification beyond the species that belong to the genus, or if it exists but exists as matter (for vocal sound is genus and matter, and the differentiae make the species, that is, the letters, from it), it is evident that the definition is the account composed of the differentiae. But we must also divide by the differentia of the differentia. For instance, "footed" is a differentia of animal; next, the differentia of footed animal must be a differentia of it insofar as it is footed. So we should not say that of the footed one kind is feathered and another featherless, if we are to speak correctly (someone will do this out of inability), but only that one kind is split-footed and another not split. For these are differentiae of foot, since split-footedness is a kind of footedness. And in this way one wants to keep going until one comes to things that have no differentiae. Then there will be as many species of foot as there are differentiae, and the footed animals will be equal in number to the differentiae. If this is so, it is evident that the last differentia will be the substance of the thing and its definition, since we should not

say the same things several times in our definitions; that is superfluous. And yet this does happen. For when someone says "footed two-footed animal," he has said nothing other than "animal having feet, having two feet"; and if he divides this by its proper division, he will say it several times, as many times as there are differentiae. If, then, a differentia of a differentia is taken each time, one differentia, the last, will be the form and the substance. But if the division is by accidents—if, for instance, one were to divide the footed into the pale and the dark—there will be as many as there are cuts. So it is evident that the definition is the account composed of the differentiae, and, if it is done correctly, of the last of these. This would be clear if one were to rearrange such definitions—that of human being, for instance, saying "two-footed footed animal"; for "footed" is superfluous once "two-footed" has been said. But there is no order in the substance; for how are we to think of one element as posterior and another as prior? About definitions by division, then, let this much be said as a first account of what they are like.

## NO UNIVERSAL IS SUBSTANCE

*A universal is common to many and cannot be the substance of anything.*

1038b Since our inquiry is about substance, let us return to it. The underlying subject is said to be substance, and so are the essence and the compound of these, and the universal. We have discussed two of these—the essence and the underlying subject, of which we said that it underlies in two ways: either being a "this," as the animal underlies its affections, or as the matter underlies the actuality. But some also think that the universal is a cause most of all, and that the universal is a principle; so let us discuss this too. For it seems impossible for anything spoken of universally to be substance. First, the substance of each thing is the one that is peculiar to it, which does not belong to anything else; but the universal is common, since what is called universal

is what naturally belongs to more than one thing. Of which thing, then, will it be the substance? Either of all of them or of none. But it cannot be of all; and if it is to be of one, the others too will be this one, for things whose substance is one and whose essence is one are themselves one. Further, substance is what is not said of an underlying subject, but the universal is always said of some underlying subject. But perhaps the universal cannot be substance in the way the essence is, but is present in the essence, as animal is present in human being and horse? Then clearly there is some account of it. And it makes no difference even if there is not an account of everything in the substance; for this will be no less the substance of something, as human being is of the human being in which it is present, so that the same result will follow again: it will be the substance of that thing—animal, say—in which it is present as peculiar to it. Further, it is both impossible and absurd that a "this" and a substance, if it is composed of anything, should be composed not of substances or of a "this" but of a quality; for then what is not substance, the quality, will be prior to substance and to the "this." That is impossible; for neither in account nor in time nor in coming-to-be can affections be prior to substance, since then they would also be separable. Further, a substance will be present in Socrates, a substance, so that it will be the substance of two things. In general it follows, if human being and things spoken of in this way are substance, that nothing in the account is the substance of anything, or exists separately from them or in something else. I mean, for instance, that there is no animal beyond the particular animals, nor any other of the items in the accounts. If we study the matter from these points, then, it is evident that nothing that belongs universally is substance, and that none of the things predicated in common signifies a "this," [1039a] but a "such." Otherwise many other consequences follow, including the third man. It is also clear from this: it is impossible for a substance to be composed of substances present in it in actuality. For two things that are in actuality in this way are never one in actuality; but if they are two poten-

tially, they will be one (the double, for instance, is composed of two halves—potentially, that is, since actuality separates). So if substance is one, it will not be composed of substances present in it, and in this way what Democritus says is correct. He says that it is impossible for one thing to come to be from two or two from one; for he makes the indivisible magnitudes the substances.[12] Clearly, then, the same will hold of number too, if number is a combination of units, as some say it is. For either the dyad is not one, or there is no unit in it in actuality.—But the result involves a puzzle. For if no substance can be composed of universals, because they signify a "such" and not a "this," and if no substance can be composed of substances present in actuality, then every substance would be incomposite, so that there would be no account of any substance either. Yet everyone thinks, and it was said long ago, that there is definition either of substance alone or of substance most of all; and now it turns out there is not even of this. So there will be definition of nothing. Or perhaps in one way there will be and in another there will not. What is meant will become clearer from what follows.

### AGAINST FORMS COMPOSED OF GENUS AND DIFFERENTIA

*If Forms are substances, their genus and differentiae lead to absurdities.*

From these same points it is also evident what follows for those who say that the Forms are substances and separable, and at the same time make the Form out of the genus and the differentiae. For if there are Forms, and animal is present in human being and in horse, then it is either one and the same in number or different. In account, clearly, it is one; for whoever states the account goes through the same account in each case. If, then, there is a human being itself by itself that is a "this" and separated, then the things it is composed of, such as animal and two-

12 The "third man" is a regress argument against the Forms: if human beings share a Form of human being, a further Form is needed for them and that Form, and so on without end.

footed, must also signify a "this" and be separable and substances. So animal must be too. Now if the animal in the horse and in the human being is one and the same, as you are with yourself, how will the one that is in things that exist separately be one, [1039b] and why will this animal not also be separated from itself? Then, if it is to participate in two-footed and in many-footed, something impossible follows: contraries will belong at the same time to it, though it is one and a "this." And if it does not, what is the manner in which someone says that the animal is two-footed or footed? Perhaps they are put together and in contact, or mixed? But all of this is absurd. Suppose instead that the animal is different in each. Then there will be practically infinitely many things whose substance is animal; for it is not accidentally that human being is composed of animal. Further, animal itself will be many. For the animal in each species is substance, since it is not said by reference to anything else (otherwise human being would be composed of that other thing, and that would be its genus); and further, all the things of which human being is composed will be Forms. Now nothing will be the Form of one thing and the substance of another (that is impossible); so each of the animals in the animal species will be animal itself. Further, what will this animal be composed of, and how will it be composed of animal itself? Or how can the animal whose substance is just this exist beyond animal itself? Further, in the case of perceptible things these consequences follow, and others more absurd still. If, then, it is impossible for things to be so, it is clear that there are not Forms of these in the way some people say.

### INDIVIDUALS CANNOT BE DEFINED

*Neither perishable particulars nor the Forms can be defined.*

Since substance is of two kinds, the composite and the account (I mean that one kind of substance is the account taken together with the matter, the other the account in general), substances spoken of in the first way are subject to destruction, since they

are also subject to coming-to-be. But the account is not such as to be destroyed, since it does not come to be either (for being a house does not come to be, but only being this house); rather, accounts are and are not without coming-to-be and destruction, for it has been shown that no one begets or makes them. It is for this reason, too, that there is neither definition nor demonstration of particular perceptible substances: they have matter whose nature is such that it is capable both of being and of not being. That is why all the particular instances of them are perishable. Now demonstration is of what is necessary, and definition is a matter of scientific knowledge; and just as knowledge cannot be at one time knowledge and at another ignorance—it is opinion that is like that—so too demonstration and definition cannot be, but it is opinion that concerns what can be otherwise. [1040a] If so, it is clear that there could be neither definition nor demonstration of these things. For perishing things are unclear to those who have knowledge of them, once they have passed out of perception; and though the accounts are preserved in the soul, there will no longer be either definition or demonstration of them. That is why, in matters of definition, when someone is defining one of the particulars, he must not fail to recognize that his definition can always be overturned; for it is impossible to define them. Nor, indeed, is it possible to define any Form. For the Form, as they say, is a particular, and separable. But the account must be composed of words, and the one defining will not make up a word (for it would not be understood), and the established words are common to all the things they apply to. So these must also belong to something else. If someone were to define you, for instance, he will say you are a lean animal, or pale, or something else that will also belong to something else. If someone were to say that nothing prevents all the terms from belonging separately to many things but together to this alone, we must reply, first, that they also belong to both: "two-footed animal," for instance, belongs to animal and to two-footed. (In the case of eternal things this must even be so, since they are prior and parts of the compound; and

indeed they are separable, if human being is separable. For either neither is separable or both are. If neither is, the genus will not exist beyond the species; if it does, the differentia will too.) Second, that they are prior in being, and prior things are not destroyed along with what is posterior. Next, if Forms are composed of Forms (for the components are less composite), the components of the Form, such as animal and two-footed, will also have to be predicated of many things. If not, how will they be known? For there will then be some Form which cannot be predicated of more than one thing. But this is not what they think; they think every Form can be participated in. So, as has been said, it goes unnoticed that it is impossible to define in the case of eternal things, especially those that are unique, such as the sun or the moon. For people go wrong not only by adding the sort of attributes which, if removed, would still leave it the sun—"going round the earth," for instance, or "hidden at night" (for if it stood still or were visible at night, it would no longer be the sun; but it is absurd if it would not be, since "the sun" signifies a certain substance)—but also by adding attributes that can belong to something else: if, for instance, another thing of this kind were to come to be, clearly it would be a sun. So the account is common; [1040b] but the sun was supposed to be one of the particulars, like Cleon or Socrates. After all, why does none of them put forward a definition of a Form? It would become clear, if they tried, that what has just been said is true.[13]

### POTENTIALITIES, UNITY AND BEING

*Parts, elements, being and unity are not substances; the Forms rightly separate but wrongly universalize.*

It is evident too that most of the things thought to be substances are potentialities. So it is with the parts of animals (for none of them exists separated, and when they are separated, they too all exist only as matter), and earth and fire and air. For none of

13 Cleon was a leading Athenian politician of the Peloponnesian War, here simply an example of an individual.

them is one; each is like a heap, until they are worked up and something one comes to be from them. One might suppose above all that the parts of ensouled things, and the parts of the soul, come close to being both, existing both in actuality and in potentiality, because they have starting points of motion from something in their joints; that is why some animals live when divided. Still, they will all exist potentially when they are one and continuous by nature, and not by force or by growing together; for that sort of thing is a deformity.[14] Since "one" is said in the same ways as "being," and the substance of what is one is one, and things whose substance is one in number are one in number, it is evident that neither unity nor being can be the substance of things, just as being an element or a principle cannot either. But we ask what the principle is so that we may lead the inquiry back to something more knowable. Of these, then, being and unity are more substance than principle, element, and cause are; but not even these are substance yet, if indeed nothing else that is common is substance either. For substance belongs to nothing except itself and what has it, whose substance it is. Further, what is one cannot be in many places at once, but what is common belongs to many places at once; so it is clear that no universal exists separately beyond the particulars. But those who speak of the Forms are in one respect right to separate them, if they are substances, but in another respect wrong, because they say that the one over many is a Form. The reason is that they cannot say what these imperishable substances, beyond the particular and perceptible ones, are. So they make them the same in kind as the perishable ones (for these we know): the human being itself and the horse itself, adding the word "itself" to the perceptible things. And yet even if we had not seen the stars, 1041a they would no less, I think, have been eternal substances beyond the ones we knew. So now too, even if we cannot say what they are, it is still perhaps necessary that there be some. It is clear, then, that nothing spoken of univer-

14 "Worked up" renders a word meaning "cooked" or "digested," Aristotle's term for natural processes that unify material.

sally is substance, and that no substance is composed of substances.

### SUBSTANCE AS CAUSE

*Substance is the cause that makes matter a thing, as a syllable is more than its letters.*

What, and what sort of thing, we ought to say substance is, let us state by making a fresh start, as it were. For perhaps from this it will also become clear about that substance which is separated from perceptible substances. Since, then, substance is a kind of principle and cause, we must proceed from here. The "why" is always sought in this way: why does one thing belong to some other thing? For to ask why the musical human being is a musical human being is either to ask what has been said—why the human being is musical—or something else. Now to ask why a thing is itself is to ask nothing. (For the fact and the existence must already be clear—I mean, for instance, that the moon is eclipsed. But that a thing is itself is the one account and one cause for everything—why the human being is a human being, or the musical musical—unless one were to say that each thing is indivisible from itself, and this was what being one is; but this is a short answer that fits every case.) But one might ask why a human being is an animal of such-and-such a kind. Here, then, it is clear that one is not asking why he who is a human being is a human being. So one is asking why something belongs to something (that it belongs must be clear; if it is not, one is asking nothing)—for instance, why does it thunder? Why does a noise occur in the clouds? For in this way what is being sought is one thing said of another. And why are these things here—bricks and stones, say—a house? It is evident, then, that one is seeking the cause. This is the essence, to speak in terms of accounts; in some cases it is that for the sake of which, as perhaps with a house or a bed, and in others it is what first initiated the motion, for this too is a cause. But this second sort of cause is sought in the case of coming to be and perishing, the other in the case of

being as well. What is being sought escapes notice most of all where things are not said of one another— [1041b] as when one asks what a human being is—because the question is put simply and does not specify that these things are this. We must articulate the question before we search; otherwise it becomes something between seeking nothing and seeking something. Since the being of the thing must already be given and belong to it, it is clear that one is asking about the matter, why it is something. For instance, why are these things here a house? Because what it is to be a house belongs to them. And why is this a human being, or this body in this state? So what is sought is the cause of the matter—that is, the form—by which it is something; and this is the substance. It is evident, then, that in the case of simple things there is no seeking or teaching; there is another way of inquiring into such things.—Now take what is composed of something in such a way that the whole is one, not like a heap but like a syllable. The syllable is not its letters—ba is not the same as b and a—nor is flesh fire and earth; for when they are separated, the wholes, such as the flesh and the syllable, no longer exist, but the letters do, and so do fire and earth. The syllable, then, is something—not only its letters, the vowel and the consonant, but also something else; and flesh is not only fire and earth, or the hot and the cold, but also something else. If, then, that something must itself be either an element or composed of elements, then, if it is an element, the same argument will apply again: flesh will be composed of this and fire and earth and yet something else, so that it will go on to infinity. And if it is composed of elements, clearly it is composed not of one but of more than one, or else it will be that element itself; so again we shall use the same argument about it as about flesh or the syllable. But it would seem that this is something, and not an element, and that it is the cause of this being flesh and that a syllable, and similarly in the other cases. And this is the substance of each thing, since it is the primary cause of its being. (And since some things are not substances, but those that are substances are constituted in accordance with nature and by

nature, this nature too would appear to be substance, which is not an element but a principle.) An element is that into which a thing is divided and which is present in it as matter—the a and the b of the syllable, for instance.

# Book Eta (VIII)

*Matter, form, and sensible substance.*

## CHAPTER 1

1042a We must now draw conclusions from what has been said, gather up the main points, and bring the discussion to a close. We have said that what is sought are the causes and principles and elements of substances. Some substances are agreed on by everyone, but about some, certain people have declared their own views. The agreed ones are the natural substances, such as fire, earth, water, air, and the other simple bodies; next, plants and their parts, and animals and the parts of animals; and finally the heavens and the parts of the heavens. Certain people, however, say on their own account that the Forms and the objects of mathematics are substances. But it follows from our arguments that there are other substances: the essence and the underlying subject. Further, in another way, the genus seems more substance than the species, and the universal than the particulars. And with the universal and the genus the Forms are also connected, for they are thought to be substances by the same argument. Since the essence is substance, and its account is the definition, we have for this reason drawn distinctions about definition and about what is in its own right. And since the definition is an account, and an account has parts, it was necessary to consider parts as well—which are parts of the substance and which are not, and whether these are also parts of the definition. Further, neither the universal nor the genus is substance. The Forms and the objects of mathematics must be examined later, for some people say that these are substances

beyond the perceptible ones.—Now let us go through the agreed substances. These are the perceptible ones, and perceptible substances all have matter. The underlying subject is substance: in one way the matter (by matter I mean what, not being a "this" in actuality, is potentially a "this"); in another way the account and shape, which, being a "this," is separable in account; and third, what is composed of these, of which alone there is coming-to-be and perishing, and which is separable without qualification. For of the substances according to the account some are separable and some are not. That matter too is substance is clear. For in all changes between opposites there is something that underlies the changes. In change of place, for instance, there is what is now here and later elsewhere; in growth, what is now of this size and later smaller or larger; in alteration, what is now healthy and later sick. 1042b Likewise in change of substance, there is what is now in coming-to-be and later in perishing, now underlying as a "this" and later underlying as characterized by privation. The other changes follow this one, but this one does not follow either one or two of the others; for if something has matter for change of place, it does not necessarily also have matter for coming-to-be and perishing. What the difference is between coming to be without qualification and coming to be in a qualified way has been stated in our works on nature.[1]

### DIFFERENTIAE AS ACTUALITY

*Things are distinguished by position, time, blending, and other differences, which play the role of form.*

Since the substance that is the underlying subject and the matter is agreed on, and this is the substance that exists potentially, it remains to say what the substance of perceptible things is as actuality. Democritus seems to think there are three differences: the underlying body, the matter, is one and the same, but it differs either in rhythm, which is shape, or in turning, which is position, or in touching, which is order. But there evidently are

1 The reference is to Aristotle's *Physics* and *On Coming-to-Be and Passing-Away*.

many differences. For instance, some things are spoken of by the composition of their matter, as are those formed by blending, like honey-water; others by binding, like a bundle; others by glue, like a book; others by nails, like a box; others by more than one of these. Others are spoken of by position, like a threshold and a lintel (for these differ by lying in a certain way); others by time, like dinner and breakfast; others by place, like the winds. Others are spoken of by the affections of perceptible things, such as hardness and softness, density and rarity, dryness and wetness—some by some of these, others by all of them —and in general some by excess, others by deficiency.[2] So it is clear that "is" is also said in just as many ways. A threshold is, because it lies in this way, and its being signifies its lying in this way; and being ice is being solidified in this way. The being of some things will be defined by all of these: by some parts being mixed, some blended, some bound, some solidified, and some having the other differences, as with a hand or a foot. We must grasp, then, the kinds of differences, since these will be the principles of being—for instance, what differs by more and less, or by dense and rare and other such qualities; for all these are excess and deficiency. And if something differs by shape, or by smoothness and roughness, all these are cases of straight and curved. For other things, being will be their being mixed, and not being will be the opposite. 1043a It is clear from these considerations, then, that if substance is the cause of each thing's being, we must look among these differentiae for what causes each of these things to be. Now none of them is substance, not even when coupled with matter; but it is what is analogous to substance in each case. And just as among substances what is predicated of the matter is the actuality itself, so too, most of all, in the other definitions. If we had to define a threshold, for instance, we would say "wood or stone lying in such-and-such a position"; a house, "bricks and timbers lying in such-and-such a position" (or in some cases we would also add that for the sake of which); ice, "water frozen or solidified in such-and-such a

2 "Rhythm," "turning," and "touching" are Democritus' own terms.

way"; and harmony is "such-and-such a blend of high and low." And the same holds in the other cases. It is clear from this, then, that the actuality is different for different matter, and so is the account: in some cases it is composition, in others mixture, in others something else of those we have mentioned. That is why, among people who give definitions, those who say what a house is by saying "stones, bricks, timbers" are stating the potential house, since these are matter; those who propose "a receptacle that shelters goods and bodies," or something else of that sort, are stating the actuality; and those who put both together are stating the third kind of substance, the one composed of these. (For the account that goes through the differentiae seems to be an account of the form and the actuality, while the one drawn from the constituents seems to be rather of the matter.) The same is true of the sort of definitions Archytas used to accept, since they are of the combination of both. For instance, what is windless weather?[3] Stillness in a mass of air: the air is the matter, and the stillness is the actuality and the substance. What is a calm? Smoothness of the sea: the sea is the underlying subject as matter, and the smoothness is the actuality and the shape. It is clear from what has been said, then, what perceptible substance is and how it is: one kind is as matter, another as shape and actuality, and the third is the one composed of these.

### FORM, COMPOSITE, AND NUMBER

*Names may signify form or composite; definitions are like numbers.*

We must not fail to notice that it is sometimes unclear whether a name signifies the composite substance or the actuality and the shape. Does "house," for instance, signify the combination—"a shelter made of bricks and stones lying in such-and-such a way"—or the actuality and the form, "a shelter"? Is a line "twoness in length" or "twoness"? Is an animal "a soul in a body" or "a soul"? For the soul is the substance and actuality of a cer-

3 Archytas of Tarentum was a Pythagorean philosopher, mathematician and statesman of the fourth century BC, a friend of Plato.

tain body. "Animal" might in fact apply to both, not as being said in one account but as being related to one thing. But while these questions make a difference for some other purpose, they make none for the inquiry into perceptible substance; [1043b] for the essence belongs to the form and the actuality. For soul and being-soul are the same, but being-human and human are not the same, unless the soul too is to be called human; and so in one way they are the same and in another not. —When people inquire, it does not turn out that a syllable consists of its letters plus composition, nor that a house is bricks plus composition. And rightly so; for the composition or the mixture does not consist of the things of which it is the composition or mixture. Nor does this hold in any other case: if the threshold is what it is by its position, for instance, the position is not made of the threshold; rather the threshold is made of it. Nor, then, is a human being the animal plus the two-footed. If these are matter, there must be something beyond them, something that is neither an element nor made of elements—namely the substance. This is what people leave out when they state only the matter. If, then, this is the cause of being, and this is substance, they would not be stating the substance itself. (Now this must either be eternal, or be perishable without being in the process of perishing, and have come to be without being in the process of coming to be. It has been shown and made clear elsewhere that no one makes or generates the form; what is made is this particular thing, and what comes to be is the thing composed of form and matter. Whether the substances of perishable things are separable is not yet at all clear—except that in some cases it clearly cannot be so: in the case of things that cannot exist apart from the particulars, such as a house or a utensil. Perhaps, indeed, neither these things themselves nor anything else that is not constituted by nature is a substance at all; for one might count nature alone as the substance in perishable things.) So the puzzle raised by the followers of Antisthenes, and by other such uneducated people, has a certain point: that it is not possible to define what a thing is (for a definition, they say, is a long-winded

account), though one can indeed teach what sort of thing it is—with silver, for instance, one cannot say what it is, but one can say that it is like tin. So there is one kind of substance of which there can be a definition and an account, namely the composite kind, whether perceptible or intelligible; but there can be none of the primary things of which it is composed, since a defining account signifies something of something, and one part must be like matter and the other like shape. —It is also clear why, if substances are in some way numbers, they are numbers in this way, and not, as some say, numbers of units. For a definition is a kind of number: it is divisible, and into indivisible parts (for accounts do not go on to infinity), and number too is of this kind. And just as, when any of the things a number consists of is taken away from it or added to it, it is no longer the same number but a different one, even if the smallest amount is taken away or added, [1044a] so too the definition and the essence will no longer remain the same if anything is taken away or added. A number, too, must be something in virtue of which it is one—which these people cannot now say: what makes it one, if it is one. (For either it is not one but like a heap, or, if it is one, we must say what it is that makes one thing out of many.) And the definition is one, but they are equally unable to say what makes it so. This is a natural result, since the same reasoning applies; and substance is one in this way—not, as some say, by being a kind of unit or point, but because each substance is an actuality and a certain nature. And just as number does not admit of the more and the less, neither does substance in the sense of form; if any substance does, it is the substance that is with matter. So much, then, for the coming to be and passing away of what are called substances—how it is possible and how it is impossible—and for the reduction of substances to number.

### PROPER MATTER AND THE CAUSES

*Each thing has its own proximate matter, and we must state all its causes.*

As for material substance, we must not overlook that even if everything comes from the same first thing, or from the same things as first, and the same matter serves as the principle for things that come to be, there is nevertheless some matter proper to each. The matter of phlegm, for instance, is the sweet or the fatty, and that of bile the bitter or certain other things—though perhaps these come from the same source. There come to be several matters of the same thing when one matter is the matter of the other: phlegm, for instance, comes from the fatty and from the sweet, if the fatty comes from the sweet; and it comes from bile by bile's being dissolved into its first matter. For one thing comes from another in two ways: either because it is a step further along the way, or because the other has been dissolved into its principle. And when the matter is one, different things can come to be from it because of the moving cause: from wood, for instance, both a chest and a bed. But in some cases, if the things are different, the matter must be different: a saw, for instance, could not come to be from wood, and this is not up to the moving cause, since it will not make a saw out of wool or wood. If, however, the same thing can be made from different matter, clearly the craft—the principle as mover—must be the same; for if both the matter and the mover are different, so too is the product. —When someone looks for the cause, then, since causes are spoken of in several ways, we should state all the causes there can be. For instance, what is the cause of a human being as matter? The menstrual fluid, perhaps? What is the cause as mover? The seed, perhaps? What is the cause as form? The essence. What is the cause as that for the sake of which? The end. [1044b] But perhaps these last two are the same. And we should state the nearest causes. What is the matter? Not fire or earth, but the matter peculiar to the thing. In the case of natural sub-

stances that come to be, this is how one must proceed if one is to proceed correctly—if these really are the causes, and this is their number, and it is the causes we must come to know. But with natural substances that are eternal the account is different. For perhaps some of them have no matter, or not matter of this sort, but only matter that can move with respect to place. Nor do things that exist by nature but are not substances have matter; what underlies them is the substance. For instance, what is the cause of an eclipse, what is its matter? There is none; rather, the moon is what undergoes it. What is the cause as what moved and destroyed the light? The earth. That for the sake of which perhaps does not exist. The cause as form is the account, but it is unclear unless the account includes the cause. For instance, what is an eclipse? Privation of light. But if we add "by the earth's coming in between," this is the account that includes the cause. In the case of sleep, it is unclear what it is that primarily undergoes it. The animal, you say? Yes, but in virtue of what part, and what part primarily? The heart, or something else. Next, what is it produced by? Next, what is the affection—the one that belongs to that part and not to the whole? That it is such-and-such an immobility? Yes, but this comes about through the primary part's undergoing what?

### MATTER AND CONTRARIES

*How matter relates to contraries, and why wine is not potentially vinegar.*

Some things are and are not without coming to be and passing away—points, for instance, if they exist, and forms in general (for it is not the white that comes to be but the wood that comes to be white, if everything that comes to be comes from something and becomes something). Since this is so, not all contraries could come to be from one another: a pale person comes from a dark person in a different way from that in which white comes from black. Nor does everything have matter, but only those things that come to be and change into one another;

things that are or are not without changing have no matter. — There is a puzzle about how each thing's matter is related to the contraries. For instance, if the body is potentially healthy, and disease is contrary to health, is it potentially both? And is water potentially wine and vinegar? Or is it the matter of the one in virtue of its positive state and its form, and of the other in virtue of privation and of destruction contrary to its nature? There is also a puzzle why wine is not the matter of vinegar, nor potentially vinegar (though vinegar does come from it), and why the living person is not potentially a corpse. Or is it that they are not, but the destructions are accidental, 1045a and it is the animal's matter itself that, by being destroyed, is the potentiality and matter of a corpse, and water that of vinegar? For these come from them as night comes from day. And all things that change into one another in this way must go back to their matter: if an animal comes from a corpse, the corpse goes first into its matter, and only then does it become an animal; and vinegar goes into water, and only then becomes wine.

### WHAT MAKES A DEFINITION ONE

*Matter and form are one thing, the one potentially, the other actually.*

As for the puzzle we mentioned concerning definitions and numbers: what is the cause of their being one? For whatever has several parts and is not a mere heap, but is a whole that is something beyond its parts, has some cause of being one—since even among bodies, contact is the cause of unity for some, and stickiness or some other such affection for others. A definition is an account that is one not by being bound together, like the *Iliad*, but by being of one thing. What, then, is it that makes a human being one, and why is it one and not many—animal and two-footed, for instance—especially if there is, as some say, an animal-itself and a two-footed-itself? For why are human beings not those very things, so that people would exist by participation not in human-itself, nor in any one thing, but in two, animal and two-footed? And in general a human being would

not be one but more than one, animal and two-footed. It is clear, then, that if people proceed in the way they usually define and speak, it is impossible to give an answer and solve the puzzle. But if, as we say, one element is matter and the other shape, and one is potential and the other actual, what we are looking for would no longer seem to be a puzzle. For this puzzle is the same one that would arise if the definition of "cloak" were "round bronze": the name would be a sign of that account, so that what we would be looking for is the cause of the round and the bronze being one. There no longer appears to be a puzzle, then, because one is matter and the other shape. What, then, is the cause of this—of what is potentially being actually—other than the maker, in things that come to be? For there is no other cause of the potential sphere's being an actual sphere; this was the essence of each. Some matter is intelligible and some perceptible; and in an account one part is always matter and the other actuality—for instance, "the circle is a plane figure." But things that have no matter, either intelligible or perceptible, are each straightway just what a unity is, [1045b] just as each is straightway just what a being is—a this, a quality, a quantity. (That is why neither being nor one is included in definitions.) And the essence is straightway a kind of unity, just as it is a kind of being. That is why there is no other cause of any of these things' being one, nor of their being a kind of being; for each is straightway a kind of being and a kind of unity—not as belonging to being or one as to a genus, nor as though these existed separately beyond the particulars. Because of this puzzle some speak of participation, and are at a loss about what causes participation and what participating is. Others speak of "communion," as Lycophron says that knowledge is a communion of knowing and the soul; others say that life is a composition or connection of soul with body. Yet the same argument applies in every case: being healthy, too, will be a communion or connection or composition of soul and health; the bronze's being a triangle will be a composition of bronze and triangle; and something's being white will be a composition of surface and whiteness. The

reason is that they are looking for an account that unifies potentiality and actuality, and for a difference between them.[4] But, as has been said, the ultimate matter and the shape are one and the same thing, the one potentially, the other actually; so asking what causes them to be one is like asking what causes anything to be one. For each thing is a kind of unity, and what is potential and what is actual are in a way one. So there is no other cause, unless it is whatever moved the thing from potentiality to actuality. And things that have no matter are all, without qualification, just what a unity is.

4 Lycophron was a sophist of the fourth century BC, perhaps a pupil of Gorgias.

# Book Theta (IX)

*Potentiality and actuality.*

## CHAPTER 1

We have now discussed what primarily is, to which all the other categories of being are referred—namely substance. (For it is by reference to the account of substance that the other things are said to be—quantity, quality, and the others spoken of in this way; for they will all involve the account of substance, as we said in our first discussions.) But since being is spoken of in one way as a what, or a quality, or a quantity, and in another way with respect to potentiality and actuality, and with respect to function, let us also make distinctions about potentiality and actuality. First let us take potentiality in the sense in which it is most strictly so called, though this is not the most useful for our present purpose; 1046a for potentiality and actuality extend further than to things spoken of only with respect to motion. But when we have spoken about this sense, we shall make the others clear in our distinctions concerning actuality. That "capacity" and "to be capable" are said in many ways we have set out elsewhere. Of these, let us set aside those that are called capacities homonymously (for some are so called by a certain likeness, as in geometry we call things possible and impossible by their being or not being in some way). But those that are related to the same form are all principles of a sort, and are so called by reference to one primary kind, which is a principle of change in another thing or in the thing itself qua other. One kind is the capacity for being acted on: the principle, in the very thing acted on, of its being changed passively by another thing or by

itself qua other. Another is the state of being unaffected by change for the worse and by destruction at the hands of another thing, or of itself qua other, through a principle of change. For the account of the primary capacity is contained in all these definitions. Again, these capacities are called capacities either of merely acting or being acted on, or of doing so well; so that in their accounts too the accounts of the prior capacities are in a way contained.—It is clear, then, that in one sense the capacity for acting and for being acted on is one (for a thing is capable both by itself having the capacity to be acted on and by something else's having the capacity to be acted on by it), but in another sense it is different. For one is in the thing acted on: it is because it has a certain principle—and the matter too is a kind of principle—that what is acted on is acted on, and one thing by one agent, another by another. What is oily can be burned, for instance, and what yields in a certain way can be crushed, and similarly in other cases. The other is in the agent, as heat and the craft of building are, the one in what can heat, the other in what can build. That is why nothing, insofar as it is a natural unity, is acted on by itself; for it is one and not other. And incapacity and the incapable are the privation contrary to this sort of capacity; so every capacity is of the same thing, and in the same respect, as an incapacity. Privation is spoken of in many ways. We use the word of what does not have something; of what would naturally have it but does not, either at all or at the time it would naturally have it; and either in some particular way, for instance completely, or in any way whatever. And in some cases, if things that would naturally have something do not have it because of force, we say they have been deprived of it.

### RATIONAL AND NONRATIONAL CAPACITIES

*Capacities that involve reason can produce contrary effects; nonrational ones produce only one.*

Since some such principles are present in soulless things, and others in things with souls—in the soul, and in the part of the

soul that has reason— [1046b] it is clear that some capacities will be nonrational and others will involve reason. That is why all the crafts, that is, the productive kinds of knowledge, are capacities; for they are principles of change in another thing or in the thing itself qua other. And the capacities that involve reason are each capable of contrary effects, whereas each nonrational one is capable of one effect: the hot, for instance, is capable only of heating, whereas medicine is capable of producing disease and health. The reason is that scientific knowledge is an account, and the same account makes clear both the thing and its privation, though not in the same way: in a sense it is of both, but in a sense it is more of what is present. So such sciences must be of contraries, but of one in its own right and of the other not in its own right. For the account too is of one in its own right and of the other, in a way, accidentally; for it makes the contrary clear by denial and removal. The primary privation is the contrary, and this is the removal of the other. Now contraries do not occur in the same thing; but scientific knowledge is a capacity by having an account, and the soul has a principle of motion. So while what is healthy produces only health, what can heat only heat, and what can cool only cold, the person with knowledge produces both. For the account is of both, though not in the same way, and it is in a soul, which has a principle of motion; so the soul will set both in motion from the same principle, linking them to the same account. That is why things capable in accordance with reason act in the opposite way to things capable without reason: their effects are contained under one principle, the account. It is clear, too, that the capacity for merely acting or being acted on follows the capacity for doing so well, but the latter does not always follow the former. For whoever acts well must also act, but whoever merely acts need not act well.

### AGAINST THE MEGARIANS

*The Megarians say a thing is capable only while acting; Aristotle shows this abolishes change.*

There are some—the Megarians, for instance—who say that a thing is capable only when it is acting, and when it is not acting it is not capable: that someone who is not building cannot build, for instance, but only someone who is building, when he is building; and similarly in other cases. It is not hard to see the absurdities that follow for them. For clearly no one will be a builder unless he is building (since being a builder is being capable of building); and similarly with the other crafts. Now it is impossible to have such crafts without having learned and acquired them at some time, [1047a] and impossible not to have them without having lost them at some time (through forgetting, or some affection, or time; not, surely, through the destruction of the object, since that always exists). If so, then when someone stops building he will not have the craft; and when he immediately starts building again, how will he have acquired it? [1] The same will hold for soulless things: nothing will be cold or hot or sweet, or perceptible at all, unless it is being perceived; so these people will end up stating the doctrine of Protagoras. Indeed, nothing will even have perception unless it is perceiving and actively doing so. If, then, what lacks sight when it would naturally have it, at the time when it would naturally have it, and while it still exists, is blind, the same people will be blind many times a day—and deaf as well. Further, if what is deprived of a capacity is incapable, then what is not happening will be incapable of happening; but whoever says that what is incapable of happening is or will be is speaking falsely (for that is what "incapable" meant). So these arguments do away with both motion and coming to be. What is standing will always stand, and what is sitting will always sit; if it is sitting, it will never get up, since what cannot get up will be incapable of get-

1 The Megarians were followers of Euclides of Megara, a companion of Socrates.

ting up. If, then, one cannot say these things, it is clear that capacity and actuality are different. (Those arguments make capacity and actuality the same, which is why it is no small thing they are seeking to abolish.) So it is possible for something to be capable of being and yet not be, and capable of not being and yet be; and similarly in the other categories, for something capable of walking not to walk, and for something capable of not walking to walk. A thing is capable if, should the actuality of which it is said to have the capacity belong to it, nothing impossible will follow. I mean, for instance, that if something is capable of sitting and it is possible for it to sit, then if sitting belongs to it nothing impossible will follow; and similarly if it is capable of being moved or of moving something, of standing or of making something stand, of being or of coming to be, of not being or of not coming to be. The word "actuality" (*energeia*), which is bound up with *entelecheia*, has been extended to other things chiefly from motions; for actuality seems above all to be motion. That is why people do not attribute being moved to things that are not, though they do attribute certain other predicates to them: they say that things that are not are objects of thought and of desire, but not that they are moved. This is because, while they are not actually, they will be actually. 1047b For of things that are not, some are potentially; but they are not, because they are not actually.

### THE POSSIBLE AND THE IMPOSSIBLE

*What is possible must be able to happen without absurdity; and what follows from the possible is possible.*

If what we have described is what is capable, or follows from it, it is clear that it cannot be true to say, "This is capable of being, but it will not be," in such a way that the impossible would thereby disappear. I mean, for instance, if someone—someone who does not take account of what is impossible—were to say that the diagonal is capable of being measured but will never be measured, on the grounds that nothing prevents something that

is capable of being or coming to be from not being, now or in the future. But from what we have laid down this much necessarily follows: if we were to suppose that what is not, but is capable of being, is or has come to be, nothing impossible would follow. Yet here something impossible will follow, since the diagonal's being measured is impossible. For the false and the impossible are not the same: that you are standing now is false, but not impossible. At the same time it is also clear that if, when A is, B must be, then when A is possible, B too must be possible. For if B need not be possible, nothing prevents its not being possible. Now let A be possible. Then when A was possible, if A were posited, nothing impossible would follow; but then B must be. Yet B was supposed impossible. So let it be impossible. If B is impossible, A must be impossible too. But then the first was impossible; and so, therefore, was the second. If, then, A is possible, B too will be possible, given that they were so related that when A is, B must be. If, then, with A and B so related, B is not possible in this way, neither will A and B be related as was supposed. And if, when A is possible, B must be possible, then if A is, B too must be. For to say that B must be possible if A is possible means this: if A is, both at the time and in the way in which it was possible for it to be, then B too must be at that time and in that way.

### HOW CAPACITIES ARE EXERCISED

*Rational capacities need desire or decision to settle which of two contraries they will produce.*

Of all capacities, some are innate, like the senses; some come by habit, like the capacity for playing the pipes; and some by learning, like that for the crafts. Those that come by habit and by reason we can have only if we have first exercised them; those that are not of this kind, and those for being acted on, do not require this. 1048a What is capable is capable of something, at some time, in some way, and with whatever other qualifications must be included in the definition. Some things can initiate

motion in accordance with reason, and their capacities involve reason, while others are nonrational and their capacities are nonrational; the former must be in something with a soul, while the latter can be in both. Now with capacities of the latter kind, when the agent and the patient come together in the way appropriate to the capacity, the one must act and the other be acted on; but with the former kind this is not necessary. For the nonrational capacities are each productive of one effect, whereas the rational ones are productive of contraries, so that they would produce contraries at the same time; and that is impossible. There must, then, be something else that is decisive; I mean desire or decision. For whichever of the two a thing desires decisively, it will do, when it is in the condition in which it is capable and approaches the patient. So everything capable in accordance with reason, when it desires what it has a capacity for, and in the way it has the capacity, must do it. And it has the capacity when the patient is present and is in a certain condition; otherwise it will not be able to act. (There is no further need to add the qualification "if nothing external prevents it"; for it has the capacity insofar as it is a capacity for acting, and this is not in all circumstances but under certain conditions, and these will exclude external hindrances, since some of the qualifications in the definition rule them out.) That is why, even if someone wishes or has an appetite to do two things, or contrary things, at the same time, he will not do them; for this is not how he has the capacity for them, nor is there a capacity for doing both at the same time, since he will do the things it is a capacity for in the way it is for them.

### WHAT ACTUALITY IS

*Actuality is explained by analogy, and activities complete in themselves are distinguished from motions.*

Since we have discussed the capacity spoken of with respect to motion, let us determine what actuality is and what sort of thing it is. For as we draw our distinctions it will also become clear

that we call something capable not only when it is naturally apt to move something else or to be moved by something else, either without qualification or in a certain way, but also in another sense; that is why, in our inquiry, we went through those senses too. Actuality, then, is the thing's being present, but not in the way in which we call it potentially present. We say that something is potentially present as, for instance, a Hermes is in the wood and the half-line in the whole, because it could be separated out; and we call someone a knower even when he is not contemplating, if he is capable of contemplating. The other way of being present is actuality. What we mean is made clear in particular cases by induction, and we should not look for a definition of everything but also see the analogy at a glance: as what is building is to what is capable of building, [1048b] so is what is awake to what is asleep, what is seeing to what has its eyes shut but has sight, what has been shaped out of the matter to the matter, and what has been worked up to what is unworked. Let actuality be marked off by one side of this contrast, and the potential by the other. But things are not all said to be actual in the same way, except by analogy—as this is in this or related to this, so that is in that or related to that. For some are related as motion to capacity, others as substance to some matter. The infinite and the void, and all such things, are said to be potentially and actually in a different sense from many of the things that are, such as what sees, what walks, and what is seen. For these can at some time be truly said to be, without qualification (for what is seen is so called either because it is being seen or because it is capable of being seen). But the infinite is not potential in the sense that it will ever actually be separate; it is so only in knowledge. For the fact that division never gives out ensures that this actuality exists potentially, but not that it exists separately.

Of actions that have a limit, none is an end; all are among the things directed toward an end. Slimming, for instance, or the process of slimming: the parts of the body themselves, when one is slimming them, are in motion in this way, the things for

the sake of which the motion occurs not yet being present. These are not action, or at least not complete action, since they are not an end; but that in which the end is present is an action. For instance, at the same time one sees and has seen, exercises practical wisdom and has exercised it, thinks and has thought; but it is not the case that at the same time one is learning and has learned, or is being cured and has been cured. One is living well and has lived well at the same time, and is happy and has been happy. If this were not so, the process would have to stop at some point, as when one is slimming; but as it is, it does not stop—one lives and has lived. Of these processes, then, we should call the one kind motions and the other activities. For every motion is incomplete—slimming, learning, walking, building. These are motions, and incomplete ones. For one is not at the same time walking and has walked, nor building and has built, nor coming to be and has come to be, nor being moved and has been moved; these are different, as are moving something and having moved it. But the same thing at the same time has seen and is seeing, is thinking and has thought. The latter kind I call an activity, the former a motion. What actuality is, then, and what sort of thing it is, let this and similar discussion make clear to us.

### WHEN A THING IS POTENTIALLY SOMETHING

*Earth is not yet potentially a human being; seed is, once nothing more must be added.*

We must determine when each thing is potentially something and when it is not; for it is not at just any time. [1049a] Is earth, for instance, potentially a human being? Or is it not, but rather when it has already become seed—and perhaps not even then? It is just as not everything can be healed by medicine or by luck; there is something that is capable of it, and this is what is potentially healthy. The mark of what comes to be actual from what is potential through thought is that it comes to be when the agent wishes it, if nothing external prevents it; and in the other case,

in what is being healed, when nothing within it prevents it. Similarly a thing is potentially a house if nothing in it or in its matter prevents its becoming a house, and there is nothing that must be added or taken away or changed: this is potentially a house. And the same holds for all other things whose principle of coming to be is external. And with things whose principle is within the thing itself, they are potentially whatever they will be through themselves if nothing external hinders them. The seed, for instance, is not yet potentially a human being (for it must be deposited in another and change); but when through its own principle it is already of that kind, then it is already potentially a human being. In the earlier state it needs another principle, just as earth is not yet potentially a statue, since it must change to become bronze. It seems that what we call a thing is not "that" but "that-en"—a chest, for instance, is not wood but wooden, and wood is not earth but earthen; and earth in turn, if it is like this, is not that other thing but "that-en"—and in each case it is the earlier that is, without qualification, potentially the later. The chest, for instance, is not earthen or earth but wooden; for this is potentially a chest, and this is the matter of a chest: wood in general of chest in general, and this wood of this chest.[2] If there is some first thing that is no longer called "that-en" with reference to something else, this is prime matter. If earth, for instance, is airy, and air is not fire but fiery, then fire is prime matter, not being a this. For this is how the subject of predication, the underlying subject, is differentiated: by being a this or not. For instance, the subject of affections is a human being, a body and a soul, while the affection is musical or pale. (When music has come to be in him, the subject is called not "music" but "musical"; the human being is not "paleness" but "pale," nor "a walk" or "a motion" but "walking" or "moving"—just as with "that-en.") In cases of this kind, then, the ultimate subject is substance; but where this is not so, and what is predicated is a form and a this, the ultimate subject is matter and material sub-

2 Aristotle coins *ekeininon*, "that-en," on the model of material adjectives like "wooden" and "earthen."

stance. And it turns out, rightly, that "that-en" is said with reference both to matter and to affections; [1049b] for both are indeterminate. We have said, then, when a thing should be called potentially something and when not.

### ACTUALITY IS PRIOR TO POTENTIALITY

*Actuality is prior in account, in time, and above all in substance; eternal things are wholly actual.*

Since we have distinguished the various senses of "prior," it is clear that actuality is prior to potentiality. By potentiality I mean not only the kind we have defined, which is called a principle of change in another thing or in the thing itself qua other, but in general every principle of motion or of rest. For nature too is in the same genus as capacity, since it is a principle of motion—though not in another thing, but in the thing itself qua itself.—To every such capacity, then, actuality is prior both in account and in substance; and in time it is prior in one sense, and in another not. That it is prior in account is clear. (For what is capable in the primary sense is capable because it can become active: I mean, for instance, that "capable of building" means able to build, "capable of seeing" able to see, and "visible" able to be seen. The same account holds in other cases, so that the account and knowledge of the one must precede the knowledge of the other.) It is prior in time in this way: the actual thing that is the same in form as the potential one is prior to it, though not the thing that is the same in number. I mean this: prior in time to this particular human being, who already exists actually, and to the grain, and to what is seeing, are the matter, the seed, and what is capable of seeing, which are potentially a human being, grain, and seeing, but not yet actually. But prior in time to these are other things, existing actually, from which they came to be. For what is actual always comes to be from what is potential by the agency of something actual—a human being by a human being, a musician by a musician—there always being some first mover; and the mover already exists actually. We said in our dis-

cussion of substance that everything that comes to be comes to be from something, becomes something, and does so by the agency of something, and that this agent is the same in form as what comes to be. That is why it seems impossible to be a builder if one has built nothing, or a lyre-player if one has never played the lyre; for someone who learns to play the lyre learns by playing the lyre, and similarly with other learners. From this arose the sophistical refutation that someone who does not have a science will be doing what the science is of, since the learner does not have it. But since of what is coming to be some part has already come to be, and of what is being moved in general some part has already been moved (this is shown in our discussion of motion), [1050a] the learner too must perhaps have some part of the science. At any rate it is clear in this way too that actuality is prior to potentiality in this sense also, in coming to be and in time. But it is also prior in substance: first, because things that are posterior in coming to be are prior in form and in substance (a man, for instance, is prior to a boy, and a human being to seed, since the one already has the form and the other does not); and because everything that comes to be proceeds toward a principle and an end (for that for the sake of which is a principle, and coming to be is for the sake of the end). And the actuality is the end, and it is for its sake that the capacity is acquired. For animals do not see in order to have sight; they have sight in order to see. Likewise people have the craft of building in order to build, and the capacity for contemplation in order to contemplate; they do not contemplate in order to have the capacity for contemplation—except those who are practicing, and they are not contemplating except in a limited sense, or else because they have no need to contemplate.[3] Further, matter is potentially because it might come to its form; and when it is actually, then it is in its form. Similarly in other cases too, including those whose end is a motion. That is why, just as teachers think they have achieved their end when they have shown the pupil at

3 The end of this sentence is corrupt in the manuscripts; the rendering gives the likeliest sense.

work, so too does nature. For if it were not so, we would have Pauson's Hermes again: it would be unclear whether the knowledge is inside or outside, as it is with that figure. For the work is the end, and the actuality is the work; that is why the word "actuality" (*energeia*) is derived from "work" (*ergon*) and points toward *entelecheia*.[4] In some cases the ultimate thing is the use (with sight, for instance, it is seeing, and nothing else comes to be from sight besides this), while in others something does come to be (from the craft of building, for instance, a house comes to be besides the act of building). Even so, the actuality is no less the end in the first case, and in the second it is more the end than the capacity is; for the building takes place in what is being built, and comes to be, and is, at the same time as the house. Where what comes to be is something other than the use, the actuality is in what is being made (building, for instance, is in what is being built, and weaving in what is being woven, and similarly in other cases; and in general motion is in what is being moved). But where there is no other work besides the actuality, the actuality is present in the agents themselves (seeing, for instance, is in the one seeing, contemplation in the one contemplating, and life in the soul—which is why happiness is too, 1050b since it is a certain kind of life). So it is clear that substance and form are actuality. By this argument, then, it is clear that actuality is prior in substance to potentiality; and, as we said, in time one actuality always precedes another, back to that of the primary eternal mover.—But it is also prior in a stricter sense. For eternal things are prior in substance to perishable things, and nothing eternal is potential. The argument is this. Every capacity is at the same time a capacity for the contradictory. For what is not capable of being present could not be present in anything, but everything that is capable may fail to be active. So what is capable of being may both be and not be; the same thing, then, is capable both of being and of not being. And what is capable of not being may not be; and what may not

4 Pauson was a Greek painter; his Hermes was apparently a trick picture in which one could not tell whether the figure was inside the stone or on its surface.

be is perishable—either without qualification, or in the very respect in which it is said that it may not be, whether with respect to place or to quantity or to quality; "without qualification" means with respect to substance. So nothing that is imperishable without qualification is potential without qualification (though nothing prevents its being so in some respect, for instance with respect to quality or place); all such things, then, are actual. Nor is anything that exists of necessity potential (and yet these things are primary; for if they did not exist, nothing would). Nor is motion potential, if there is any eternal motion. Nor, if anything is eternally in motion, is it in motion potentially, except with respect to its "from where" and "to where" (and nothing prevents its having matter for this). That is why the sun and the stars and the whole heaven are always active, and there is no fear that they may some day stop, as the natural philosophers fear. Nor do they grow weary in doing this. For their motion does not involve, as it does for perishable things, the capacity for the contradictory, which would make the continuity of the motion laborious; the cause of that is substance's being matter and capacity, not actuality. Things involved in change, such as earth and fire, also imitate imperishable things. For these too are always active, since they have their motion in their own right and in themselves. The other capacities, on the distinctions we have drawn, are all capacities for the contradictory: what can move something in this way can also move it not in this way—that is, in the case of rational capacities; while the nonrational ones will be capacities for the contradictory by being present or absent. If, then, there are any natures or substances of the sort that those who deal in abstract arguments say the Forms are, there would be something much more knowing than knowledge itself, and something much more in motion than motion itself; [1051a] for these are more truly actualities, while the Forms are capacities for them. It is clear, then, that actuality is prior both to capacity and to every principle of change.

### ACTUALITY IS BETTER THAN CAPACITY

*A good actuality is better than the capacity for it; geometers discover proofs by actualizing constructions.*

That actuality is also better and more valuable than a good capacity is clear from the following. Whatever is said to be capable is capable, one and the same, of contraries: what is said to be capable of being healthy, for instance, is the same as what is capable of being ill, and at the same time; for it is the same capacity that is for being healthy and being ill, for resting and moving, for building and demolishing, for being built and collapsing. So the capacity for contraries belongs to a thing at the same time; but the contraries cannot belong at the same time, nor can the actualities (being healthy and being ill, for instance). So one of them must be the good, while the capacity is equally both or neither. Actuality, then, is better. And in the case of bad things the end and the actuality must be worse than the capacity; for what is capable is capable of both contraries alike. It is clear, then, that the bad does not exist apart from things; for the bad is by nature posterior to the capacity. So among things that are original and eternal there is nothing bad, no error, nothing corrupted (for corruption too is one of the bad things). Geometrical constructions too are discovered by being actualized; for people discover them by dividing figures. If the figures were already divided, the constructions would be obvious; as it is, they are present only potentially. Why are the angles of a triangle equal to two right angles? Because the angles about one point are equal to two right angles. If, then, the line parallel to the side had been drawn, it would at once be clear why to anyone who looked. Why is the angle in a semicircle a right angle, universally? If three lines are equal—the two halves of the base and the one set upright from the center—it is clear on looking, to anyone who knows that earlier proposition.[5] It is clear, then, that what

5 Drawn through one vertex, a line parallel to the opposite side forms, with the two other sides, three angles on a straight line equal to the triangle's three angles.

is potential is discovered by being brought into actuality. The reason is that thinking is an actuality; so the capacity comes from actuality, and that is why people come to know by constructing. (For the actuality that is one in number is posterior in coming to be.)

## BEING AS TRUTH

*Truth for composites is combining what is combined; for simple things it is touching and thinking them.*

"Being" and "not being" are said in one way according to the figures of the categories, in another according to the potentiality or actuality of these or their opposites, [1051b] and in another as true or false. In the case of things, this depends on their being combined or divided, so that one who thinks that what is divided is divided, and that what is combined is combined, has the truth, while one whose thought is contrary to the state of things is in error. That being so, when is what we call truth or falsehood present, and when is it not? We must consider what we mean by this. For it is not because we truly think that you are pale that you are pale; rather, it is because you are pale that we who say so are telling the truth. If some things are always combined and cannot be divided, others are always divided and cannot be combined, and others admit of both contraries, then being is being combined and one, and not being is not being combined but being more than one. So with things that admit of contraries, the same opinion or the same statement comes to be false and true, and one can be right at one time and wrong at another; but with things that cannot be otherwise, the same thing does not come to be true at one time and false at another, but the same things are always true or false.—But in the case of incomposite things, what is being or not being, and truth and falsehood? Such a thing is not composite, so as to be when it is combined and not be when it is divided, like "the wood is white" or "the diagonal is incommensurable"; nor will truth and falsehood still belong to these things in the same way as to those.

Rather, just as truth is not the same in these cases, neither is being. Truth or falsehood here is this: touching and saying is truth (for saying is not the same as affirming), and not touching is ignorance. (For one cannot be deceived about what a thing is, except accidentally; and the same holds for incomposite substances, since one cannot be deceived about them. They are all actual, not potential; otherwise they would come to be and perish, but as it is, being itself does not come to be or perish, since it would have to come to be from something.—About all things, then, that are just what some being is, and are actualities, one cannot be deceived; one either thinks them or does not. What we do inquire about them is what they are—whether they are of such a kind or not.) As for being in the sense of truth, and not being in the sense of falsehood: in one case, if the terms are combined, it is true, and if they are not combined, false; in the other case, if the thing is, it is in just this way, and if it is not in this way, it is not at all. 1052a Truth is thinking these things; and there is no falsehood, nor deception, but only ignorance—and not ignorance like blindness, for blindness would be like lacking the capacity for thought altogether. It is also clear that about unchangeable things there is no deception with respect to time, if one supposes them to be unchangeable. If someone thinks that the triangle does not change, for instance, he will not think that it sometimes has angles equal to two right angles and sometimes does not (for then it would change); but he may think that one thing has an attribute and another does not—that no even number is prime, for instance, or that some are and some are not. But about what is numerically one not even this is possible; for one will no longer think that one instance is so and another not, but will be right or wrong on the understanding that it is always so.

# Book Iota (X)

*Unity, and contraries.*

## CHAPTER 1

That "one" is said in many ways has been stated earlier, in our distinctions of the various senses of terms. But though it is said in several ways, the ways in which things are called one primarily and in their own right, and not accidentally, can be summed up as four. First, the continuous, either without qualification or, most of all, what is continuous by nature and not by contact or by being bound together (and among these, that is more one, and prior, whose motion is more indivisible and more simple). Second, and still more, what is a whole and has a certain shape and form—most of all if something is such by nature and not by force, as things are that are held together by glue or nails or a binding, but has in itself the cause of its being continuous.[1] A thing is of this kind by having a motion that is one and indivisible in place and time; so it is clear that if something has by nature the first principle of the first kind of motion—I mean, of locomotion, the principle of circular motion—this is the primary one magnitude. Some things, then, are one in this way, as continuous or whole; others are one whose account is one. Such are things the thought of which is one, and such are things the thought of which is indivisible; and a thought is indivisible when it is of what is indivisible in form or in number. In number, the particular is indivisible; in form, what is indivisible in being known and in scientific knowledge; so that what would be

1 The earlier distinctions referred to are in Book Δ.

one primarily is what causes substances to be one. "One," then, is said in this many ways: the naturally continuous, the whole, the particular, and the universal. All of these are one by being indivisible—some in their motion, others in their thought or account. 1052b But we must realize that the questions what sorts of things are called one, and what being one is and what its account is, should not be taken to be the same. "One" is said in these many ways, and each of the things to which one of these ways belongs will be one; but being one will sometimes be being one of these, and sometimes being something else, which is closer to the meaning of the word, while those others are so potentially. So too with "element" and "cause," if one had to speak both determining the things and giving the definition of the name. For in one sense fire is an element (and so perhaps, in its own right, is the infinite or some other such thing), and in another sense it is not; for being fire and being an element are not the same. As a thing and a nature, fire is an element; but the name "element" signifies that it has this attribute: that something is made of it as a primary constituent. So too with "cause" and "one" and all such terms. That is why being one is being indivisible—being just a this, separate on its own, either in place or in form or in thought—or being whole and indivisible; but most of all it is being the first measure of each genus, and most strictly of quantity; for it is from this that it has been extended to the other cases. For a measure is that by which quantity is known; and quantity qua quantity is known either by a one or by a number, and every number is known by a one. So every quantity qua quantity is known by the one, and that by which quantities are first known is the one itself. That is why the one is the principle of number qua number. From this, in other cases too, the measure is said to be that by which each thing is first known, and the measure of each is a one—in length, breadth, depth, weight, speed. (Weight and speed are common to both contraries, since each is twofold: "weight," for instance, is both what has any downward tendency whatever and what has an excess of downward tendency; and "speed" is both what has any

motion whatever and what has an excess of motion. For even what is slow has some speed, and what is lighter some weight.) In all these, then, the measure and principle is something one and indivisible, since even with lines people treat the foot-length as indivisible. For everywhere they look for something one and indivisible as the measure; and this is what is simple either in quality or in quantity. Where it seems that nothing can be taken away or added, the measure is exact (which is why the measure of number is the most exact, 1053a since they posit the unit as indivisible in every respect); in other cases they imitate this. For from a stade or a talent, and in general from what is larger, an addition or subtraction would more easily go unnoticed than from something smaller. So the first thing from which, as far as perception goes, nothing can be taken away is what everyone makes the measure, whether of liquids or of dry goods, of weight or of size; and they think they know the quantity when they know it by means of this measure.[2] They also measure motion by simple motion, the fastest, since it takes the least time. That is why in astronomy a one of this kind is the principle and measure (for they assume that the motion of the heaven is uniform and the fastest, and judge the others by it); in music it is the quarter-tone, because it is the smallest; and in speech it is the letter. All these are one in this sense—not as though "one" were something common to them, but in the way we have described.—But the measure is not always one in number; sometimes there are several. There are two quarter-tones, for instance (those distinguished not by hearing but in the ratios); the spoken sounds by which we measure are more than one; and the diagonal and the side are measured by two measures, as are all magnitudes. So the one is the measure of all things, because we come to know what a substance consists of by dividing it, either in quantity or in form. And the one is indivisible because what is first in each class of things is indivisible. But not everything is indivisible in the same way—the foot and the unit, for instance: the one is indivisible in every respect, while the

2 A stade was a unit of length of about 600 feet; a talent was a large unit of weight.

other must be placed among things indivisible to perception, as we have already said; for perhaps everything continuous is divisible. The measure is always of the same kind as what it measures: of magnitudes a magnitude, and in particular of length a length, of breadth a breadth, of spoken sounds a spoken sound, of weight a weight, of units a unit. This is how one should take it, and not say that the measure of numbers is a number—though one ought to, if the cases were alike. But the claim would not be alike; it would be as if one claimed that the measure of units is units and not a unit; for a number is a plurality of units. We also call knowledge and perception the measure of things, for the same reason—because we come to know something by them—though in fact they are measured rather than measuring. But what happens to us is as if someone else were measuring us, and we came to know how tall we are by his applying the cubit-rule to us so many times. Protagoras says that a human being is the measure of all things, as if he meant the knower or the perceiver; [1053b] and these because they have, respectively, knowledge and perception, which we say are the measures of their objects. So while saying nothing out of the ordinary, these people appear to be saying something remarkable. It is clear, then, that being one, if one defines it according to the meaning of the name, is most of all a kind of measure—most strictly of quantity, and next of quality. Something will be of this kind if it is indivisible, in the one case in quantity, in the other in quality. That is why the one is indivisible, either without qualification or qua one.

### IS THE ONE A SUBSTANCE?

*In every category the one is some particular nature, never a substance in its own right.*

But with regard to its substance and nature we must inquire how it stands, as we did in going through the puzzles: what the one is and how we should conceive it—whether the one itself is a kind of substance, as first the Pythagoreans and later Plato say,

or rather some nature underlies it, and it should be explained in more familiar terms, more in the manner of the natural philosophers. For among them, one says the one is Love, another air, another the infinite.[3] If, then, no universal can be a substance, as was said in our discussions of substance and being, and if being itself cannot be a substance in the sense of a one beside the many (since it is common) but only a predicate, clearly the one cannot be a substance either; for being and one are the most universal of all predicates. So neither are genera natures and substances separate from other things, nor can the one be a genus, for the same reasons that being and substance cannot. Further, the case must be alike for all categories; and "being" and "one" are said in equally many ways. So since among qualities the one is something definite, some nature, and likewise among quantities, clearly we must also ask in general what the one is, just as we must ask what being is, since it is not enough to say that its nature is just this. Now among colors the one is a color, white for instance, and the other colors are seen to be produced from this and black, black being the privation of white as darkness is of light. So if the things that are were colors, the things that are would be a number—but a number of what? Clearly of colors; and the one would be some one thing, white for instance. Likewise, if the things that are were tunes, they would be a number—a number of quarter-tones, however, and their substance would not be number; and the one would be something whose substance is not the one but the quarter-tone. 1054a Likewise with spoken sounds: the things that are would be a number of letters, and the one would be a vowel. And if they were rectilinear figures, they would be a number of figures, and the one would be the triangle. The same argument applies to the other genera too. So if among affections, qualities, quantities, and motion there are numbers and some one in all of them, and the number is a number of certain things and the one is a certain one, and its substance is not just this, then the same must

3 The natural philosophers meant are Empedocles (Love), Anaximenes (air), and Anaximander (the infinite).

hold for substances too; for it holds alike in all cases.—It is clear, then, that in every genus the one is a certain nature, and that in no case is the nature of anything just this, the one. Rather, just as among colors we must look for the one itself as one color, so too among substances we must look for the one itself as one substance. That "one" and "being" in a sense signify the same thing is clear from several facts: they follow the categories in equally many ways and are not contained in any one of them (neither in the what-it-is, for instance, nor in quality, but are related to them in the same way that being is); "one human being" predicates nothing different from "human being" (just as being is nothing beside the what or the quality or the quantity); and being one is being each thing.

### THE ONE AND THE MANY

*The one and plurality are contraries; sameness, likeness and equality belong to the one.*

The one and the many are opposed in several ways, one of which is the opposition of the one and plurality as indivisible and divisible. For what is either divided or divisible is called a plurality, and what is indivisible or undivided is called one. Now since oppositions are of four kinds, and one of this pair is so called by privation, they will be contraries, and not opposed as contradictories or as relatives. The one is named and made clear from its contrary—the indivisible from the divisible—because plurality and the divisible are more perceptible than the indivisible; so in account plurality is prior to the indivisible, because of perception. To the one belong, as we also set out in our division of the contraries, the same, the like, and the equal; to plurality belong the other, the unlike, and the unequal. "The same" is said in many ways. In one way we sometimes call it so in number; in another, if a thing is one both in account and in number, as you are one with yourself both in form and in matter; and again, if the account of its primary substance is one, [1054b] as equal straight lines are the same, and so are equal squares with equal angles,

though they are several; but in these, equality is unity. Things are like if, while not being the same without qualification, nor undifferentiated in their composite substance, they are the same in form: the larger square is like the small one, for instance, and unequal straight lines are like each other; these are like, but not the same without qualification. Other things are like if, having the same form, and being things in which more and less can occur, they have it neither more nor less. Others, if they have the same affection, one in form—white, for instance—in a greater and a lesser degree, people call like because their form is one. Others are like if they have more features that are the same than are different, either without qualification or among their obvious features: tin is like silver insofar as it is white, for instance, and gold is like fire insofar as it is yellow and flame-colored. So it is clear that "other" and "unlike" are also said in many ways. In one way, "other" is said in opposition to "the same," which is why everything is either the same as or other than everything else. In another way, things are other unless both their matter and their account are one, which is why you are other than your neighbor. The third way is as with the objects of mathematics. "Other" or "the same," then, is for this reason said of everything in relation to everything—of all things that are said to be one and to be. For "other" is not the contradictory of "the same"; that is why it is not said of things that are not (whereas "not the same" is said of them), but it is said of all things that are. For whatever is a being and one is by nature either one or not one with anything. "Other" and "the same," then, are opposed in this way; but difference is distinct from otherness. For what is other and that from which it is other need not be other in some particular respect, since everything that is, whatever it is, is either other or the same. But what is different is different from something in some respect, so there must be something the same in which they differ. And this same thing is genus or species. For everything that differs differs either in genus or in species: in genus, things that have no common matter and no coming-to-be into each other—for instance, things

that belong to different figures of predication; in species, things that have the same genus (and "genus" means that one and the same thing which both of the different things are said to be in respect of their substance). Contraries are different, and contrariety is a kind of difference. That we are right to assume this is clear from induction. For all contraries too turn out to be different, not merely other: some are other in genus, while others fall in the same column of predication, [1055a] and so are in the same genus and the same in genus. Which things are the same or other in genus has been determined elsewhere.

### CONTRARIETY AS COMPLETE DIFFERENCE

*Contrariety is the greatest, complete difference, so each thing has only one contrary.*

Since things that differ can differ from each other more and less, there is also a greatest difference, and this I call contrariety. That it is the greatest difference is clear from induction. Things that differ in genus have no path into each other; they are too far apart, and cannot be compared. But for things that differ in species, comings-to-be are from contraries as their extremes, and the distance between extremes is the greatest, so the distance between contraries is the greatest too. And surely what is greatest in each genus is complete. For the greatest is that which cannot be exceeded, and the complete is that beyond which nothing further can be found. The complete difference has reached its end (just as other things are called complete because they have reached their end), and there is nothing beyond the end: in everything the end is the last point and contains the rest, which is why there is nothing beyond the end, and what is complete needs nothing further. From this, then, it is clear that contrariety is complete difference. And since contraries are spoken of in many ways, their being complete will follow in whatever way their being contraries belongs to them. Given this, it is evident that one thing cannot have more than one contrary: nothing could be more extreme than the extreme, and a single interval

cannot have more than two extremes. And in general, if contrariety is a difference, and a difference is between two things, so is complete difference.[4] The other definitions of contraries must also be true. For complete difference differs most (nothing can be found further out than things that differ in genus and in species; for it has been shown that there is no difference in relation to things outside the genus, and among these this is the greatest). Things in the same genus that differ most are contraries (for the complete difference is the greatest difference among these). Things in the same receptive subject that differ most are contraries (for contraries have the same matter). And things that fall under the same capacity and differ most are contraries (for one science deals with one genus). In all these the complete difference is the greatest.—The primary contrariety is possession and privation—not every privation (for "privation" is spoken of in many ways), but whichever is complete. The other contraries will be called so with reference to these: some by having them, some by producing them or being productive of them, some by being acquisitions or losses of these or of other contraries. Now if the kinds of opposition are contradiction, privation, contrariety, and relatives, [1055b] and the first of these is contradiction, and contradiction has no intermediate while contraries can have one, it is clear that contradiction and contraries are not the same. Privation, though, is a kind of contradiction. For what is deprived is either what is wholly incapable of having something, or what would naturally have something but does not have it—either wholly or when specified in some way (we already use this in many senses, as we have distinguished elsewhere). So privation is a kind of contradiction, or an incapacity that is determined or taken together with what receives it. That is why contradiction has no intermediate, while a certain kind of privation does: everything is equal or not equal, but not everything is equal or unequal—only, if anything, what is receptive of equality. Now if comings-to-be, for matter, are from contraries, and they proceed either from the form and the pos-

4 "Complete" (*teleios*) is formed from *telos*, "end," which the argument relies on.

session of the form, or from some privation of the form and shape, it is clear that every contrariety would be a privation, while perhaps not every privation is a contrariety (the reason is that what is deprived can be deprived in many ways); for the contraries are the extremes from which changes proceed. This is evident by induction too. For every contrariety has privation as one of its two contraries, but not all in the same way: inequality is the privation of equality, unlikeness of likeness, badness of excellence. And they differ as has been said. In one case it is enough that the thing be deprived; in another, that it be deprived at some time or in some part—say, at a certain age or in the controlling part—or entirely. That is why some have an intermediate, and a person can be neither good nor bad, while others have none: a number must be either odd or even. Further, some have a determinate underlying subject, others do not. So it is evident that one of two contraries is always spoken of by way of privation. It is enough if this holds of the primary contraries, the genera of contraries, such as the one and the many; for the others are reduced to these.

### HOW THE EQUAL IS OPPOSED TO GREAT AND SMALL

*The equal is the privative negation of both the great and the small.*

Since one thing has one contrary, one might raise the puzzle of how the one is opposed to the many, and the equal to the great and the small. For we always use "whether" in an antithesis—for instance, "whether it is white or black," or "whether it is white or not white." (We do not ask "whether it is a human or white" except on a presupposition, when inquiring, say, "whether Cleon came or Socrates." But this is not necessary in any genus; even this use has come from the other. For only opposites cannot belong at the same time, and this is what is relied on here too, in asking which of the two came; 1056a for if both could have come at once, the question would be absurd. And if they could, even so it falls into an antithesis in the same way, that of one or many—for instance, "whether both came or one of the two.") If,

then, the question "whether" is always about opposites, and we ask "whether it is greater or less or equal," what is the opposition of the equal to these? It is not contrary to one of them alone, nor to both: why to the greater rather than to the less? Further, the equal is contrary to the unequal, so it will be contrary to more than one thing. But if "unequal" means the same as both together, the equal would be opposed to both (and the puzzle helps those who say that the unequal is a dyad); but then it follows that one thing is contrary to two, which is impossible. Further, the equal appears to be intermediate between great and small, but no contrariety appears to be intermediate, nor can it be, given its definition; for it would not be complete if it were intermediate between some things—rather, it always has something intermediate between its own terms. It remains, then, that it is opposed either as negation or as privation. It cannot be the negation or privation of one of the two (why of the great rather than the small?). It is therefore the privative negation of both. That is why "whether" is said with reference to both, and not to one of them (not, for instance, "whether greater or equal," or "whether equal or less"); there are always three. But it is not a privation of necessity; for not everything that is not greater or less is equal, but only things in which those attributes naturally occur.—The equal, then, is what is neither great nor small but is naturally such as to be great or small; and it is opposed to both as a privative negation, which is why it is also intermediate. And what is neither good nor bad is opposed to both, but it has no name; for each of these is spoken of in many ways, and what receives them is not one thing. What is neither white nor black has a better claim to be one. Yet even this is not called by one name, though the things of which this negation is said privatively are in a way determinate: it must be gray or pale yellow or something else of that kind. So those critics are wrong who think that all such phrases are used alike, so that there will be something intermediate between a shoe and a hand—what is neither shoe nor hand—since what is neither good nor bad is intermediate between the good and the bad, as though there will

be something intermediate between any two things. This need not follow. For the joint negation of opposites applies where there is something intermediate and some natural distance between them; [1056b] but between the others there is no difference, since the things jointly denied are in different genera, so that the underlying subject is not one.

### HOW THE ONE IS OPPOSED TO THE MANY

*The one is opposed to the many as measure to what is measured.*

One might raise a similar puzzle about the one and the many. For if the many are opposed to the one without qualification, some impossible consequences follow. The one will be little, or few; for the many are also opposed to the few. Further, two are many, since the double is multiple and "double" is said with reference to two. So one is little: for in relation to what are two many, if not to one and to the little? There is nothing less. Further, if as long and short are in length, so much and little are in plurality, and whatever is much is also many, and the many are much (unless perhaps there is some difference in the case of an easily bounded continuum), then the little will be a plurality.[5] So the one is a plurality, if it is also little; and this must be so if two are many. But perhaps, though "many" is in a way also said as "much," it is with a difference: water, for instance, is much but not many. Rather, "many" is said of things that are divisible: in one sense, if there is a plurality that has an excess, either without qualification or relative to something (and "little," likewise, is a plurality that has a deficiency); in another sense, as number, and in this sense alone it is opposed to the one. For we say "one or many" as if one were to say "one and ones" or "white and whites," or as measured things are related to their measure; and this is also the sense in which multiples are so called. For each number is many because it consists of ones and because each is measurable by one, and many as what is opposed to the

5 Greek uses one word pair, *polu/polla* and *oligon/oliga*, for both "much/many" and "little/few," differing only in number.

one, not to the little. In this sense, then, even two are many—but not as a plurality that has an excess, either relative or absolute: it is the first plurality. Without qualification, two are few; for it is the first plurality that has a deficiency. (This is why Anaxagoras was wrong to leave the matter where he did, when he said that "all things were together, boundless both in plurality and in smallness"; instead of "in smallness" he should have said "in fewness"—for they are not boundless in that.) For fewness is due not to the one, as some say, but to two.—So the one and the many in numbers are opposed as measure to measurable; and these are opposed as those relatives are that are not relatives in their own right.[6] We have distinguished elsewhere that relatives are spoken of in two ways: some as contraries, others as knowledge is related to the knowable, by something else being spoken of in relation to them. [1057a] Nothing prevents one from being less than something, for instance than two; for if it is less, it is not therefore little. Plurality is a sort of genus of number; for number is plurality measurable by one. And one and number are in a way opposed—not as contraries but, as has been said, as some relatives are: they are opposed insofar as one is measure and the other measurable. That is why not everything that is one is a number—for instance, if something is indivisible. But though knowledge is spoken of in the same way in relation to the knowable, the relation does not turn out the same way. For it might seem that knowledge is the measure and the knowable what is measured; but it turns out that all knowledge is knowable, while not everything knowable is knowledge, because in a way knowledge is measured by the knowable. Plurality is neither contrary to the little—rather, what is contrary to that is much, as a plurality that exceeds is to a plurality that is exceeded—nor in every sense to the one. Rather, they are opposed in one sense, as has been said, because the one is divisible and the other indivisible; in another, as relatives, like knowledge to the knowable, if plurality is number and the one is its measure.

6 Anaxagoras of Clazomenae (fifth century BC) held that in the beginning all things were mixed together; the quoted words open his book.

### INTERMEDIATES

*Intermediates lie in the same genus as their contraries and are composed of them.*

Since contraries can have something intermediate, and some do, the intermediates must be composed of the contraries. For all intermediates are in the same genus as the things they are between. We call intermediates the things into which what changes must change first. For instance, if one were to pass from the lowest string to the highest by the smallest steps, one would first come to the intermediate notes; and in colors, if one is to pass from white to black, one will come to crimson and gray before black; and similarly in the other cases. But there is no changing from one genus into another except accidentally—from color to shape, for instance. So intermediates must be in the same genus both as one another and as the things they are between.[7] Now all intermediates are between some opposites; for only from these can there be change in its own right (which is why there cannot be an intermediate between things that are not opposites—for there would then be change that was not from opposites). Of opposites, contradiction has no intermediate (for this is what contradiction is: an antithesis one part or the other of which is present to anything whatever, and which has no intermediate); of the rest, some are relatives, some privations, some contraries. Relatives that are not contraries have no intermediate, and the reason is that they are not in the same genus. 1057b For what is between knowledge and the knowable? But there is something between great and small. And if intermediates are in the same genus, as has been shown, and between contraries, they must be composed of these contraries. For either there will be a genus that includes them or there will be none. And if there is a genus in such a way as to be something prior to the contraries, then the differentiae that make the contrary species, as spe-

7 The Greek names the *hypatē* and the *nētē*, the lowest- and highest-pitched strings of the lyre.

cies of a genus, will be contraries prior to them; for species are made up of the genus and the differentiae. (For instance, if white and black are contraries, and one is a piercing color and the other a compressing color, these differentiae—piercing and compressing—are prior; so these, being contrary to each other, are prior.)[8] But things that differ contrarily are more truly contraries; and the rest, the intermediates, will be made up of the genus and the differentiae. (For instance, all the colors that are between white and black must be described by the genus—and the genus is color—and by certain differentiae. But these will not be the primary contraries; otherwise each color would be either white or black. So they are different; so they will be intermediate between the primary contraries; and the primary differentiae are piercing and compressing.) So we must first ask, of those contraries that are not in a genus, what their intermediates are composed of (for things in the same genus must either be composed of things not compounded with the genus, or else be uncompounded themselves). Contraries, then, are not compounded from each other, and so they are principles; but the intermediates are either all compounded or none are. But something comes to be from the contraries, so that there will be change to it before there is change to the contraries themselves; for it will be both less and more than each of them. So this too will be intermediate between the contraries. All the other intermediates, then, are composite too; for what is more than one and less than the other is in a way composed of those things of which it is said to be more than one and less than the other. And since there are no other things prior to the contraries and of the same genus, all the intermediates would be composed of the contraries. So all the lower things too, both contraries and intermediates, will be composed of the primary contraries. It is clear, then, that intermediates are all in the same genus, are between contraries, and are all composed of the contraries.

8 The examples reflect a theory found in Plato's *Timaeus*: white "pierces," or dilates, the ray of vision, and black "compresses" it.

### DIFFERENCE IN SPECIES

*Things other in species differ by a contrariety within the same genus.*

What is other in species is other than something in something, and this must belong to both: for instance, if it is an animal other in species, both are animals. Things other in species, then, must be in the same genus. For by a genus I mean that one and the same thing which both are said to be, and which is differentiated not accidentally, 1058a whether it is as matter or in some other way. For not only must the common thing belong to both—for instance, both are animals—but this very thing, animal, must also be different for each, for instance a horse in one case and a human in the other; which is why this common thing is other in species in each. In its own right, then, one will be this sort of animal and the other that sort—for instance, one a horse and the other a human. This difference, then, must be an otherness of the genus. For by a difference of the genus I mean an otherness that makes the genus itself other. This, then, will be a contrariety (and this is clear also from induction). For all things are divided by opposites, and it has been shown that contraries are in the same genus; for contrariety was complete difference, and every difference in species is a difference from something in something, so that this is the same thing and is the genus for both. (That is why all contraries that differ in species and not in genus are in the same column of predication, and are other than each other to the highest degree—for the difference is complete—and do not come to be together with each other.) The difference, then, is a contrariety. This, then, is what it is to be other in species: to be in the same genus and to have a contrariety, while being indivisible (and things are the same in species if, being indivisible, they have no contrariety). For contrarieties arise in the course of division, in the intermediate steps, before one reaches the indivisibles. So it is evident that, in relation to what is called the genus, none of the species of the genus is either the same or other in species. (And fittingly so: for matter is indic-

ated by negation, and the genus is the matter of that of which it is called the genus—not in the sense in which we speak of the *genos* of the Heraclidae, but as in nature.) Nor are they so in relation to things not in the same genus: they will differ in genus from those, and in species from things in the same genus. For the difference of what differs in species must be a contrariety, and this belongs only to things in the same genus.[9]

### WHY MALE AND FEMALE ARE NOT DIFFERENT SPECIES

*Contrarieties in the account make species; those in the matter, like sex or color, do not.*

One might raise the puzzle why a woman does not differ in species from a man, when female and male are contraries and difference is contrariety; nor is a female and a male animal other in species, even though this difference belongs to animal in its own right, and not as whiteness or blackness do—female and male belong to it insofar as it is an animal. This puzzle is almost the same as asking why one contrariety makes things other in species and another does not: footed and winged do, for instance, but whiteness and blackness do not. Is it because some are proper affections of the genus, and others less so? And since there is the account on one side and the matter on the other, 1058b contrarieties that are in the account make a difference in species, but those in the thing taken together with the matter do not. That is why paleness or darkness in a human does not make one, and there is no difference in species between a pale human and a dark human, not even if each were given a single name. For the human here is in the role of matter, and matter does not make a difference; for this reason individual humans are not species of human, even though the flesh and bones of which this human and that human are made are different. The composite is other, but not other in species, because there is no contrariety in the account. And this is the last indivisible; Callias is the

9 *Genos* means both "genus" and "family" or "clan"; the Heraclidae were the descendants of Heracles.

account together with the matter. The pale human, then, is so because Callias is pale; so the human is pale accidentally. Nor, then, do a bronze circle and a wooden one differ in species; and if a bronze triangle and a wooden circle differ in species, it is not because of the matter but because there is contrariety in the account. But does matter, since it is in a way other, not make things other in species, or is there a way in which it does? For why is this horse other in species from this human? Yet their accounts include the matter. Is it because there is contrariety in the account? For there is contrariety between a pale human and a dark horse too, and they are other in species—but not insofar as one is pale and the other dark, since even if both were pale, they would still be other in species. Male and female are proper affections of animal, but not in virtue of its substance: they are in the matter and the body. That is why the same seed becomes female or male by being affected in a certain way. What it is to be other in species, then, and why some things differ in species and others do not, has been stated.

### THE PERISHABLE AND THE IMPERISHABLE

*Perishable and imperishable differ in genus, so there cannot be imperishable Forms of perishable things.*

Since contraries are other in species, and the perishable and the imperishable are contraries (for privation is a determinate incapacity), the perishable and the imperishable must be other in genus. So far, though, we have spoken about the universal terms themselves, so it might seem unnecessary for any imperishable thing and any perishable thing to be other in species, just as it is not necessary for white and black (for the same thing can be both, even at the same time, if it is a universal—as "human" could be both pale and dark—and also if it is a particular;



for the same person could be pale and dark, though not at the same time; and yet pale is contrary to dark). But while some

contraries belong to certain things accidentally—both those just mentioned and many others—for others this is impossible, and among these are the perishable and the imperishable. 1059a For nothing is perishable accidentally. What is accidental can fail to belong, whereas perishability is among the attributes that belong of necessity to whatever they belong to. Otherwise one and the same thing will be both perishable and imperishable, if perishability can fail to belong to it. So perishability must be either the substance or in the substance of each perishable thing. The same argument applies to the imperishable, since both belong of necessity. The features, then, by which and in virtue of which primarily one thing is perishable and the other imperishable are in opposition, so that the two must be other in genus. It is evident, then, that there cannot be Forms of the kind some people speak of; for then there will be one human who is perishable and another who is imperishable. Yet the Forms are said to be the same in species as the individuals, and not merely homonymous; but things other in genus are further apart than things other in species.

# Book Kappa (XI)

*A summary of earlier discussions; chance and change.*

## CHAPTER 1

That wisdom is a science concerned with principles is clear from our first discussions, in which we raised puzzles about what others have said about the principles. But one might raise the puzzle whether wisdom should be taken to be one science or many. If one: a single science always deals with contraries, but the principles are not contraries. If not one, what sort of sciences should we take these to be? Further, does it belong to one science or to more to study the principles of demonstration? If to one, why to this one rather than to any other? If to more, what sort of sciences should we take these to be? Further, does it deal with all substances or not? If not all, it is hard to say which; but if one science deals with all, it is unclear how the same science can deal with several things. Further, does it deal only with substances, or also with their accidents?[1] For if there is demonstration about accidents, there is none about substances. But if the sciences are different, what is each, and which of them is wisdom? Insofar as it is demonstrative, wisdom is the science of accidents; insofar as it deals with what is primary, it is the science of substances. Nor, again, should the science we are seeking be taken to deal with the causes discussed in the *Physics*. It does not deal with that for the sake of which: for that is the good, and the good is found among things done and things in motion; and it is the first to move—for the end is of this kind—

1 Much of the first half of Book K goes over ground covered in Books B, Γ and E.

but what first moves is not found among immovable things. In general, it is a puzzle whether the science now being sought is about perceptible substances or not, but about some others. 1059b For if about others, it would be about the Forms or about mathematical objects. Now it is clear that the Forms do not exist. (Still, even if one supposes that they exist, there is a puzzle why the same does not hold of the other things of which there are Forms as holds of mathematical objects. I mean that they place mathematical objects between the Forms and perceptible things, as a kind of third set of things beside the Forms and the things here; but there is no third human or horse beside the human itself and the particular ones. If, on the other hand, things are not as they say, what sort of things should we suppose the mathematician deals with? Certainly not the things here; for none of these is the sort of thing the mathematical sciences inquire into.) Nor, then, is the science now being sought about mathematical objects, since none of them is separable. But neither is it about perceptible substances, since they are perishable. In general, one might raise the puzzle of which science it belongs to to work through the puzzles about the matter of mathematical objects. It does not belong to natural science, because the natural scientist's whole business concerns things that have in themselves a principle of motion and rest; nor to the science that examines demonstration and scientific knowledge, since its inquiry is about precisely that subject. It remains, then, that the philosophy we have set before ourselves conducts the investigation of them. One might also puzzle over whether the science being sought should be taken to be about the principles that some call elements; but everyone takes these to be present in composite things. It might seem, rather, that the science being sought must be of universals; for every account and every science is of universals and not of the lowest things, so that on this view it would be of the primary genera. These would be being and the one; for these more than anything might be supposed to contain all the things that are, and to be most like principles because they are first by nature: if they are des-

troyed, the rest are destroyed with them, since everything is and is one. But insofar as their differentiae must share in them if one posits them as genera, while no differentia shares in its genus, in this respect it would seem that one should posit them neither as genera nor as principles. Further, if what is simpler is more a principle than what is less so, and the lowest members of a genus are simpler than the genera (for they are indivisible, while the genera are divided into many different species), the species would seem to be principles more than the genera. But insofar as species are destroyed along with their genera, the genera are more like principles; for a principle is what destroys other things along with itself. 1060a These, then, and others like them, are the things that raise the puzzle.

### MORE PUZZLES ABOUT SEPARATE SUBSTANCE

*Is there any substance besides perceptible things, and could its principles be being and the one?*

Further, should we posit something beside particulars or not, and is the science being sought about particulars? But these are infinite. And the things beside particulars are genera or species, but the science now being sought is of neither of these; why this is impossible has been stated. For in general it is a puzzle whether one should suppose that there is some separable substance beside perceptible substances—the ones here—or not, but that these are the things that are, and wisdom is concerned with them. For we seem to be seeking some other substance, and this is the task set before us: I mean, to see whether there is anything separable in its own right and belonging to no perceptible thing. Further, if there is some other substance beside perceptible substances, beside which perceptible substances should we suppose it to exist? Why should one posit it beside humans or horses rather than beside the other animals, or even beside inanimate things in general? Yet to construct eternal substances, other than and equal in number to the perceptible and perishable ones, would seem to fall outside what is reasonable. But if

the principle now being sought is not separable from bodies, what could one posit rather than matter? Yet matter does not exist in actuality, but only in potentiality. Form and shape would seem to be a more authoritative principle than matter; but this is perishable, so that there is no eternal substance at all that is separable and exists in its own right. But that is absurd; for such a principle and substance does seem to exist, and it is sought by nearly all the most refined thinkers as something that exists. For how will there be order unless there is something eternal, separable, and lasting? Further, if there is a substance and principle of the kind we are now seeking, and this is one for all things and the same for eternal and perishable things, there is a puzzle why, if the principle is the same, some of the things under it are eternal and others not (for this is absurd). But if there is one principle of perishable things and another of eternal ones, then if the principle of perishable things is eternal too, we will face the same puzzle (for why, if the principle is eternal, are the things under it not eternal too?); and if it is perishable, another principle comes to be of it, and another of that, and this goes on to infinity. If, again, one posits being and the one, which seem more than anything to be immovable principles, then first, if neither of them signifies a this and a substance, [1060b] how will they be separable and exist in their own right? Yet it is principles of this kind, eternal and primary, that we are seeking. But if each of them does indicate a this and a substance, all the things that are are substances; for being is predicated of all things (and the one of some), but it is false that all the things that are are substances. Further, those who say that the first principle is the One and that this is substance, and who generate number first from the One and matter and say that it is substance—how can what they say be true? For how are we to think of the dyad, and each of the other composite numbers, as one? On this they say nothing, and it is not easy to say anything. And if one posits lines or what comes after them (I mean the primary surfaces) as principles, these at any rate are not separable substances but sections and divisions—the former of surfaces, the

latter of bodies (and points of lines)—and further they are limits of these same things; and all these belong in other things, and none is separable. Further, how are we to suppose that there is a substance of the One and of the point? For of every substance there is coming-to-be, but of a point there is none; for a point is a division. It also raises a puzzle that every science is of universals and of the such-and-such, while substance is not among universals but is rather a this and separable; so if there is a science of the principles, how are we to suppose that the principle is substance? Further, is there anything beside the composite or not (I mean the matter and what goes with it)? If not, everything in matter is perishable; if there is something, it would be the form and shape. But in which cases this exists and in which it does not is hard to determine; for in some cases it is clear that the form is not separable—in the case of a house, for instance. Further, are the principles the same in species or in number? For if they are one in number, all things will be the same.

### ONE SCIENCE OF BEING AS BEING

*Being is said in many ways but with reference to one thing, so one science studies it.*

Since the philosopher's science is of being as being, universally and not with regard to a part, and "being" is said in many ways and not in one: if it is said homonymously and not in virtue of anything common, it does not fall under one science (for there is no one genus of such things); but if in virtue of something common, it would fall under one science. It seems, then, to be said in the way we have described, as "medical" and "healthy" are; for each of these too we say in many ways. [1061a] Each of them is said in this way because one thing is referred in some way to medical science, another to health, another in some other way, but each to the same thing. Both an argument and a scalpel are called medical: the one because it comes from medical science, the other because it is useful to it. It is similar with "healthy": one thing is called so because it signifies health, another

because it produces it. And the same holds for the rest. It is in this same way that everything that is is called "being": each of these things is called being because it is an affection, or a state, or a disposition, or a motion, or something else of this kind, of being as being. And since everything that is is referred to some one common thing, each of the contrarieties too will be referred to the primary differences and contrarieties of being, whether the primary differences of being are plurality and unity, or likeness and unlikeness, or some others; let these be taken as already studied. It makes no difference whether what is is referred to being or to the one. For even if they are not the same but different, they are at least convertible: what is one is also in a way being, and what is being is one.—Since it belongs to one and the same science to study all contraries, and each of them is spoken of by way of privation—though one might raise a puzzle about some, how they can be spoken of by way of privation, namely those that have something in between, as the unjust and the just do—in all such cases one must take the privation to be not of the whole account but of the last species. For instance, if the just person is one who, by some state, is obedient to the laws, the unjust person will not in every case be deprived of the whole account, but will fall short in some respect in obeying the laws, and the privation will belong to him in this respect; and similarly in the other cases.—The mathematician studies things that result from abstraction. He studies them after stripping away all perceptible attributes, such as heaviness and lightness, hardness and its contrary, and also heat and cold and the other perceptible contrarieties, and leaves only the quantitative and continuous—some in one dimension, some in two, some in three—and their attributes insofar as they are quantitative and continuous, and does not study them in any other respect. Of some he examines their positions relative to each other and what belongs to these, [1061b] of others their commensurabilities and incommensurabilities, of others their ratios; yet we posit one and the same science of all of them, geometry. It is the same way with being. For the attributes of being insofar as it is being, and

its contrarieties as being, it belongs to no science other than philosophy to study. For one would assign to natural science the study of things not insofar as they are beings but rather insofar as they share in motion; and dialectic and sophistic deal with the accidents of things that are, but not insofar as they are beings, nor with being itself insofar as it is being. So it remains that it is the philosopher who studies the things we have mentioned, insofar as they are beings. Since everything that is is said in virtue of some one common thing, though it is said in many ways, and contraries are said in the same way (for they are referred to the primary contrarieties and differences of being), and such things can fall under one science, the puzzle stated at the beginning would be resolved—I mean the one in which we puzzled over how there could be a single science of things that are many and different in genus.

### FIRST PHILOSOPHY, MATHEMATICS AND PHYSICS

*First philosophy studies the common axioms and being as being; mathematics and physics study parts.*

Since the mathematician too uses the common principles in a way specific to his subject, it would also belong to first philosophy to study their principles. That when equals are taken from equals the remainders are equal is common to all quantities; but mathematics marks off some part of its proper matter and studies that—lines, for instance, or angles or numbers or some other kind of quantity—not insofar as they are beings, but insofar as each of them is continuous in one, two, or three dimensions. Philosophy, on the other hand, does not examine particular things insofar as each of them has some attribute; it studies being, insofar as each such thing is a being. Natural science is in the same position as mathematics. Natural science studies the attributes and the principles of the things that are insofar as they are in motion, and not insofar as they are beings (whereas the first science, we have said, deals with these insofar as the underlying subjects are beings, and not insofar as they

are something else). That is why both natural science and mathematical science must be taken to be parts of wisdom.

### THE PRINCIPLE OF NON-CONTRADICTION

*The same thing cannot be and not be at once; it can only be defended against an opponent.*

There is a principle in the things that are about which one cannot be mistaken, but must always do the contrary—I mean, be right: the principle that the same thing cannot at one and the same time be and not be, [1062a] and the others that are opposed to each other in this way. Of such principles there is no demonstration without qualification, but there is one against a particular person. For one cannot construct a deduction of this from a more certain principle than itself; yet one would have to, if it is to be demonstrated without qualification. But against someone who asserts opposite statements, anyone showing why this is false must take something of this kind: something that will be the same as "the same thing cannot be and not be at one and the same time," but will not seem to be the same. For only in this way could it be demonstrated against someone who says that opposite statements can be truly asserted of the same thing. Those who are going to share in discussion with each other must understand each other to some extent; for if this does not happen, how will they share in discussion with each other? Each word, then, must be intelligible and indicate something—not many things, but only one; and if it signifies more than one, one must make clear which of these the word refers to. So whoever says that this is and is not denies what he asserts, and so denies that the word signifies what it signifies; and this is impossible. So if "to be this" signifies something, it is impossible for the contradiction to be true. Further, if a word signifies something and this is truly asserted, it must be so of necessity; and what is of necessity cannot ever not be; so opposite affirmations and negations cannot be true of the same thing. Further, if the affirmation is no more true than the negation, whoever calls something

a human will be no more right than whoever calls it not a human. It would seem, too, that whoever says the human is not a horse would be either more right, or no less right, than whoever says he is not a human; so whoever says he is a horse will also be right (for opposite statements were equally true). It follows, then, that the same being is a human and a horse, or some other animal.—There is, then, no demonstration of these principles without qualification, but there is a demonstration against the person who holds these views. By questioning him in this way, one could quickly have compelled even Heraclitus himself to agree that opposite statements can never be true of the same things; as it is, he adopted this opinion without understanding what he himself was saying. And in general, if what he says is true, not even this itself would be true, [1062b] I mean that the same thing can at one and the same time both be and not be. For just as, when they are separated, the affirmation is no more true than the negation, in the same way, when the two are combined and woven together as though into a single affirmation, the whole, posited as an affirmation, will be no more true than its negation. Further, if nothing can be truly affirmed, then this itself would be false: the claim that there is no true affirmation. But if there is some true affirmation, then what is said by those who raise such objections and do away with discussion altogether would be refuted.

### PROTAGORAS AND THE APPEARANCES

*The view that each appearance is true comes from natural philosophy and from disagreements in perception.*

Close to what has been said is the saying of Protagoras as well. For he said that a human being is the measure of all things, meaning nothing other than that what seems so to each person also firmly is so. But if this is so, it follows that the same thing both is and is not, and is bad and good, and so with everything else expressed in opposite statements, since often a given thing appears beautiful to these people and the contrary to those, and

what appears to each is the measure. This puzzle would be resolved if one considered where this belief took its start. It seems to have arisen for some from the opinion of the natural philosophers, and for others from the fact that not everyone judges the same things in the same way, but a given thing seems pleasant to these people and the contrary to those. For that nothing comes to be from what is not, but everything from what is, is a doctrine common to nearly all who have written about nature. Since, then, a thing does not become white if it was already perfectly white and in no way not white, what becomes white would come to be from what is not white; so on their view it would come to be from what is not, unless the same thing was white and not white to begin with. But it is not hard to resolve this puzzle; for it has been stated in the *Physics* how things that come to be come to be from what is not, and how from what is. And to pay equal attention to the opinions and impressions of people who disagree with each other is simple-minded; for clearly one side or the other must be mistaken. This is evident from what happens in perception. For the same thing never appears sweet to some and the contrary to others [1063a] unless in one of the two groups the sense organ that discerns the flavors in question has been damaged or impaired. That being so, one group must be taken as the measure and the other not. I say the same about good and bad, beautiful and ugly, and all other such things. For to claim this is no different from claiming that what appears to people who press a finger under the eye and make one thing look like two must be two, because it appears to be that many—and again one; for to those who do not move their eye, the one thing appears one. In general, it is absurd to base our judgment about the truth on the fact that the things here appear to change and never remain in the same state. For one must hunt for the truth on the basis of things that are always in the same state and undergo no change; and such are the things in the heavens. For these do not appear one way at one time and different at another, but are always the same and share in no change. Further, if there is motion, there is also something

moved, and everything is moved from something and into something. So what is moved must be in that from which it will be moved and also not be in it, and must be moved into this and come to be in it; but the contradictory statements are not true together, as they claim. And if the things here are continuously in flux and motion with respect to quantity—suppose one grants this, though it is not true—why should they not remain constant with respect to quality? For it seems to be not least because they have assumed that quantity does not remain constant in bodies that they predicate contradictories of the same thing, and say that the same thing both is and is not four cubits long. But substance goes with quality, and this belongs to a determinate nature, whereas quantity belongs to the indeterminate. Further, why, when the doctor prescribes that they take this particular food, do they take it? For why is this bread rather than not bread? So it would make no difference whether they ate or did not eat. As it is, they take it as if they were right about it, and as if this were the food prescribed. Yet they ought not to, if no nature remained firmly constant among perceptible things, but all were always in motion and flux. Further, if we are always being altered and never remain the same, what wonder is it if things never appear the same to us, as to the sick? 1063b (For to them too, because their condition is not the same as when they were healthy, the objects of perception do not appear alike—not that the perceptible things themselves share in any change on this account, but they produce different sensations in the sick, and not the same ones. And it is perhaps necessary that it is the same way if the change we mentioned takes place.) But if we do not change but go on being the same, there would be something that remains.—Now against those who hold the puzzles described on the basis of argument, it is not easy to resolve them unless they posit something and no longer demand an argument for it; for this is how every argument and every demonstration comes about. By positing nothing they do away with discussion, and with argument altogether. So against such people there is no argument; but against those who are per-

plexed because of the puzzles handed down, it is easy to respond and to remove what produces the puzzle in them. This is clear from what has been said. So it is evident from this that opposite statements cannot be true of the same thing at one time, nor can contraries, since every contrariety is spoken of by way of privation. This is clear if one analyzes the accounts of contraries back to their principle. Similarly, none of the intermediates can be predicated of one and the same thing. For if the subject is white, we will speak falsely if we say that it is neither black nor white; for it follows that it is white and is not white. For one of the two combined terms will be true of it, and this is the contradictory of white. So one cannot speak truly either on Heraclitus' view or on Anaxagoras'; otherwise it will follow that contraries are predicated of the same thing. For when Anaxagoras says that in everything there is a portion of everything, he is saying that it is no more sweet than bitter, or any other of the contrarieties whatever, if everything is present in everything not only potentially but in actuality and separated out. Similarly, it is not possible for all statements to be false, nor for all to be true—both because of the many other difficulties that this thesis would bring with it, and because if all are false, not even someone who says so will be right, while if all are true, someone who says they are all false will not be speaking falsely.

### THE THREE THEORETICAL SCIENCES

*Physics, mathematics and theology are the theoretical sciences, and theology, about separate unmovable substance, is highest.*

Every science seeks certain principles and causes for each of the knowable things that fall under it— [1064a] medicine and gymnastics, for instance, and each of the other sciences, productive and mathematical. For each of these marks off some genus for itself and deals with it as something that exists and is, but not insofar as it is; that is the concern of another science beside these. Each of the sciences mentioned grasps in some way the what-it-is in each genus, and tries to demonstrate the rest more

loosely or more precisely. Some grasp the what-it-is through perception, others by hypothesis; which is also why it is clear from such an induction that there is no demonstration of substance and of the what-it-is. And since there is a science of nature, it is clear that it will be different both from a practical science and from a productive one. For in a productive science the principle of motion is in the producer and not in the thing produced, and this is either a craft or some other capacity; and similarly in a practical science the motion is not in the thing done but rather in the doers. But the science of the natural scientist deals with things that have in themselves a principle of motion. From this it is clear that natural science must be neither practical nor productive but theoretical (for it must fall into one of these kinds). And since each of the sciences must in some way know the what-it-is and use it as a principle, we must not overlook how the natural scientist should define, and how the account of the substance is to be taken—whether like the snub, or rather like the concave. Of these, the account of the snub is stated together with the matter of the thing, while that of the concave is stated without the matter. For snubness occurs in a nose, which is why its account too is considered together with the nose: the snub is a concave nose. It is evident, then, that the account of flesh, of the eye, and of the other parts must always be given together with the matter. Since there is a science of being as being and as separable, we must consider whether this should be taken to be the same as natural science or rather different. Natural science deals with things that have a principle of motion in themselves; mathematics is theoretical and concerned with things that remain, but not with separable ones. About being that is separable and immovable, then, there is a science different from both of these, if there is a substance of this kind—I mean, separable and immovable—which we shall try to show. And if there is such a nature among the things that are, this is where the divine would be found, and this would be the first and most authoritative principle. [1064b] It is clear, then, that there are three kinds of theoretical science: natural science, mathematics, and theology.

The kind made up of theoretical sciences is the best, and among these the last mentioned is best; for it deals with the most honorable of the things that are, and each science is called better or worse according to its own object of knowledge. One might raise the puzzle whether the science of being as being should be taken to be universal or not. For each of the mathematical sciences deals with some one determinate genus, while the universal one is common to all. Now if natural substances are the first of the things that are, natural science would also be the first of the sciences; but if there is another nature and substance, separable and immovable, the science of it must also be different, and prior to natural science, and universal by being prior.

### THE ACCIDENTAL AND LUCK

*There is no science of the accidental; luck is an accidental cause among things done for a purpose.*

Since being without qualification is said in several ways, one of which is being said to be accidentally, we must first consider being of this kind. That none of the traditional sciences deals with the accidental is clear. (Housebuilding does not consider what will happen to those who will use the house—whether they will live in it unhappily, for instance, or the reverse—nor do weaving, shoemaking, or cookery; each of these sciences considers only what is proper to it in its own right, and this is its own end. Nor does any of them consider the fact that someone who is musical, on becoming literate, will be both at once, not having been so before—and what is, but not always, has come to be—so that he became musical and literate at once. None of the sciences agreed to be sciences seeks this except sophistic; for it alone deals with the accidental, which is why Plato was not wrong to say that the sophist spends his time on what is not.) That there cannot even be a science of the accidental will be evident if we try to see what the accidental actually is.[2] Of everything, we say that some of it is always and of necessity

2 The reference is to Plato's dialogue *Sophist*.

(necessity not in the sense of force, but the kind we rely on in demonstrations), some is for the most part, and some is neither for the most part nor always and of necessity, but as it happens. For instance, there might be cold in the dog days, but this happens neither always and of necessity nor for the most part, though it might happen at some time. 1065a The accidental, then, is what happens, but not always or of necessity or for the most part. What the accidental is has now been stated, and why there is no science of such a thing is clear: every science is of what is always or for the most part, and the accidental is in neither of these. That accidental being does not have causes and principles of the same kind as being in its own right is clear; for then everything would be of necessity. For if this is when that is, and that when something else is, and this not as it happens but of necessity, then what that was the cause of will also be of necessity, down to the last thing said to be caused (but this was supposed to be accidental). So everything will be of necessity, and chance—things turning out either way—and the possibility both of coming to be and of not coming to be are removed entirely from events. And if the cause is supposed to be not something that is but something coming to be, the same results will follow; for everything will come to be of necessity. For tomorrow's eclipse will happen if this happens, and this if something else does, and that if yet another thing does; and in this way, as time is subtracted from the limited time between now and tomorrow, one will eventually come to what exists already. So since this exists, everything after it will happen of necessity, so that everything happens of necessity. As for being in the sense of the true and being accidentally: the former lies in a combination in thought and is an affection of thought (which is why it is not the principles of being in this sense that are sought, but those of being that is outside and separable); the latter is not necessary but indeterminate—I mean the accidental—and the causes of such a thing are unordered and infinite.—That for the sake of which is found in things that come to be by nature or from thought; and it is luck when one of these comes about accident-

ally. For just as some being is in its own right and some accidental, so too with cause. Luck is an accidental cause in things that come to be for the sake of something in accordance with decision. That is why luck and thought concern the same things; for there is no decision without thought. The causes from which lucky results might come about are indeterminate. That is why luck is obscure to human reasoning, and is a cause accidentally, but without qualification a cause of nothing. Luck is good or bad when the outcome is good or bad; good fortune and misfortune concern these on a large scale. [1065b] Since nothing accidental is prior to what is in its own right, neither are accidental causes prior. If, then, luck or spontaneity is a cause of the heavens, intellect and nature are prior causes.

### WHAT MOTION IS

*Motion is the actuality of what is potential, insofar as it is potential.*

Some things are in actuality only, some in potentiality, and some both in potentiality and in actuality—some as beings, some as quantities, and some in the other categories. There is no motion apart from things; for what changes always changes according to the categories of being, and there is nothing common to these that is not in one category. Each belongs to everything in two ways—for instance, the this: one is its form, the other its privation; with respect to quality, white and black; with respect to quantity, complete and incomplete; with respect to locomotion, up and down, or light and heavy. So there are as many kinds of motion and change as there are of being. Since in each genus there is a distinction between what is potentially and what is in actuality, I call the actuality of what is potentially, insofar as it is such, motion. That we are right is clear from the following. When the buildable, insofar as we call it such, is in actuality, it is being built, and this is building; and similarly with learning, healing, walking, jumping, aging, ripening. Motion occurs when this actuality itself is present, and neither before nor after. The actuality of what is potentially, then, when it is active, being in

actuality—not insofar as it is itself but insofar as it is movable—is motion. By "insofar as" I mean this. Bronze is potentially a statue; yet the actuality of bronze, insofar as it is bronze, is not motion. For to be bronze and to be potentially something are not the same, since if they were the same without qualification, in account, the actuality of bronze would be a motion. But they are not the same. (This is clear in the case of contraries: being capable of being healthy and being capable of being ill are not the same—otherwise being healthy and being ill would be the same—but the underlying subject, which is healthy and which is ill, whether it is moisture or blood, is one and the same.) And since they are not the same, just as color and the visible are not the same, it is the actuality of what is capable, insofar as it is capable, that is motion. That this is motion, then, and that things are in motion just when this actuality itself is present, and neither before nor after, is clear. (For each thing can be active at one time and not at another— 1066a the buildable, for instance, insofar as it is buildable; and the actuality of the buildable insofar as it is buildable is building. For the actuality is either this—the building—or the house. But when there is a house, it is no longer buildable, whereas what is being built is the buildable. So the actuality must be building, and building is a kind of motion. The same argument applies to the other motions too.) That this has been stated correctly is clear from what others say about motion, and from the fact that it is not easy to define it in any other way. For one could not place it in any other genus. This is clear from what people say. Some call it otherness and inequality and not-being; but none of these need be in motion, nor is change to or from these any more than to or from their opposites. The reason for placing it among these is that motion seems to be something indeterminate, and the principles in the second column are indeterminate because they are privative; for none of them is a this or a such, nor in any of the other categories.[3] The reason motion seems to be indeterminate is that it cannot

3 The "column" is one side of the Pythagorean table of paired opposites (limit/unlimited, odd/even, one/plurality, straight/curved, good/bad, and so on).

be placed either under the potentiality of things or under their actuality; for neither what can be of a certain quantity nor what is actually of a certain quantity is necessarily in motion. And motion seems to be a kind of actuality, but incomplete; the reason is that what is potential, of which it is the actuality, is incomplete. That is why it is hard to grasp what it is: it must be placed either under privation, or under potentiality, or under actuality without qualification, and none of these seems possible. What remains, then, is that it is what we have said—an actuality, and actuality of the kind described—which is hard to see but can exist. And it is clear that motion is in the movable; for it is the actuality of the movable, brought about by what is capable of causing motion. And the actuality of what is capable of causing motion is no different. For there must be an actuality of both. A thing is capable of causing motion by being able to, and actually causes it by being active; but what it activates is the movable. So the actuality of both is one in the same way that the interval from one to two and from two to one is the same, and so is the road uphill and the road downhill, though their being is not one. It is the same with the mover and the moved.

### THE INFINITE

*No actual infinite exists, either as a separate thing or as a perceptible body.*

The infinite is either what cannot be traversed because it is not of a nature to be traversed, in the way that a sound is invisible; or what admits of a traversal that never ends; or what can scarcely be traversed; or what, though of a nature to have a traversal or a limit, does not have one. Further, a thing is infinite by addition, or by subtraction, or both. 1066b Now the infinite cannot be a separate thing existing by itself. For if it is neither a magnitude nor a plurality, but the infinite itself is a substance and not an accident, it will be indivisible (for what is divisible is either a magnitude or a plurality); and if it is indivisible, it is not infinite, except in the way that a sound is invisible. But that is

not what people mean, nor what we are inquiring into: we mean the infinite as what cannot be traversed. Again, how can the infinite exist in its own right, if number and magnitude, of which infinity is an attribute, do not? Further, if it is infinite accidentally, it could not, as infinite, be an element of the things that are, any more than the invisible is an element of speech, even though speech is invisible. And it is clear that the infinite cannot exist in actuality. For then any part of it that one took would be infinite (for to be infinite and the infinite are the same, if the infinite is a substance and not predicated of a subject). So it is either indivisible or, if it has parts, divisible into infinites. But the same thing cannot be many infinites (for as air is part of air, so an infinite would be part of an infinite, if it is a substance and a principle). It must, then, be without parts and indivisible. But what is actually infinite cannot be so, since it must be a quantity. So the infinite belongs to things accidentally. But if so, it has been said that it cannot be a principle; the principle is rather that to which it is accidental, the air or the even.—This inquiry, then, has been general. But that the infinite is not found among perceptible things is clear from the following. If the definition of body is "what is bounded by surfaces," there could be no infinite body, whether perceptible or intelligible; nor could there be a number that is separate and infinite, since a number, or what has a number, is countable. From the standpoint of physics, it is clear from these considerations: the infinite can be neither composite nor simple. It will not be a composite body if the elements are limited in number. (For the contraries must balance, and none of them can be infinite: if the power of one body falls short of the other's by any amount at all, the finite will be destroyed by the infinite. And each of them cannot be infinite, since a body is what has extension in every direction, and the infinite is what extends without limit; so if the infinite is a body, it will be infinite in every direction.) Nor can the infinite be a single, simple body—neither, as some say, something apart from the elements, from which they generate the elements (for there is no such body apart from the elements:

everything is dissolved into what it is made of, and no such thing is observed apart from the simple bodies), [1067a] nor fire nor any other of the elements. For quite apart from any of them being infinite, it is impossible for the universe, even if it is finite, either to be or to become any one of them, in the way that Heraclitus says all things at some time become fire. The same argument applies to the one that the natural philosophers posit apart from the elements. For everything changes from a contrary, from hot to cold, for instance.—Further, a perceptible body is somewhere, and the whole and the part have the same place, as with the earth. So if the infinite is homogeneous, it will either be motionless or always be moving. But this is impossible. (For why should it move down rather than up, or anywhere else? If there were a clod of earth, for example, where would it move or stay at rest? The place of the body akin to it is infinite. Will it, then, occupy the whole place? And how? What, then, will its rest or its motion be? Either it will rest everywhere, and then it will not move; or it will move everywhere, and then it will not come to a stop.) And if the universe is not homogeneous, its places are not alike either. First, then, the body of the universe will not be one, except by contact; and second, its parts will be either finite or infinite in kind. They cannot be finite: for then, if the universe is infinite, some of them would be infinite and others not—fire, say, or water—and such a thing would mean destruction for their contraries. And if they are infinite and simple, the places too will be infinite, and there will be infinitely many elements. But if this is impossible and the places are finite, the universe too must be finite. In general, there cannot be an infinite body, or an infinite place for bodies, if every perceptible body has either weight or lightness. For it will move either toward the middle or upward, and the infinite—whether the whole or the half of it—cannot undergo either. For how will you divide it? Or how will part of the infinite be down and part up, or part at the extremity and part in the middle? Further, every perceptible body is in a place, and there are six kinds of place, but these cannot exist in an infinite body. In general, if there cannot be an

infinite place, there cannot be an infinite body either. For what is in a place is somewhere, and this means up or down or one of the other directions, and each of these is a limit. The infinite is not the same in magnitude, in motion, and in time, as though it were a single nature. Rather, what is posterior is called infinite by reference to what is prior: motion, for instance, by reference to the magnitude over which something moves, or alters, or grows; and time because of motion.

### KINDS OF CHANGE

*Change is between contraries or contradictories; coming to be and passing away are not motions.*

1067b What changes changes in some cases accidentally, as when the musical walks. In other cases it is said to change without qualification because something belonging to it changes, as with things that change in their parts (the body is healed because the eye is). And there is something that is moved primarily and in its own right, and this is what is movable in its own right. The same holds for the mover: it causes motion accidentally, or in respect of a part, or in its own right. There is something that is the first mover; there is something that is moved; and further there is the time in which, that from which, and that into which. But the forms, the attributes, and the place into which moving things are moved are unmoved—knowledge, for instance, and heat. It is not heat that is a motion, but heating. Change that is not accidental is not found in all things, but between contraries, their intermediates, and contradictories; the evidence for this comes from induction. What changes changes from subject to subject, or from not-subject to not-subject, or from subject to not-subject, or from not-subject to subject (by "subject" I mean what is signified by an affirmative term). So there must be three kinds of change; for change from not-subject to not-subject is not change, since the terms are neither contraries nor contradictories, there being no opposition between them. Change from not-subject to subject, which is change by way of contra-

diction, is coming-to-be—unqualified coming-to-be when it is unqualified, and a particular coming-to-be when it is particular. Change from subject to not-subject is passing away—unqualified when it is unqualified, and particular when it is particular. Now if "what is not" has several senses, and neither what is not in the sense of combination or separation can be moved, nor what is not in the sense of potentiality, which is opposed to what is without qualification (for the not-white or the not-good can nevertheless be moved accidentally, since the not-white might be a human being; but what is not a "this" without qualification cannot be moved in any way), then what is not cannot be moved. (If so, coming-to-be cannot be motion either, since it is what is not that comes to be. For even if it comes to be only accidentally, still it is true to say that "not being" belongs to what comes to be without qualification.) Likewise, what is not cannot be at rest either. These awkward consequences follow, then; and further, everything that is moved is in a place, but what is not is not in a place, for then it would be somewhere. Nor, then, is passing away a motion. For the contrary of a motion is a motion or rest, whereas the contrary of passing away is coming-to-be. [1068a] Since every motion is a kind of change, and the changes are the three we have described, and of these the changes by way of coming-to-be and passing away are not motions—these are the ones between contradictories—it follows that only change from subject to subject is motion. The subjects are either contraries or intermediates (for let privation too count as a contrary), and they are signified by an affirmative term: naked, toothless, black, for instance.

### NO CHANGE OF CHANGE

*Motion occurs only in quality, quantity and place; together, touching and continuity are defined.*

If, then, the categories are divided into substance, quality, place, acting or being acted on, relation, and quantity, there must be three kinds of motion: of quality, of quantity, and of place. There

is no motion with respect to substance, because nothing is contrary to substance. Nor is there motion of relation (for when one of the two relata changes, the other may cease to be truly said of it without changing at all, so that their motion is accidental). Nor is there motion of agent and patient, or of mover and moved, because there is no motion of motion, nor coming-to-be of coming-to-be, nor in general change of change. For there could be motion of motion in two ways. First, motion might be the subject that is moved: as a human being is moved because he changes from pale to dark, so motion too would be heated or cooled or change its place or grow. But this is impossible, since change is not a subject. Or, second, some other subject might change from one change into another form—a human being, say, from sickness into health. But this too is not possible, except accidentally. For every motion is a change from something into something else, and so likewise are coming-to-be and passing away—except that these go into opposites in one way and motion in another. So a thing would at the same time be changing from health into sickness and from this very change into another. Clearly, then, once it has fallen sick, it will have changed into some change or other (for it can be at rest), and moreover never into just any chance change; and that change too will be from something into something else. So it will be the opposite change, getting well—but only accidentally, just as a change from remembering to forgetting occurs because the thing it belongs to is changing, now toward knowledge and now toward ignorance.—Further, there will be an infinite regress if there is change of change and coming-to-be of coming-to-be. For if the later exists, the earlier must too. If, for example, simple coming-to-be was once coming to be, then what was coming to be was also coming to be; [1068b] so there was not yet what was simply coming to be, but something that was coming to be coming to be. And this too was once coming to be, so that at that time it was not yet coming to be. But since in an infinite series there is no first term, there will be no first here, and so no next either. Nothing, then, could come to be, or be moved, or change.

Further, the same thing is capable of a motion and of the contrary motion and of rest, and of coming-to-be and passing away. So what is coming to be, when it has come to be coming to be, would then be passing away. For it cannot be passing away as soon as it is coming to be, nor afterward, since what passes away must exist. Further, there must be matter underlying what comes to be and what changes. What, then, will it be? As the body or the soul is what undergoes alteration, what is it that becomes motion or coming-to-be? And further, what is it that they move into? For motion or coming-to-be must be of this thing, from this, into that. How, then, can this be? There cannot be a learning of learning, and so there cannot be a coming-to-be of coming-to-be either. Since there is no motion of substance, of relation, or of acting and being acted on, it remains that motion is with respect to quality, quantity, and place (for each of these admits of contrariety). By quality I do not mean the quality in the substance (for the differentia too is a quality) but the affective quality, in virtue of which a thing is said to be acted on or to be incapable of being acted on. The immovable is what cannot be moved at all; what can be moved only with difficulty, over a long time, or starts slowly; and what is of a nature to be moved and is capable of it, but is not moved when, where, and as it is of a nature to be. This last is the only kind of the immovable that I call being at rest. For rest is contrary to motion, so it must be a privation in what is receptive of motion. Things are together in place when they are in one primary place, and apart when they are in different places. Things touch when their extremities are together. Between is what a changing thing naturally reaches before it reaches the last point into which it changes, when it changes continuously in accordance with nature. Contrary in place is what is farthest away in a straight line. Successive is what comes after the starting point—its order being fixed by position, by form, or in some other way—with nothing of the same genus between it and what it succeeds: lines after a line, for instance, or units after a unit, or a house after a house (nothing prevents something of another kind from being between).

For what is successive succeeds something and comes after it: one does not succeed two, nor the first day of the month the second. [1069a] Contiguous is what is successive and touches. Since all change is between opposites, and these are contraries and contradictories, and there is no middle term between contradictories, it is clear that what is between is found among contraries. The continuous is a kind of the contiguous. I call things continuous when the limits of each, at which they touch and are held together, become one and the same; so it is clear that continuity belongs to things out of which some one thing naturally comes to be through their contact. It is also clear that succession is primary. (For what is successive need not touch, but what touches is successive; and if something is continuous it touches, but if it touches it is not yet continuous; and where there is no touching there is no growing together.) So a point is not the same as a unit: points can touch, but units cannot—they can only be successive; and between points there is something, but not between units.

# Book Lambda (XII)

*Kinds of substance and the unmoved mover.*

## CHAPTER 1

Our study is about substance, for it is the principles and causes of substances that we are seeking. For if the universe is a kind of whole, substance is its first part; and if it is a series, even so substance comes first, then quality, then quantity. At the same time, these others are not even beings in the unqualified sense, so to speak, but qualities and motions—or else the not-white and the not-straight would be beings too; at any rate we say that these also are, as in "it is not-white." Further, none of the others is separable. The ancients too bear witness to this in practice, for it was of substance that they sought the principles, elements, and causes. Thinkers today tend to posit universals as substances (for the genera are universal, and these they say are more truly principles and substances, because their approach to the inquiry is abstract and logical); the thinkers of old posited particular things—fire and earth, for instance—and not what is common to them, body. There are three kinds of substance. One is perceptible—and of this one kind is eternal and another perishable, the latter recognized by everyone, plants and animals, for instance—and of this we must grasp the elements, whether one or many. Another is unmovable, and this some say is separate: some divide it into two, others put the Forms and mathematical objects into one nature, and others recognize only the mathematical objects among these. The first two kinds belong to physics (for they involve motion); [1069b] the third belongs to another science, if there is no principle common to them.

Perceptible substance is subject to change. Now if change is from opposites or from intermediates—not from all opposites, though (for a sound is not-white), but from the contrary—there must be something underlying that changes into the contrary state; for the contraries themselves do not change.

### MATTER AND THE CONTRARIES

*All change needs matter that persists and is potentially both contraries.*

Further, something persists, while the contrary does not persist. There is, then, some third thing besides the contraries: the matter. Now if changes are of four kinds—with respect to what a thing is, or its quality, or quantity, or where it is—and simple coming-to-be and passing away are change with respect to the "this," growth and diminution change with respect to quantity, alteration change with respect to an attribute, and locomotion change with respect to place, then the changes will be into the contrary states in each of these respects. The matter, then, that changes must be capable of both contraries. And since what is has two senses, everything changes from what is potentially to what is actually—from potentially white to actually white, for instance, and likewise in the case of growth and diminution. So not only can a thing come to be, accidentally, from what is not; all things also come to be from what is, though from what is potentially and is not actually. And this is the "one" of Anaxagoras; for instead of "all things together"—and the "mixture" of Empedocles and Anaximander, and what Democritus says—it is better to say "all things were together potentially, but not actually." So these thinkers would have been grasping at matter. All things that change have matter, but different kinds of matter; and of eternal things, those that do not come to be but are movable by locomotion have matter too—not matter for coming-to-be, but for moving from somewhere to somewhere. One might raise the puzzle: from what sort of "what is not" does coming-to-be proceed? For "what is not" has three senses. If,

then, something exists potentially, still it is not potentially any chance thing; different things come from different things. Nor is it enough to say that "all things were together," for they differ in their matter; otherwise why did infinitely many things come to be and not one? For intellect is one, so if the matter too were one, only that thing would have come to be in actuality which the matter was potentially. There are, then, three causes and three principles: two form the contrariety, of which one side is the account and form and the other is privation; the third is the matter.

### NEITHER MATTER NOR FORM COMES TO BE

*Each substance comes from something of the same kind; only intellect might survive the body.*

Next, neither the matter nor the form comes to be—I mean the ultimate matter and form. For everything that changes is something, and is changed by something, and into something. 1070a That by which it is changed is the first mover; that which is changed is the matter; that into which it is changed is the form. So there would be an infinite regress if not only the bronze comes to be round but also the round, or the bronze, comes to be. There must, then, be a stopping point.—Next, each substance comes to be from something that shares its name and nature (for natural things and the others are substances). For things come to be by craft, by nature, by luck, or spontaneously. Craft is a principle in something other than the thing produced; nature is a principle in the thing itself (for a human being begets a human being); and the remaining causes are privations of these. There are three substances. There is the matter, which is a "this" by appearing to be one (for things that are one by contact and not by growing together are matter and underlying subject); there is the nature, a "this" and a state toward which coming-to-be proceeds; and third, there is the particular composed of these, Socrates or Callias, for instance. In some cases the "this" does not exist apart from the composite substance; the form of a

house, for instance, does not, unless we mean the craft. (Nor is there coming-to-be and passing away of these forms; rather, the house without matter, and health, and everything that is produced by craft, are and are not in a different way.) If it does exist apart, it is in the case of natural things. That is why Plato was not wrong to say that there are Forms of as many things as there are by nature—if indeed there are Forms distinct from these things. (Fire, flesh, head: all these are matter, and the last is the matter of what is most fully substance.) Moving causes exist beforehand, while causes in the sense of the account exist at the same time as what they cause. For when a human being is healthy, then health too exists; and the shape of the bronze sphere exists at the same time as the bronze sphere. (Whether anything also survives afterward must be considered; for in some cases nothing prevents it. The soul may be like this—not all of it, but the intellect; for presumably it is impossible for all of it to survive.) It is clear, then, that there is no need, on these grounds at least, for the Forms to exist. For a human being begets a human being, a particular individual a particular individual. Similarly with the crafts: the medical craft is the account of health.

### THE SAME PRINCIPLES BY ANALOGY

*All things have the same principles only by analogy: form, privation, matter and a mover.*

In one sense the causes and principles are different for different things; in another sense, if one speaks universally and by analogy, they are the same for all. For one might raise the puzzle whether the principles and elements of substances and of relations are different or the same, and likewise for each of the categories. But it would be absurd if they were the same for all; for then relations and substances would come from the same elements. [1070b] What, then, would this element be? For besides substance and the other categories there is nothing common to them, and an element is prior to what it is an element of. But

substance is not an element of relations, nor is any relation an element of substance. Further, how can all things have the same elements? For none of the elements can be the same as what is composed of elements—B or A the same as BA, for instance. (Nor, then, can any of the intelligibles, such as being or unity, be an element; for these belong to each thing, even to composites.) None of the elements, then, will be either a substance or a relation; but it must be one or the other. So all things do not have the same elements.—Or rather, as we say, in one sense they do and in another they do not. For example, perhaps the elements of perceptible bodies are, as form, the hot, and in another way the cold, which is the privation; and, as matter, what is primarily and in its own right potentially these. And substances are both these and the things composed of them, of which these are the principles, or any unity that comes to be from hot and cold, such as flesh or bone; for what comes to be must be different from its elements. These things, then, have the same elements and principles (though different things have different ones); but one cannot say in this way that all things have the same ones, only by analogy—as if one said that there are three principles: the form, the privation, and the matter. But each of these is different for each genus: in color, for instance, they are white, black, and surface; and light, darkness, and air, from which come day and night. And since not only the constituents are causes but also certain external things, such as the mover, it is clear that principle and element are different. Both are causes, and principle is divided into these two; and what moves a thing or brings it to rest is a principle and a substance. So by analogy there are three elements, but four causes and principles. They are different in different things, and the first cause, as mover, is different for different things. Health, disease, body: the mover is the medical craft. Form, a certain disorder, bricks: the mover is the builder's craft. And since the mover, among natural things, is—for a human being—a human being, and among products of thought it is the form or its contrary, there would be in one way three causes, in another way four. For the medical craft is in a

way health, and the builder's craft is the form of the house, and a human being begets a human being. Further, besides these there is what, as first of all things, moves all things.

### ACTUALITY AND POTENTIALITY AS PRINCIPLES

*Particulars have particular causes; universal causes do not exist.*

Since some things are separable and others not, the former are substances. [1071a] And for this reason the causes of all things are the same: because without substances there are no attributes and no motions. Further, these causes will presumably be soul and body, or intellect, desire, and body.—Again, in another way, by analogy, the principles are the same: actuality and potentiality, for instance. But these too are different for different things and apply in different ways. In some cases the same thing exists sometimes actually and sometimes potentially—wine, for instance, or flesh, or a human being. (These too fall under the causes already described: the form exists actually, if it is separable, and so does the composite of form and matter, and the privation, such as darkness or the sick; while the matter exists potentially, since this is what is capable of becoming both.) But actuality and potentiality differ in another way in the case of things that do not have the same matter, some of which do not have the same form either, but a different one. Thus the causes of a human being are the elements, fire and earth, as matter; his own proper form; further, something external, such as his father; and besides these the sun and the ecliptic, which are neither matter nor form nor privation nor of the same form, but are movers.[1] Further, one must see that some things can be stated universally and others cannot. The first principles of all things are the first thing that is actually a "this," and another thing that is potentially. Now those universals do not exist; for the principle of particulars is a particular. Human being in general would be the principle of human being in general, but there

1 The ecliptic (literally "the slanting circle") is the sun's yearly path against the stars; its tilt brings the seasons, and so the cycle of generation.

is no such human being. Rather, Peleus is the principle of Achilles, and your father of you, and this B of this BA, while B in general is the principle of BA in general. Next, if the causes of substances are the causes of all things, still different things have different causes and elements, as was said: things not in the same genus—colors, sounds, substances, quantity—have different ones, except by analogy; and things in the same species have different ones, not different in species, but in that the causes of different particulars are different: your matter and form and moving cause are different from mine, though in their universal account they are the same. As for inquiring what the principles or elements of substances, relations, and qualities are, and whether they are the same or different: clearly, when the terms are used in many senses, each has them; but when the senses are distinguished, they are not the same but different, except that in a certain way they are the same for all. In one way they are the same, or analogous: matter, form, privation, the mover. And in one way the causes of substances are causes of all things, because when substances are removed, everything is removed. Further, what is first is in actuality. But in another way the first causes are different: all the contraries that are neither spoken of as genera nor spoken of in many senses; and further, the kinds of matter. [1071b] We have said, then, what the principles of perceptible things are and how many, and in what way they are the same and in what way different.

### AN ETERNAL UNMOVABLE SUBSTANCE

*Since motion and time are eternal, there must be a substance whose very being is actuality.*

Since there were three kinds of substance, two of them natural and one unmovable, we must speak about the last, and show that there must be some eternal, unmovable substance. For substances are the first of the things that are, and if they are all perishable, everything is perishable. But motion cannot come to be or pass away (for it always was), nor can time. For there cannot

be a before and after if there is no time. So motion too is continuous in the same way as time is; for time is either the same thing as motion or an attribute of motion. But no motion is continuous except motion in place, and of this, circular motion.

But if there is something capable of moving things or acting on them, but not actually doing so, there will be no motion; for what has a capacity need not exercise it. There is no use, then, in positing eternal substances, as those who posit the Forms do, unless there is in them some principle capable of causing change. Nor is even this enough, nor another substance besides the Forms; for if it is not active, there will be no motion. Further, even if it is active, it is not enough if its substance is potentiality; for then there will be no eternal motion, since what is potentially may not be. There must, then, be a principle of this kind whose very substance is actuality. Further, these substances must be without matter; for they must be eternal, if anything else is eternal. So they must be actuality. Yet there is a puzzle. It seems that everything that acts is capable of acting, but not everything capable of acting acts, so that potentiality would be prior. But if so, none of the things that are would exist; for a thing may be capable of being and yet not yet be. And yet if things are as the theologians say, who generate everything from Night, or as the natural philosophers say, that "all things were together," the same impossible result follows. For how will anything be moved, if there is no cause in actuality? Matter will certainly not move itself—the carpenter's craft must move it; nor will menstrual fluid or earth move themselves—seeds and semen must move them. That is why some thinkers, Leucippus and Plato for instance, posit eternal activity; for they say there is always motion. But why there is, and what motion it is, they do not say; nor, if it moves this way or that, do they give the cause.[2] For nothing is moved at random; there must always be something present to move it, just as now a thing moves in one way by nature and in another by force, or by intellect, or by some-

2 The "theologians" are early poets such as Hesiod and Orpheus, whose accounts of the world's origin began from Night or Chaos.

thing else. (Then which kind of motion is primary? For this makes an enormous difference.) Nor can Plato, for his part, name as the principle what he sometimes thinks is the principle, [1072a] what moves itself; for the soul is later than the heavens and comes into being together with them, as he says. To think that potentiality is prior to actuality is right in one sense and not in another; we have said how. That actuality is prior is attested by Anaxagoras (for intellect is actuality), and by Empedocles with his Love and Strife, and by those who say there is always motion, such as Leucippus. So there was not chaos or night for an infinite time; rather, the same things have always existed, either in a cycle or in some other way, if actuality is prior to potentiality. If, then, the same thing always exists in a cycle, something must always remain, acting in the same way. And if there is to be coming-to-be and passing away, there must be something else that is always acting, now in one way and now in another. This must, then, act in one way in its own right and in another in virtue of something else—either of a third thing or of the first. It must be in virtue of the first; for otherwise that third thing would in turn be the cause both of the second and of itself. So it is better to say the first; for it was the cause of what is always the same, the other the cause of what varies, and both together, clearly, the cause of what always varies. And this is in fact how the motions behave. Why, then, should we look for other principles?

### THE UNMOVED MOVER

*The first mover moves as an object of love; its life is thinking, and it is the god.*

Since this is a possible account, and if it were not so, things would come from night, and from "all things together," and from what is not, these difficulties may be considered solved. There is something that is always moved with an unceasing motion, and this motion is circular (this is clear not only from argument but from the facts); so the first heaven would be eternal. There is,

then, also something that moves it. And since what is moved and moves is intermediate, there is something that moves without being moved, being eternal, substance, and actuality. The object of desire and the object of thought move in this way: they move without being moved. The primary objects of desire and of thought are the same. For the object of appetite is what appears fine, while the primary object of wish is what is fine. And we desire something because it seems fine, rather than its seeming fine because we desire it; for thinking is the starting point.[3] Intellect is moved by the object of thought, and one of the two columns of opposites is in its own right the object of thought. In this column substance is first, and among substances the one that is simple and exists in actuality. (The one and the simple are not the same: "one" signifies a measure, while "simple" signifies that the thing itself is in a certain state.) But the fine, too, and what is choiceworthy for its own sake, are in the same column; and what is first is always best, or analogous to the best. [1072b] That the "for the sake of which" is found among unmovable things is shown by a distinction: "that for the sake of which" is either the one for whose good something is done or the goal at which it aims, and of these the latter can exist among unmovable things but the former cannot. It causes motion, then, as something loved, and it is by being moved that the other things cause motion. If, then, something is moved, it can be otherwise than it is. So if its actuality is the primary locomotion, then insofar as it is moved, in this respect at least it can be otherwise—in place, even if not in substance. But since there is something that moves while itself being unmoved, existing in actuality, this cannot be otherwise in any way at all. For locomotion is the first of the changes, and of locomotion, circular motion; and this is the motion that it causes. It exists, then, of necessity; and insofar as it exists of necessity, it exists in a fine way, and it is in this way a principle. For "necessary" has these senses: what is by force, because it goes against impulse; what is required for the good; and what cannot be otherwise but is so

3 One word of the Greek here is corrupt; the sense is not in doubt.

without qualification.—On such a principle, then, the heavens and nature depend. Its way of life is like the best that we enjoy for a short time. For it is always in this state (which for us is impossible), since its activity is also pleasure. (That is why being awake, perceiving, and thinking are most pleasant, and hopes and memories are pleasant because of these.) Thinking in its own right is of what is best in its own right, and the highest thinking is of what is highest. Intellect thinks itself by sharing in the object of thought; for it becomes an object of thought by touching and thinking its objects, so that intellect and the object of thought are the same. For what is receptive of the object of thought, that is, of the substance, is intellect, and it is active when it possesses its object. So it is the possessing rather than the receptivity that seems to be the divine element in intellect, and contemplation is what is most pleasant and best. If, then, the god is always in that good state in which we sometimes are, this is wonderful; and if in a better state, more wonderful still. And that is the state it is in. Life, too, belongs to it; for the activity of intellect is life, and the god is that activity; and the god's activity in its own right is life that is best and eternal. We say, then, that the god is a living being, eternal and best, so that life and an unbroken and eternal existence belong to the god; for this is what the god is. Those who suppose, as the Pythagoreans and Speusippus do, that the most beautiful and best is not present at the beginning—because the beginnings of plants and animals are causes, while beauty and completeness are in what comes from them—are mistaken. For the seed comes from other, prior beings that are complete, and what is first is not the seed but the complete being. [1073a] One would say, for instance, that a human being is prior to the seed—not the one that comes from it, but another, from whom the seed comes. It is clear, then, from what has been said, that there is a substance that is eternal, unmovable, and separate from perceptible things. It has also been shown that this substance cannot have any magnitude, but is without parts and indivisible. (For it causes motion for an infinite time, and nothing finite has infinite

power. And since every magnitude is either infinite or finite, it could not have finite magnitude for this reason, and it could not have infinite magnitude because there is no infinite magnitude at all.) Further, it has been shown to be impassive and unalterable; for all the other motions are posterior to motion in place. It is clear, then, why these things are as they are.

### HOW MANY UNMOVED MOVERS?

*Astronomy suggests fifty-five or forty-seven heavenly spheres, each with its own unmoved mover.*

Whether we should posit one such substance or more than one, and if more, how many, is a question we must not neglect. We must also remember the pronouncements of others, and note that they have said nothing about the number of these substances that can even be stated clearly. The theory of Forms contains no special inquiry into the matter. (Those who speak of Forms say the Forms are numbers, and they speak of the numbers sometimes as infinite, sometimes as limited to ten; but why there should be just so many numbers they say nothing with demonstrative rigor.) We, however, must discuss the question on the basis of the premises and distinctions we have laid down. The principle and first of the things that are is unmovable, both in its own right and accidentally, and it causes the primary motion, which is eternal and one. Now what is moved must be moved by something, and the first mover must be unmoved in its own right, and an eternal motion must be caused by something eternal, and a single motion by a single thing. But besides the simple locomotion of the universe, which we say the first and unmovable substance causes, we see other locomotions that are eternal, those of the planets (for a body that moves in a circle is eternal and never at rest; this has been shown in the works on nature). So each of these locomotions too must be caused by a substance that is both unmovable in its own right and eternal. For the nature of the stars is eternal, being a kind of substance; the mover is eternal and prior to what is moved; and

what is prior to a substance must be a substance. It is clear, then, that there must be as many substances as there are such motions, eternal in nature, unmovable in their own right, and without magnitude, for the reason given earlier. [1073b] It is clear, then, that the movers are substances, and that one of them is first and another second, in the same order as the motions of the stars. But the number of the motions must be investigated in the light of the mathematical science most akin to philosophy, astronomy. For astronomy studies a substance that is perceptible but eternal, while the others, arithmetic and geometry, for instance, study no substance at all. That the motions are more numerous than the bodies moved is clear to anyone who has given the matter even moderate attention; for each of the planets has more than one motion. As for how many these motions actually are, we shall for now state what some of the mathematicians say, to give an idea of the matter, so that the mind may have some definite number to grasp. For the rest, we must partly investigate for ourselves and partly learn from those who investigate; and if those who work on these questions come to a view that differs from what has now been said, we must respect both parties but follow the more accurate.—Eudoxus, then, held that the motion of the sun and of the moon each involves three spheres. The first is that of the fixed stars; the second moves along the circle that runs through the middle of the zodiac; and the third along the circle inclined across the breadth of the zodiac (the circle along which the moon moves being inclined at a greater angle than the one along which the sun moves). The motion of each of the planets, he held, involves four spheres. Of these the first and second are the same as those just mentioned (for the sphere of the fixed stars is the one that carries all the others, and the sphere placed beneath it, which moves along the circle through the middle of the zodiac, is common to all). The poles of the third sphere of every planet lie on the circle through the middle of the zodiac, and the fourth moves along a circle

inclined to the equator of the third.[4] The poles of the third sphere, he held, are different for each of the other planets, but the same for Venus and Mercury. Callippus assumed the same arrangement of the spheres as Eudoxus, and assigned the same number to Jupiter and Saturn as Eudoxus did; but he thought that two more spheres must be added for the sun and two for the moon, if one is to account for the observed phenomena, and one for each of the remaining planets.[5] But if all the spheres combined are to account for the phenomena, there must be, 1074a for each of the planets, other spheres, one fewer in number, that unwind the others and restore to the same position the first sphere of the star placed next below. Only in this way can the whole system produce the motion of the planets. Since, then, the spheres in which the planets themselves are carried are eight for some and twenty-five for others, and of these only those in which the lowest-placed body is carried need not be unwound, the spheres that unwind those of the first two will be six, and those that unwind those of the next four will be sixteen. So the number of all the spheres, both those that carry the planets and those that unwind these, will be fifty-five. And if one does not add to the moon and the sun the motions we mentioned, the spheres will number forty-seven in all.—Let the number of the spheres, then, be this, so that it is reasonable to suppose that the unmovable substances and principles are just as many (as for necessity, let us leave that to be asserted by more forceful thinkers). But if there can be no locomotion that does not contribute to the locomotion of a star, and if, further, every nature and every substance that is impassive and has in its own right attained the best must be considered an end, there can be no other nature besides these, and this must be the number of the substances. For if there were others, they would cause motion as ends of locomotion; but there cannot be other loco-

4 Eudoxus explained the heavenly motions by nested rotating spheres centered on the earth.

5 Callippus of Cyzicus, a younger astronomer, refined Eudoxus's system; the Greek names the planets after their gods (Aphrodite, Hermes, Zeus, Cronus).

motions besides those mentioned. And this is reasonable to suppose from the bodies that are carried around. For if everything that carries something exists by nature for the sake of what is carried, and every locomotion is the locomotion of something carried, no locomotion can be for its own sake or for the sake of another locomotion; they must be for the sake of the stars. For if one locomotion is for the sake of another, that one too will have to be for the sake of something else; and since an infinite regress is impossible, the end of every locomotion will be one of the divine bodies that move through the heavens. That there is one heaven is evident. For if there were many heavens, as there are many human beings, the principle of each would be one in form but many in number. But whatever is many in number has matter (for one and the same account, that of a human being, for instance, applies to many, whereas Socrates is one). But the primary essence has no matter, for it is actuality. The first unmoved mover, then, is one both in account and in number; and so, therefore, is what is always and continuously moved. There is, then, only one heaven. [1074b] It has been handed down from the ancients of the remotest past, and left to later generations in the form of myth, that these heavenly bodies are gods and that the divine encompasses the whole of nature. The rest has been added later in mythical form, to persuade the many and to serve the laws and the common interest. For they say that these gods are in human form or like certain other animals, and they add other things that follow from these and resemble what has been mentioned. But if one were to separate out the first point alone and take it by itself—that they thought the first substances were gods—one would think it a divinely inspired saying. And since each craft and each philosophy has probably been developed many times, as far as possible, and lost again, one might think that these opinions of theirs have survived like relics until now. Only to this extent, then, is the view of our ancestors and of the earliest thinkers clear to us.

## THINKING OF THINKING

*Divine intellect must think the best thing, itself, so its thinking is a thinking of thinking.*

The nature of intellect involves certain puzzles. It seems to be the most divine of the things we observe, but how it must be disposed in order to be such involves some difficulties. For if it thinks of nothing, what would be so venerable about it? It would be like someone asleep. And if it thinks, but something else controls its thinking, then, since what its substance is would not be thinking but a capacity, it would not be the best substance; for it is through thinking that it has its value. Further, whether its substance is intellect or thinking, what does it think? Either itself or something else; and if something else, either always the same thing or different things. Does it make any difference, then, or none at all, whether it thinks what is fine or any chance thing? Would it not even be absurd for it to think about some things? It is clear, then, that it thinks what is most divine and most valuable, and that it does not change; for change would be for the worse, and such a thing would already be a kind of motion. First, then, if it is not thinking but a capacity, it is reasonable to suppose that the continuity of its thinking would be wearisome to it. Second, it is clear that something else would be more valuable than the intellect, namely the object of its thought. For thinking and the act of thought will belong even to one who thinks the worst things; so if this is to be avoided (and there are some things it is better not to see than to see), thinking would not be the best thing. It must, then, be itself that it thinks, if it is the most excellent thing, and its thinking is a thinking of thinking. But knowledge, perception, opinion, and reasoning always seem to be of something else, and of themselves only in passing. Further, if thinking and being thought are different, in virtue of which of them does the good belong to it? For to be an act of thinking and to be an object of thought are not the same. Or is it that in some cases the knowledge is the object? [1075a] In the

productive sciences, the substance without matter, the essence, is the object; in the theoretical sciences, the account and the thinking are. Since, then, what is thought and intellect are not different in the case of things that have no matter, they will be the same, and the thinking will be one with the object of thought. There remains a further puzzle: whether the object of thought is composite. For then intellect would change as it passed from part to part of the whole. Or is everything that has no matter indivisible? As human intellect, or at least the intellect of composite beings, is in a certain period of time (for it does not possess the good in this part or in that, but achieves the best in a whole, which is something other than itself), so is thinking's thinking of itself throughout all eternity?

### THE GOOD OF THE UNIVERSE

*The good is in the world as order is in an army and also, above all, as its general.*

We must also consider in which of two ways the nature of the universe possesses the good and the best: as something separate and existing by itself, or as its order. Or is it both ways, as with an army? For an army's good lies both in its order and in its general, and more in the general; for he does not exist because of the order, but the order because of him. All things are ordered together in some way, though not all in the same way—fish, birds, and plants; and things are not such that one has no relation to another; they are related. For all things are ordered together toward one end. But it is as in a household: the free are least at liberty to act at random, and all or most of what they do is ordered, while the slaves and the animals contribute little to the common good and mostly act at random. For such is the principle that constitutes the nature of each. I mean, for instance, that all things must at least come to be dissolved; and similarly there are other things in which all share for the good of the whole.—We must not overlook the impossible or absurd consequences that face those who hold other views, and what

the views of the more refined thinkers are, and which views involve the fewest puzzles. All thinkers make all things out of contraries. But neither "all things" nor "out of contraries" is right; nor do they say how things in which the contraries are present will come from the contraries, since contraries are not affected by one another. For us this difficulty is reasonably resolved by there being a third factor. Others make one of the two contraries matter, as those do who make the unequal the matter for the equal, or the many for the One. This too is resolved in the same way: for the matter that is one is contrary to nothing. Further, on their view everything except the One will partake of the bad; for the bad itself is one of the two elements. Others do not even treat the good and the bad as principles; yet in all things the good is a principle in the highest degree. Others are right that it is a principle, but they do not say how the good is a principle—whether as end, as mover, or as form. [1075b] Empedocles too speaks absurdly: he makes Love the good, and this is a principle both as mover (for it brings things together) and as matter (for it is part of the mixture). Now even if the same thing happens to be a principle both as matter and as mover, still what it is to be each is not the same. In which respect, then, is Love a principle? It is also absurd that Strife should be imperishable; for Strife is, for him, the nature of the bad. Anaxagoras makes the good a principle as mover, for intellect moves things. But it moves them for the sake of something, which must therefore be something other than it—except as we put it, for the medical craft is in a way health. It is also absurd not to make something contrary to the good and to intellect. All who speak of contraries fail to make use of the contraries, unless one reshapes their views. And no one says why some things are perishable and others imperishable; for they make all the things that are out of the same principles. Further, some make the things that are come from what is not; others, to avoid being forced to this, make all things one.—Further, no one says why there will always be coming-to-be, or what its cause is. Those who posit two principles must posit another, more

authoritative principle; and so must those who posit the Forms, for why did things come to participate in them, or why do they participate? And for the others, wisdom, the most valuable knowledge, must have a contrary; for us it need not. For nothing is contrary to what is first. All contraries have matter, and things that have matter exist potentially; and the ignorance contrary to wisdom would be of the contrary object; but nothing is contrary to what is first. And if there are to be no other things besides perceptible things, there will be no principle, no order, no coming-to-be, no heavenly bodies, but always a principle of the principle, as with the theologians and all the natural philosophers. But if there are to be Forms or numbers, they will be causes of nothing; or if of something, at least not of motion. Further, how can magnitude and the continuous come from things without magnitude? For number will not produce the continuous, either as mover or as form. Again, none of the contraries will be something that is essentially productive and capable of causing motion; for then it could possibly not be. And in any case its acting would be posterior to its capacity. Then the things that are would not be eternal. But they are; so one of these premises must be rejected. How this is to be done has been said. Further, what makes numbers one, or soul and body, or in general form and thing—no one says anything about this; nor can they, unless they say, as we do, that the mover makes them one. Those who say that mathematical number is first, and that so there is always another kind of substance next in line, with different principles for each, [1076a] make the substance of the universe a series of disconnected episodes (for one substance contributes nothing to another by existing or not existing), and give us many principles. But the things that are do not wish to be badly governed. "The rule of many is not good; let there be one ruler."[6]

6 The last line quotes Homer's *Iliad* (2.204), where Odysseus restores order among the Greek troops.

# Book Mu (XIII)

*Mathematical objects and the Forms.*

### CHAPTER 1

We have said what the substance of perceptible things is: in our treatise on nature, when discussing matter, and later, when discussing substance as actuality. Since our inquiry is whether there is or is not, besides perceptible substances, some substance that is unmovable and eternal, and if there is, what it is, we must first examine what others have said, so that if they say anything wrongly we may not be liable to the same errors, and if some doctrine is common to us and them, we may not be privately annoyed at ourselves over it. For one should be content to state some points better and others no worse. There are two views on these matters: some say that mathematical objects —numbers, lines, and things akin to them—are substances, and others say that the Forms are. Since some make these two distinct genera—the Forms and the mathematical numbers—others posit a single nature for both, and still others say that only the mathematical substances exist, we must first consider mathematical objects, without attributing to them any other nature—asking, for instance, not whether they are in fact Forms or not, or whether they are principles and substances of the things that are or not, but only, as mathematical objects, whether they exist or not, and if they exist, in what way. Then after this we must consider the Forms themselves, separately, in general terms and only so far as custom requires; for most of the points have been made over and over, even in our popular works. Further, the greater part of our discussion must converge on that inquiry,

when we examine whether the substances and principles of the things that are are numbers and Forms; for after the Forms this remains as a third inquiry.—If mathematical objects exist, they must either be in perceptible things, as some say, or be separate from perceptible things (some say this too); or, if they are neither, either they do not exist or they exist in some other way. So our dispute will be not about whether they are, but about the manner in which they are.[1]

### MATHEMATICAL OBJECTS ARE NOT SEPARATE

*Mathematical objects can be neither in perceptible things nor separate from them as substances.*

That they cannot be in perceptible things, and that the theory is a fabrication, has been said in our discussion of the puzzles: that two solids cannot be in the same place at once, [1076b] and further that by the same argument the other powers and natures too would be in perceptible things and none would be separate. We have said these things before. But in addition it is evident that on this view no body at all could be divided. For it would be divided along a plane, and the plane along a line, and the line at a point; so if the point cannot be divided, neither can the line, and if the line cannot, neither can the rest. What difference does it make, then, whether perceptible things are such natures, or are not themselves, but have such natures in them? The result will be the same: when perceptible things are divided, these will be divided, or else perceptible things cannot be divided either. Nor, again, can such natures exist separately. For if there are to be solids besides perceptible solids, separate from them and prior to them, it is clear that besides perceptible planes there must also be other, separate planes, and points and lines (for the argument is the same). And if so, then again besides the planes, lines, and points of the mathematical solid there will be others that are separate. (For what is incomposite is prior to what is

1 The "popular" (literally "external") works were probably Aristotle's dialogues and other writings for a wider audience, now mostly lost.

composite; and if there are non-perceptible bodies prior to perceptible ones, by the same argument there will be planes existing by themselves prior to the planes in the unmovable solids. So these planes and lines will be different from those that exist together with the separate solids; for the latter exist together with the mathematical solids, while the former are prior to the mathematical solids.) Again, then, these planes will have lines, and prior to these, by the same argument, there will have to be other lines and points; and prior to the points in these prior lines there will have to be still other points, though there will be no others prior to these. The accumulation becomes absurd. For we end up with one set of solids besides the perceptible ones; three sets of planes besides the perceptible ones—those besides the perceptible ones, those in the mathematical solids, and those besides the ones in these; four sets of lines; and five sets of points. Which of these, then, will the mathematical sciences be about? Surely not the planes, lines, and points in the unmovable solid; for knowledge is always of what is prior. The same argument applies to numbers too: for besides each set of points there will be different units, and besides each set of the things that are, first the perceptible ones and then the intelligible ones; so there will be kinds of mathematical numbers. Further, how can one solve the problems we went through in our discussion of the puzzles? [1077a] For the objects of astronomy will exist besides perceptible things in the same way as the objects of geometry. But how can there be a heaven and its parts, or anything else that has motion, besides perceptible things? The same goes for the objects of optics and harmonics: there will be sound and sight besides the perceptible, particular ones. So clearly there will also be the other senses and the other objects of perception; for why these rather than those? And if so, there will also be animals, since there will be senses. Further, some theorems are proved universally by mathematicians, going beyond these substances. There will, then, be this too, another substance, intermediate and separate from both the Forms and the intermediates—something that is neither number nor points nor mag-

nitude nor time. But if this is impossible, clearly the others too cannot be separate from perceptible things. In general, if one posits mathematical objects as existing in this way, as certain separate natures, the result is contrary both to the truth and to what is usually supposed. For because they exist in this way, they must be prior to perceptible magnitudes, whereas in truth they are posterior. For incomplete magnitude is prior in coming-to-be but posterior in substance, as the lifeless is to the living. Further, by virtue of what, and when, will mathematical magnitudes be one? Things here are one by virtue of soul, or a part of soul, or something else, as is reasonable (otherwise they are many and fall apart); but in the case of those magnitudes, which are divisible and quantities, what is the cause of their being one and holding together? Further, the way they come to be shows this. They are generated first in length, then in breadth, and finally in depth, and then the process is complete. If, then, what is posterior in coming-to-be is prior in substance, body will be prior to plane and length; and in this way it is also more complete and more a whole, because it can come to be ensouled. But how could a line or a plane be ensouled? The supposition would be beyond the reach of our senses. Further, body is a kind of substance (for it already has completeness in a way), but how can lines be substances? Not as a form or shape, as the soul perhaps is, nor as matter, as body is; for nothing is observed that can be composed of lines or planes or points, whereas if they were a kind of material substance, things would be observed that could be so composed. Let them be prior in account, then; [1077b] but not everything that is prior in account is also prior in substance. For things are prior in substance when, being separated, they surpass others in being; they are prior in account when their accounts are the components of the other things' accounts. And these two kinds of priority do not go together. For if attributes do not exist apart from substances—something moving, for instance, or pale—then pale is prior to the pale human being in account, but not in substance. For it cannot exist separately, but always exists together with the com-

posite (by "composite" I mean the pale human being). So it is clear that neither is what results from abstraction prior, nor what results from addition posterior; for it is by adding something to pale that we speak of the pale human being.

It has been adequately stated, then, that mathematical objects are not more substances than bodies are, nor prior in being to perceptible things, but only in account, and that they cannot exist separately anywhere. And since it turned out that they could not exist in perceptible things either, it is clear that either they do not exist at all, or they exist in a certain way and so do not exist without qualification. For we speak of being in many senses.

### HOW MATHEMATICAL OBJECTS EXIST

*Mathematics studies perceptible things, but not as perceptible; its objects exist in a qualified way.*

For just as the universal propositions in mathematics are not about separate objects existing besides magnitudes and numbers, but are about these—not, however, as things that have magnitude or are divisible—it is clear that there can also be both accounts and demonstrations about perceptible magnitudes, not as perceptible but as having a certain character. For just as there are many accounts of things solely as moving, apart from what each such thing is and from their accidental attributes—and it does not follow from this that there must be something moving separate from perceptible things, or some distinct nature in them—so too there will be accounts and sciences of moving things, not as moving but only as bodies, and again only as planes, and only as lengths, and as divisible, and as indivisible but having position, and only as indivisible. So, since it is true to say without qualification not only that separable things exist but also that inseparable things exist (that moving things exist, for instance), it is also true to say without qualification that mathematical objects exist, and that they are such as the mathematicians say. And just as it is true to say, without qualification, of

the other sciences too that each is of its own object—not of what is accidental to it (not of the white, for instance, if the healthy is white and the science is of the healthy) but of that which each science is of: [1078a] of the healthy if it studies things as healthy, of human beings if it studies them as human—so it is with geometry too. If the things it is about happen to be perceptible, but it does not study them as perceptible, the mathematical sciences will not for that reason be sciences of perceptible things—nor, on the other hand, of other things separate from these. Many attributes belong to things in their own right insofar as each such character belongs to them: there are attributes peculiar to an animal as female and as male, for instance (yet there is no female or male separate from animals). So too there are attributes of things as lengths only, and as planes. And the more the things we are dealing with are prior in definition and simpler, the more precision the knowledge has (for precision just is simplicity). So there is more precision in a science that leaves magnitude aside than in one that includes it, and most of all in one that leaves motion aside; and if it does deal with motion, the most precision comes with the primary motion, since it is the simplest—and within this, with uniform motion. The same account holds for harmonics and optics. Neither studies its objects as sight or as sound, but as lines and numbers (though these are attributes proper to sight and sound). And mechanics is the same. So if someone posits attributes as separate from what they belong to and studies something about them as such, he will not for that reason say anything false—any more than someone who draws a line on the ground and calls it a foot long when it isn't. The falsehood is not in the premises. Each thing would be studied best in this way: by positing as separate what is not separate, which is just what the arithmetician and the geometer do. A human being, as human being, is one and indivisible. The arithmetician posits him as one indivisible thing, and then studies whether anything belongs to the human being as indivisible. The geometer studies him neither as human being nor as indivisible, but as a solid. For clearly the attributes that

would belong to him even if he were somehow not indivisible can belong to him without those features too. That is why geometers speak correctly: they are talking about things that are, and these things are. For being is twofold: one kind in actuality, the other as matter. Since the good and the beautiful are different (the good is always found in action, while the beautiful is found in unchanging things too), those who claim that the mathematical sciences say nothing about the beautiful or the good are mistaken. They do speak of them, and show them more than anything. It doesn't follow that because they don't name them, while showing their effects and their ratios, they aren't speaking about them. The chief forms of beauty are order, symmetry, and definiteness, [1078b] which the mathematical sciences display most of all. And since these (I mean order and definiteness, for instance) are evidently causes of many things, clearly these sciences would also, in a way, speak of this sort of cause—the beautiful as a cause. But we will speak about these matters more clearly elsewhere.

### HOW THE THEORY OF FORMS AROSE

*Socrates sought universal definitions; Plato separated the universals and called them Forms.*

About mathematical objects, then—that they are, and in what sense they are, and in what sense they are prior and in what sense not—let this much be said. As for the Forms, we must first examine the theory of Forms on its own, without connecting it to the nature of numbers, but as it was understood from the start by those who first said there were Forms. The theory of Forms occurred to those who proposed it because they were persuaded of the truth of the Heraclitean arguments that all perceptible things are always flowing. So if there is to be knowledge and understanding about anything, there must be certain other natures besides the perceptible ones, natures that stay put; for there is no knowledge of things that flow. Socrates, however, was occupied with the excellences of character, and was the first

to seek universal definitions of them. (Among the natural philosophers, Democritus touched on this only a little, and defined the hot and the cold after a fashion; and the Pythagoreans, earlier, had done so for a few things, whose definitions they tied to numbers—what opportunity is, for instance, or justice, or marriage. But Socrates had good reason to look for the what-it-is, since he was trying to reason deductively, and the starting point of deductions is the what-it-is. For there was not yet at that time the dialectical power to examine contraries even apart from the what-it-is, and whether the same science deals with contraries. There are two things one might fairly credit to Socrates: inductive arguments and universal definition; both of these concern the starting point of knowledge.) But Socrates did not make the universals or the definitions separate. The others did separate them, and called such beings Forms. So it followed for them, by almost the same argument, that there are Forms of everything spoken of universally. It is rather as if someone who wanted to count things thought he couldn't do it while they were fewer, but could count them once he had made them more. For the Forms are, one might say, more numerous than the perceptible particulars [1079a] whose causes they were seeking when they went from these to those. For corresponding to each thing there is something with the same name, apart from the substances; and for other things too there is a one over many, both for things here and for eternal things. Further, of the ways in which it is proved that the Forms exist, none is convincing. From some no deduction necessarily follows; from others there come to be Forms even of things of which they think there are none. For according to the arguments from the sciences there will be Forms of all the things there are sciences of; according to the one-over-many argument, Forms even of negations; and according to the argument that we think of something even when it has perished, Forms of perishable things, since there is an image of these. Further, of the most precise arguments, some produce Forms of relatives, of which they deny there is a kind in its own right, while others bring in the "third man." And in general the

arguments for the Forms do away with things that those who speak of Forms care about more than they care about the existence of the Forms. For it follows that the dyad is not first, but number; and that the relative is prior to number, and prior to what is in its own right—and all the other points on which some people, following out the opinions about the Forms, have come into conflict with the principles. Further, according to the assumption on which they say the Forms exist, there will be Forms not only of substances but of many other things as well. (For the thought is one not only in the case of substances but also of non-substances, and there are sciences not only of substance; and countless other such consequences follow.) But according to what necessarily follows, and to the opinions about the Forms, if the Forms can be participated in, there must be Forms only of substances. For they are not participated in accidentally: a thing must participate in each Form insofar as the Form is not said of an underlying subject. (I mean, for instance, that if something participates in the double itself, it also participates in the eternal, but accidentally, since it is accidental to the double to be eternal.) So the Forms will be substance. But the same things signify substance here and there. Otherwise, what will it mean to say that there is something apart from these things, the one over many? And if the Forms and the things that participate in them have the same form, there will be something common to them. (For why should "dyad" be one and the same in the case of perishable dyads and of dyads that are many but eternal, any more than in the case of the dyad itself and some particular dyad?) But if the form is not the same, [1079b] they will share only the name. It will be as if someone called both Callias and a piece of wood "human being," without having noticed anything common to them. And suppose we posit that in other respects the common definitions fit the Forms—"plane figure," for instance, and the other parts of the definition apply to the circle itself—but that "what really is" has to be added. We must consider whether this is not completely empty. To what will it be added? To "center," or to "plane," or to all of them? For all the

items in the substance are Forms: animal, for instance, and two-footed. Further, clearly the added item must itself be something, just as "plane" is: some nature that will be present in all the Forms as their genus.

### WHAT DO THE FORMS CONTRIBUTE?

*The Forms explain neither change, nor knowledge, nor being; calling them paradigms is empty metaphor.*

Most of all, one might be puzzled about what on earth the Forms contribute, either to the perceptible things that are eternal or to those that come to be and pass away. For they are not causes of any motion or change in them. Nor do they help at all toward knowledge of the other things (for they are not their substance; otherwise they would be in them), nor toward their being, since they are not present in the things that participate in them. If they were, they might perhaps seem to be causes in the way white is, by being mixed into the white thing. But this argument, which Anaxagoras first and Eudoxus later put forward while working through the puzzles, as did some others, is very easily overturned (it is easy to collect many impossible consequences against such a view). Nor, moreover, do the other things come from the Forms in any of the usual senses of "from." To say that the Forms are paradigms and that the other things participate in them is to talk emptily and use poetic metaphors. For what is it that does the work, looking to the Forms? Anything can both be and come to be like something else without being modeled on it, so that someone like Socrates might come to be whether Socrates exists or not; and clearly the same would hold even if Socrates were eternal. There will also be several paradigms of the same thing, and so several Forms: of human being, for instance, animal and two-footed, and at the same time human-being-itself too. Further, the Forms will be paradigms not only of perceptible things but of Forms themselves, as the genus is of the species within it; so the same thing will be both paradigm and image. Further, it would seem impossible for the substance

to be separate from that of which it is the substance. [1080a] So how could the Forms, if they are the substances of things, be separate? In the *Phaedo* it is stated in this way: that the Forms are causes both of being and of coming to be. Yet even if the Forms exist, nothing comes to be unless there is something to set it in motion; and many other things come to be, such as a house or a ring, of which they say there are no Forms. So clearly the things of which they say there are Forms can also both be and come to be through causes of the kind that produce the things just mentioned, and not because of the Forms. But about the Forms it is possible to collect many objections like those we have considered, both in this way and through more abstract and more precise arguments.

### WAYS NUMBERS MIGHT EXIST

*Aristotle lists the possible accounts of separate number and the thinkers who held each.*

Now that these points have been settled, it is well to consider again the consequences concerning numbers for those who say that numbers are separate substances and first causes of the things that are. If number is some nature, and its substance is nothing other than just this, as some say, then necessarily one of the following holds. Either there is a first of it and a next, each different in form—and this either holds directly of the units, so that any unit is incomparable with any unit; or they are all directly in succession, and any is comparable with any, as they say mathematical number is (for in mathematical number no unit differs in any way from another); or some are comparable and others not. (For instance, if after the One there comes first the dyad, then the triad, and so on for the rest of number, and the units within each number are comparable—those in the first dyad with each other, those in the first triad with each other, and so on with the other numbers—while those in the dyad-itself are

incomparable with those in the triad-itself, and likewise with the other successive numbers;[2]

## CHAPTER 6

that is why mathematical number is counted thus: after one, two, by adding another one to the previous one; and three by adding another one to these two; and the rest in the same way. But this kind of number is counted thus: after the One, a distinct two that does not include the first one, and a triad that does not include the dyad, and similarly with the rest of number.) Or else one kind of number is as first described, another as the mathematicians say, and a third the kind described last. Further, these numbers must either be separate from things, 1080b or not separate but in perceptible things (not in the way we first considered, but in the sense that perceptible things are made of numbers present in them); or one kind is separate and another not, or all are.—These, then, are necessarily the only ways in which numbers can exist. And pretty much all who say that the One is the principle, substance, and element of all things, and that number comes from this and something else, have each stated one of these ways—except that no one has said that all the units are incomparable. And this has turned out reasonably, since there cannot be yet another way besides those stated. Some say that both kinds of number exist: the kind that has a before and after, namely the Forms, and mathematical number besides the Forms and perceptible things, both separate from perceptible things. Others say that only mathematical number exists, as the first of the things that are, separate from perceptible things. The Pythagoreans too recognize one kind, the mathematical, but not as separate; they say perceptible substances are composed of it. For they construct the whole heaven out of numbers—not numbers made of abstract units, though, since they suppose the units have magnitude. How the first one came

2 "Comparable" units can be combined and counted together; "incomparable" ones cannot.

to be constituted with magnitude, they seem to be at a loss to say. Someone else says that only the first kind of number, the number of the Forms, exists; and some say that mathematical number is the same as this.[3] It is similar with lengths, planes, and solids. Some hold that mathematical ones are different from those that come after the Forms. Of those who speak otherwise, some speak of mathematical objects and speak of them mathematically—those who do not make the Forms numbers, or say there are Forms at all—while others speak of mathematical objects, but not mathematically: for they say that not every magnitude is divided into magnitudes, and that not just any two units make a dyad. All of them hold that numbers are made of abstract units, except the Pythagoreans—those who say the One is the element and principle of the things that are; but these say numbers have magnitude, as was said before. It is clear from this, then, in how many ways it is possible to speak about numbers, and that all the ways have been stated. All of them are impossible, though some perhaps more than others.

### ARE UNITS COMPARABLE?

*Whether units are comparable or not, form-numbers lead to absurd consequences.*

First, then, we must examine whether the units are comparable or incomparable, and, if incomparable, in which of the ways we distinguished. 1081a For it is possible that any unit is incomparable with any unit; and it is possible that those in the dyad-itself are incomparable with those in the triad-itself, and so that the units in each first number are incomparable with those in the others. Now if all the units are comparable and undifferentiated, we get mathematical number, and only that one kind, and the Forms cannot be the numbers. (For what sort of number will human-being-itself be, or animal-itself, or any other of the

3 The first view is usually taken to be Plato's, the second that of his successor Speusippus, and the last that of Xenocrates, who headed the Academy after Speusippus.

Forms? There is one Form of each thing—one of human-being-itself, for instance, and another one of animal-itself—whereas similar and undifferentiated numbers are infinitely many, so that this particular triad is no more human-being-itself than any other.) And if the Forms are not numbers, they cannot exist at all. (For from what principles will the Forms come? Number comes from the One and the indefinite dyad, and these are said to be the principles and elements of number; and the Forms cannot be ranked either as prior to the numbers or as posterior.) But if the units are incomparable, and incomparable in such a way that any is incomparable with any, this number can be neither mathematical number (for mathematical number consists of undifferentiated units, and what is proved of it fits on that basis) nor the number of the Forms. For the dyad will not be the first thing to come from the One and the indefinite dyad, followed by the successive numbers, as they are called—dyad, triad, tetrad. For the units in the first dyad are generated at the same time, whether, as the first proponent of the theory said, from unequals (they came into being when these were equalized) or in some other way. Since if one unit is to be prior to the other, it will also be prior to the dyad made of them; for when one thing is prior and another posterior, what is made of them will be prior to the one and posterior to the other. Further, since there is first the One itself, and then among the other ones there is a first one, and a second after that, and again a third, which is second after the second and third after the first one—the units would be prior to the numbers they are counted in: in the dyad, for instance, there will be a third unit before three exists, and in the triad a fourth and fifth before those numbers exist. No one, it's true, has said that the units are incomparable in this way; but on their principles this too is reasonable, though in truth it is impossible. [1081b] For it is reasonable that units should be prior and posterior if there is in fact a first unit, a first one; and likewise with dyads, if there is in fact a first dyad. For after the first it is reasonable and necessary that there be a second, and if a second, a third, and so on in order. (But to say both at once—that

there is a first and a second unit after the One, and also a first dyad—is impossible.) Yet they make a first unit and one, but no second and third; and a first dyad, but no second and third. It is also clear that if all the units are incomparable, there cannot be a dyad-itself and a triad-itself, and so on with the other numbers. For whether the units are undifferentiated or each differs from each, number must be counted by addition: the dyad, for instance, by adding another one to the one, the triad by adding another one to the two, and the tetrad in the same way. And if this is so, numbers cannot be generated in the way they generate them, from the dyad and the One. For the dyad becomes a part of the triad, and the triad of the tetrad, and the same happens with the numbers that follow. But on their view the tetrad came from the first dyad and the indefinite dyad—two dyads besides the dyad-itself. Otherwise the dyad-itself will be a part of it, and one other dyad will be added. And the dyad will consist of the One itself and another one; but if so, the other element cannot be an indefinite dyad, for it generates a single unit, not a definite dyad. Further, how will there be other triads and dyads besides the triad-itself and the dyad-itself? And in what way are they composed of prior and posterior units? All this is absurd and fictitious, and there cannot be a first dyad and then a triad-itself. Yet there must be, since the One and the indefinite dyad are to be elements. But if the consequences are impossible, it is impossible for these to be the principles.—If, then, any units whatever differ from any others, these and other such consequences follow necessarily. And if those in different numbers differ, while those in the same number are undifferentiated only from one another, even so the difficulties that follow are no fewer. 1082a In the decad-itself, for instance, there are ten units, and the decad is composed both of these and of two pentads. But since the decad-itself is not just any number, and is not composed of just any pentads—any more than of just any units—the units in this decad must differ. For if they did not differ, neither would the pentads that make up the decad; but since these differ, the units will differ too. But if they differ, will no other

pentads be present in the decad, only these two, or will there be others? If not, that is absurd; if there will be, what sort of decad will be made of them? For there is no other decad in the decad besides itself. Moreover, the tetrad too must not be composed of just any dyads. For the indefinite dyad, they say, took the definite dyad and made two dyads, since it was a doubler of whatever it took.—Further, how can the dyad be some nature besides its two units, and the triad besides its three units? Either one will participate in the other, as "pale human being" is something besides pale and human being (since it participates in these), or one will be a differentia of the other, as human being is something besides animal and two-footed. Further, some things are one by contact, some by mixture, some by position; none of these can belong to the units of which the dyad and triad consist. Just as two human beings are not some one thing besides the two of them, so it must be with the units. Nor will the units differ because they are indivisible: points are indivisible too, yet the pair of them is nothing besides the two.—Nor should we overlook this point: it follows that there are prior and posterior dyads, and likewise with the other numbers. Let the dyads in the tetrad be simultaneous with each other; still, they are prior to those in the octad, and just as the dyad generated them, they generated the tetrads in the octad-itself. So if the first dyad is a Form, these too will be Forms of a sort. The same argument applies to the units. The units in the first dyad generate the four in the tetrad, so that all the units become Forms, and a Form will be composed of Forms. So clearly the things of which these happen to be Forms will be composite too—as if one were to say that animals are composed of animals, if there are Forms of them. [1082b] In general, to make the units different in any way whatever is absurd and fictitious (by "fictitious" I mean forced to fit a hypothesis). For we see no unit differing from another either in quantity or in quality; and a number must be either equal or unequal—every number, but especially one made of abstract units—so that if it is neither greater nor smaller, it is equal. And things that are equal and wholly undifferentiated we

take to be the same, in the case of numbers. If not, then not even the dyads in the decad-itself will be undifferentiated, though they are equal. For what reason will anyone who says they are undifferentiated be able to give? Further, if every unit together with another unit makes two, a unit from the dyad-itself together with one from the triad-itself will make a dyad—a dyad of differing units. And will it be prior to the triad or posterior? It rather seems that it must be prior, since one of its units is simultaneous with the triad and the other with the dyad. We suppose that in general one and one make two, whether the things are equal or unequal—good and bad, for instance, or a human being and a horse; but those who talk this way say that not even two units do. If the number of the triad-itself is not greater than that of the dyad, that is surprising; if it is greater, clearly there is also a number in it equal to the dyad, so that this number is undifferentiated from the dyad-itself. But that cannot be, if there is a first number and a second. Nor will the Forms be numbers. On this very point those who insist that the units are different are right, if there are to be Forms, as was said earlier. For the Form is one; but if the units are undifferentiated, the dyads and the triads will be undifferentiated too. That is why they have to say that when we count "one, two," we do not proceed by adding to what is already there. (Otherwise the generation will not come from the indefinite dyad, and a number cannot be a Form: one Form will be present in another, and all the Forms will be parts of one.) So relative to their hypothesis they speak correctly, but not correctly overall, for they do away with a great deal. They will say that this very question poses a puzzle: when we count and say "one, two, three," do we count by adding, or by taking separate portions? But we do both. So it is ridiculous to trace this back to so great a difference in substance.

### FURTHER OBJECTIONS TO SEPARATE NUMBER

*Units cannot differ in quantity or quality, and neither Platonist nor Pythagorean number works.*

1083a First of all, it is well to determine what the differentia of a number is—and of a unit, if it has one. Units must differ either in quantity or in quality, and neither seems possible. As number, they would differ in quantity. But if the units too differed in quantity, one number would differ from another even when equal to it in number of units. Further, are the first units larger or smaller, and do the later ones increase, or the reverse? All this is unreasonable. Nor can they differ in quality, since no attribute can belong to them; they themselves say that quality belongs even to numbers only after quantity. Further, this quality could come to the units neither from the One nor from the dyad: the One is not a quality, and the dyad produces quantity, since this nature is the cause of the things that are being many. If things are somehow otherwise, they should say so right at the start and determine about the differentia of the unit—above all, why it must exist; and failing that, what differentia they mean.—It is clear, then, that if the Forms are numbers, the units can neither all be comparable nor be incomparable with one another in either of the two ways. But neither is the way certain others speak about numbers correct. These are the people who do not think there are Forms, either simply or as certain numbers, but think that mathematical objects exist and that numbers are the first of the things that are, and that their principle is the One itself. For it is absurd that there should be a one that is first among ones, as they say, but not a dyad first among dyads, or a triad among triads; for the same account applies to them all. If, then, this is how things stand with number, and someone posits only mathematical number, the One is not a principle. (For a one of this kind must differ from the other units; and if so, there must also be some first dyad among the dyads, and likewise with the other successive numbers.) But if the One is a

principle, things must rather be with numbers as Plato said: there must be a first dyad and triad, and the numbers must be incomparable with one another. But if someone in turn posits this, it has been said that many impossible consequences follow. Yet it must be one way or the other; so that if it is neither, number cannot be separate. 1083b It is clear from this, too, that the third way is the worst—that the number of the Forms and mathematical number are the same. For two errors must converge in one opinion. Mathematical number cannot exist in this way; whoever holds it has to spin things out by making special hypotheses of his own. And he also has to accept all the consequences that follow for those who speak of number as Forms. —The Pythagorean way has in one respect fewer difficulties than those mentioned before, but in another respect difficulties of its own. Not making number separate removes many of the impossibilities; but that bodies should be composed of numbers, and that this number should be mathematical, is impossible. For it is not true to speak of indivisible magnitudes; and even if it were entirely so, units at least have no magnitude. And how can a magnitude be composed of indivisibles? But arithmetical number, at any rate, consists of abstract units. Yet they say that the things that are are number; at any rate they apply their theorems to bodies as though bodies consisted of those numbers.—If, then, number, if it is something that is in its own right, must exist in one of the ways described, and it cannot exist in any of these, clearly number has no such nature as those who make it separate construct for it.—Further, does each unit come from the great and the small equalized, or one from the small and another from the great? If the latter, each unit does not come from all the elements, nor are the units undifferentiated (for in one the great is present and in the other the small, which is contrary to it by nature). Further, what about the units in the triad-itself? One of them is odd. But perhaps this is why they make the One itself the middle unit in the odd number. If each of the units comes from both, equalized, how will the dyad, being a single nature, come from the great and the small? Or

how will it differ from the unit? Further, the unit is prior to the dyad (since when it is removed the dyad is removed); so it must be a Form of a Form, since it is prior to a Form, and it must have come into being first. From what, then? For the indefinite dyad was a doubler.—Further, number must be either infinite or finite; for they make number separate, so it cannot be that neither of these holds. 1084a That it cannot be infinite is clear. (For infinite number is neither odd nor even, while the generation of numbers is always of an odd or an even number: in one way, when the One falls on the even, an odd number results; in another, when the dyad falls on it, the numbers doubled from one; in another, when the odd numbers do, the other even numbers. Further, if every Form is a Form of something, and the numbers are Forms, infinite number too will be a Form of something, either of perceptible things or of something else. Yet that is not possible either on their own thesis or by reason—at least as they arrange the Forms.) But if number is finite, up to what limit? For one must state not only that it is so but why. But if number goes up to the decad, as some say, first of all the Forms will quickly run out. If the triad is human-being-itself, for instance, what number will horse-itself be? Each number up to the decad is an "itself"; so horse-itself must be one of the numbers in this range, since these are the substances and Forms. But still they will run out, for the species of animal will outnumber them. At the same time, it is clear that if the triad is human-being-itself in this way, so will the other triads be (for those in the same numbers are similar), so that there will be infinitely many human beings: each triad a human-being-itself, if each is a Form, and if not, still human beings. And if the smaller number is a part of the greater—number made of comparable units within the same number—then if the tetrad-itself is the Form of something, of horse or of white, say, human being will be part of horse, if human being is the dyad. It is also absurd that there should be a Form of the decad but not of the number eleven, nor of the numbers after it. Further, some things both exist and come to be of which there are no Forms; so why are there not

Forms of those too? The Forms, then, are not causes. Further, it is absurd if number up to the decad is more of a being, and more a Form, than the decad itself—though there is no generation of the former as a unity, and there is of the latter. But they try to treat number up to the decad as complete. At any rate they generate the derivatives—the void, proportion, the odd, and other such things—within the decad. Some they assign to the principles, such as motion and rest, good and bad, and the rest to the numbers. That is why the One is the odd: for if the odd were in the triad, how would the pentad be odd? Further, magnitudes and all such things go up only to a certain amount: 1084b first the indivisible line, for instance, then the dyad, and then these too up to the decad.—Further, if number is separate, one might be puzzled whether the One is prior, or the triad and the dyad. Insofar as number is composite, the One is prior; but insofar as the universal and the form are prior, number is. For each of the units is part of the number as its matter, while the number is its form. In one way the right angle is prior to the acute, because it is determinate, and by its definition; in another way the acute is prior, because it is a part, and the right angle is divided into acute ones. As matter, then, the acute angle, the element, and the unit are prior; but with respect to form, and substance in the sense of the definition, the right angle is prior, and the whole made of matter and form. For the two together are nearer to the form and to what the definition is of, though in generation they come later. How, then, is the One a principle? Because it is not divisible, they say. But the universal is indivisible too, and so are the particular and the element—though in different ways, one in definition, the other in time. In which way, then, is the One a principle? For, as was said, the right angle seems to be prior to the acute, and the acute to the right, and each of them is one. So they make the One a principle in both ways. But that is impossible: one is so as form and substance, the other as part and as matter. For each of the two is one in a way. In truth each unit exists potentially (at least if number is some one thing and not like a heap, but each number is made of different units, as

they say), but not in actuality. The cause of the error they fall into is that they were hunting at the same time from mathematics and from universal definitions. From mathematics they posited the One, their principle, as a point (for the unit is a point without position; so, just as some others put the things that are together out of the smallest thing, so did these thinkers, with the result that the unit becomes the matter of numbers, and at the same time prior to the dyad—and yet again posterior, since the dyad is a whole, a unity, and a form). But because they were seeking the universal, they spoke of the One that is predicated of things as a part in this way too. These characteristics cannot belong to the same thing at the same time. If the One itself must be only without position (for it differs in nothing except that it is a principle), and the dyad is divisible while the unit is not, the unit would be more like the One itself. And if the unit is, the One itself would be more like the unit than like the dyad; so each of the two units would be prior to the dyad. But they deny this; at any rate they generate the dyad first. 1085a Further, if the dyad-itself is one thing and so is the triad-itself, the two together make a dyad. From what, then, does this dyad come?[4]

### LINES, PLANES, SOLIDS AND THE ONE

*Deriving magnitudes from the great and small or from points raises the same difficulties.*

One might also be puzzled on the following point. There is no contact among numbers, but there is succession among units with nothing between them (those in the dyad or the triad, for instance). Are these units in succession with the One itself or not? And is the dyad prior to the units that succeed it, or to either of its own units?—The same difficulties arise with the classes that come after number: line, plane, and body. Some make these out of the species of the great and small—lengths from long and short, planes from broad and narrow, solids from

4 The Greek text here is corrupt, and the sense of "only without position" is uncertain.

deep and shallow; these are species of the great and small. The principle corresponding to the One, different people posit differently among such things. In these too countless impossibilities and fictions come to light, things contrary to all reason. For the results are cut off from one another, unless the principles also go together, so that the broad and narrow is also long and short (but if so, the plane will be a line and the solid a plane; and further, how will angles and figures and the like be accounted for?). And the same thing happens as with number: these are attributes of magnitude, but magnitude is not made of them, any more than length is made of straight and curved, or solids of smooth and rough.—Common to all these is the puzzle that arises with Forms taken as genera, whenever someone posits universals: whether it is animal-itself that is in the animal, or something other than animal-itself. If the universal is not separate, this will raise no puzzle. But if the One and the numbers are separate, as those who say these things claim, it is not easy to solve—if one should call the impossible "not easy." For when someone thinks of the One in the dyad, or generally in a number, is he thinking of the thing itself or of something else?—Some, then, generate magnitudes from matter of this kind; others generate them from the point (the point seems to them to be not one but like the One) and from another matter like plurality, though not plurality; and about these the same puzzles arise no less. For if the matter is one, line, plane, and solid are the same (for from the same things one and the same thing will result). [1085b] But if the matters are several—one of the line, another of the plane, another of the solid—either they go together with one another or they don't; so the same consequences follow in this way too: either the plane will not contain a line, or it will be a line.—Further, no attempt is made to explain how number can come from the One and plurality; but however they put it, the same difficulties arise as for those who derive it from the One and the indefinite dyad. For one thinker generates number from what is predicated universally, and not from some particular plurality; another from some particular plurality, but the first

one (for he says the dyad is a first plurality). So there is practically no difference, and the same puzzles will follow—mixture, position, blending, generation, and all the rest of that kind. Above all, one might ask: if each unit is one, what does it come from? For each is certainly not the One itself. It must come from the One itself and plurality, or from a part of plurality. To say that the unit is a plurality is impossible, since it is indivisible. To say it comes from a part of plurality raises many other difficulties. Each of the parts must be indivisible (or else be a plurality, and the unit divisible), and the One and plurality will not be elements (for each unit does not come from plurality and the One). Further, whoever says this does nothing but produce another number; for a plurality of indivisibles is a number. Further, we must ask those who talk this way whether number is infinite or finite. For there was, it seems, also a finite plurality, from which, together with the One, the finite units come; and plurality-itself is different from infinite plurality. Which plurality, then, is the element, together with the One? One might ask the same about the point, and the element from which they make magnitudes. For this is surely not the only point. At any rate, where does each of the other points come from? Certainly not from some extension plus the point-itself. Nor can there be indivisible parts of the extension, as there are parts of the plurality from which the units come; for number is composed of indivisibles, but magnitudes are not.—All these considerations and others like them make it clear that number and magnitudes cannot be separate. 1086a Further, the disagreement among the accounts of numbers is a sign that it is the facts themselves, being untrue, that throw these thinkers into confusion. Those who posit only mathematical objects besides perceptible things saw the difficulty and artificiality of the Forms, so they abandoned form-number and posited mathematical number. Those who wanted to make the Forms numbers at the same time, but did not see how, if one posits these principles, mathematical number would exist besides form-number, made form-number and mathematical number the same in word—since in fact

mathematical number has been done away with (for the hypotheses they state are peculiar to themselves, not mathematical). And the first to posit that there are Forms, that the Forms are numbers, and that there are mathematical objects, reasonably separated them. So it turns out that all of them are right in some respect, but not right overall. They themselves confirm it, since they say not the same things but contrary ones. The cause is that their hypotheses and principles are false. It is hard to speak well from what is not well, as Epicharmus says: "for it's only just been said, and straight away it's plainly not well."—But about numbers, the puzzles and distinctions we have gone through are enough. (Someone already persuaded would be persuaded still more by more arguments, but someone not persuaded would come no nearer to it.) As for the first principles, first causes, and elements: what is said by those who make determinations only about perceptible substance has partly been discussed in the works on nature and partly does not belong to the present inquiry; but what is said by those who claim there are other substances besides perceptible ones is next to consider after what has been said. Since some say that the Forms and the numbers are such substances, and that their elements are the elements and principles of the things that are, we must examine what they say and how they say it. Those who posit only numbers, and mathematical ones at that, must be examined later; but in the case of those who speak of Forms one can view at once their way of thinking and the puzzle about it. For they make the Forms universal, and at the same time, again, separate and particular. That this is not possible has been argued through in the puzzles earlier. The reason why those who say that substances are universal combined these characteristics in the same thing is that they did not make them the same as perceptible things. They thought that the particulars in the perceptible world were in flux and none of them stayed, [1086b] but that the universal existed besides these and was something different. Socrates, as we said earlier, set this going through his definitions; but he did not separate universals from particulars, and in not separating them

he thought rightly. The results make it plain. Without the universal it is impossible to get knowledge, but separating it is the cause of the difficulties that arise about the Forms. The others, believing that if there were to be any substances besides the perceptible ones that are in flux, they must be separate, had no others to offer, so they set out as separate those that are spoken of universally. So it followed that universals and particulars were practically the same natures. This, then, would be one difficulty in its own right in the view we have described.

### ARE THE PRINCIPLES UNIVERSAL OR PARTICULAR?

*Knowledge is of universals, yet substance is particular; potential and actual knowledge resolve the puzzle.*

Let us now discuss a point that raises a puzzle both for those who speak of Forms and for those who don't, and that was mentioned earlier, at the beginning, among the puzzles. If someone does not posit substances as separate, and separate in the way particular things are said to be, he will do away with substance as we mean it. But if someone posits substances as separate, how will he posit their elements and principles?[5] If these are particular and not universal, there will be as many things as there are elements, and the elements will not be knowable. (Suppose the syllables in speech are substances and their letters are the elements of the substances. Then BA must be one, and each of the syllables one, since they are not universal and the same in form, but each is one in number, a this, and not something that merely shares a name. Further, they posit each thing "that is itself" as one. And if the syllables are like this, so are the things they are made of. So there will not be more than one A, nor more than one of any other letter, by the same argument by which there cannot be more than one of the same syllable. But if so, there will not be other things besides the elements, but only the elements. Further, the elements will not be knowable either, for they are not universal, and knowledge is of universals. This

5 The reference is to Book B, the book of puzzles.

is clear from demonstrations and definitions: there is no deduction that this triangle has angles equal to two right angles unless every triangle does, nor that this human being is an animal unless every human being is.) [1087a] But if the principles are universal, either the substances made of them are universal as well, or non-substance will be prior to substance. For the universal is not a substance, but the element and the principle are universal, and the element and the principle are prior to what they are the principle and element of. All these consequences follow reasonably when they make the Forms out of elements and claim that, besides the substances that have the same form, there is some one thing that is separate. But if nothing prevents it from being as with the elements of speech, where there are many As and Bs and no A-itself or B-itself besides the many, then on this account there will be infinitely many similar syllables. The claim that all knowledge is universal, so that the principles of the things that are must also be universal and not separate substances, raises the greatest puzzle of all we have mentioned. Yet what is said is true in one way and not true in another. For knowledge, like knowing, is twofold: one potential, the other actual. The potentiality, being like matter, universal and indefinite, is of what is universal and indefinite; but the actuality, being definite and of something definite, is a this, of a this. Sight sees universal color only accidentally, because this color it sees is a color; and what the grammarian studies, this A, is an A. For if the principles must be universal, what comes from them must also be universal, as in demonstrations; and if so, nothing will be separate, nor will anything be a substance. But clearly knowledge is in one way universal and in another way not.

# Book Nu (XIV)

*Numbers and first principles in the Platonists.*

### CHAPTER 1

About this kind of substance, then, let this much be said. All thinkers make the principles contraries, as in natural things, and likewise in the case of unchanging substances. But if nothing can be prior to the principle of all things, it would be impossible for the principle to be a principle while being something else. It would be as if someone said that the white is a principle, not as something else but as white, and yet that it is said of a subject, and is white by being something else; for that other thing will be prior. But all things come to be from contraries, as from some underlying subject; so this must belong to contraries above all. 1087b All contraries, then, are always said of a subject, and none is separate. Rather, just as appears to be the case, nothing is contrary to substance, and reason bears this out. None of the contraries, then, is strictly a principle of all things; the principle is something else.—But these thinkers make one of the contraries matter. Some set the unequal against the One, taking it to be the nature of plurality; others set plurality against the One. (For some, numbers are generated from the dyad of the unequal, the great and small; for one thinker, from plurality; but in both cases by the substance of the One.) For the one who says the unequal and the One are the elements, and that the unequal is a dyad made of great and small, speaks as though the unequal and the great and the small were one, and does not make the distinction that they are one in definition but not in number. Moreover, they give a poor account of the principles they call elements.

Some speak of the great and the small together with the One—three elements of numbers, the two as matter and the One as form. Others speak of the many and few, because the great and small are by nature more suited to magnitude. Others speak of what is more universal than these, the exceeding and the exceeded. None of these views differs at all, one might say, with regard to some of the consequences, but only with regard to the abstract difficulties, which they guard against because they themselves offer abstract proofs. Except that it belongs to the same argument that the exceeding and the exceeded are principles, rather than the great and the small, and that number comes from the elements before the dyad does; for both are more universal. As it is, they say the one but not the other. Others set the different and the other against the One; others, plurality and the One. If the things that are come from contraries, as they want, and either nothing is contrary to the One or, if anything is to be, plurality is—while the unequal is contrary to the equal, the different to the same, and the other to the thing itself—then those who set the One against plurality have the best claim to plausibility; yet not even they are adequate. For the One will be few: plurality is opposed to fewness, and the many to the few.—That "one" signifies a measure is evident. And in every case there is something else that underlies it: in a musical scale the quarter-tone, in magnitude the finger's breadth or the foot or something of that sort, in rhythms the beat or the syllable; likewise in weight there is some definite weight. And the same holds in all cases: [1088a] in qualities it is some quality, in quantities some quantity; and the measure is indivisible, one kind in form, another relative to perception—which shows that the one is not in its own right the substance of anything. And this is reasonable: for "one" signifies the measure of some plurality, and "number" a measured plurality, a plurality of measures. (That is why it is reasonable that the one is not a number: the measure is not measures, but both the measure and the one are principles.) The measure must always be something the same that belongs to all the things measured: if the things are horses, the measure

is horse; if human beings, human being. If they are a human being, a horse, and a god, the measure is perhaps living thing, and their number will be a number of living things. If they are human being, pale, and walking, there is hardly a number of these, since they all belong to the same thing, one in number; still, their number will be a number of kinds, or of some other such term.

Those who make the unequal a unity, and make the dyad an indefinite dyad of great and small, say things very far from what is plausible or possible. For these are attributes and accidents of numbers and magnitudes rather than their underlying subjects —the many and few of number, the great and small of magnitude—just like even and odd, smooth and rough, straight and curved. Further, besides this error, the great and the small and all such things must be relative; and the relative is least of all a nature or substance, and is posterior to quality and quantity. The relative is an attribute of quantity, as was said, not its matter, since something else is the matter both for the relative in general and for its parts and species. For nothing is great or small, many or few, or relative at all, that is not many or few or great or small or relative by being something else. A sign that the relative is least of all a substance and a being is that it alone has no coming to be, destruction, or change of its own, as quantity has increase and decrease, quality alteration, place locomotion, and substance unqualified coming to be and destruction. Not so the relative: without being changed itself, one thing will be now greater, now smaller or equal, when the other has changed in quantity. [1088b] And the matter of each thing must be what is potentially such a thing, and so too for substance; but the relative is neither potentially nor actually a substance. It is absurd, then—or rather impossible—to make a non-substance an element of substance, and prior to it; for all the categories are posterior to substance. Further, elements are not predicated of the things they are elements of; but many and few are predicated of number, both separately and together, and long and short of the line, and a plane is both broad and narrow. And if

there is in fact a plurality of which one term, few, is always predicated, like the dyad (for if it were many, the one would be few), there could also be something many without qualification —the decad, say, is many if there is nothing greater than it, or ten thousand is. How, then, will number come from few and many in this way? Either both should be predicated of it or neither; but as it is, only one of them is.

### ETERNAL THINGS CANNOT BE MADE OF ELEMENTS

*Anything made of elements has matter and could fail to be, so it cannot be eternal.*

We must consider in general whether eternal things can be composed of elements. They will have matter, since everything made of elements is composite. Now a thing must come to be from what it consists of, whether it has always existed or came to be; and everything that comes to be comes to be from what is potentially the thing it becomes (for it would not have come to be from what was incapable of it, nor would it have existed); and what is capable can either be actual or not. So however much number, or anything else that has matter, always exists, it could fail to be—just as what lasts one day can, and what lasts any number of years; and if so, so can what lasts for a time without limit. They would not, then, be eternal, if what is capable of not being is not eternal, as we had occasion to discuss in other works. If what we are now saying is universally true—that no substance is eternal unless it is actuality—and the elements are the matter of substance, then no eternal substance would have elements present in it from which it is composed. There are some who make the element that goes with the One an indefinite dyad, and who reasonably object to the unequal because of the impossible consequences. They are rid only of the difficulties that necessarily arise for those who make the unequal and the relative an element. But the difficulties that arise independently of this view must hold for them too, whether they construct form-number from these elements or mathematical

number.—There are many causes of their straying toward these causes, [1089a] but above all that they framed the puzzle in an old-fashioned way. For it seemed to them that all the things that are would be one, being itself, unless one refuted Parmenides' saying and came to grips with it: "For never shall this be forced: that things that are not, are." They thought it necessary to show that what is not, is; for only so—from what is and something else—could the things that are be made, if they are many. Yet, first, if "being" has many senses (in one sense it signifies substance, in another quality, in another quantity, and so on for the other categories), what sort of one will all the things that are be, if what is not is not to be? Will it be the substances, or the attributes and the other categories likewise, or all of them—so that the this, the such, the so-much, and everything else that signifies some one thing, will be one? But it is absurd, or rather impossible, that some single nature coming into being should be the cause of the fact that, of what is, one part is a this, another a such, another so-much, another somewhere. Next, from what sort of not-being and being do the things that are come? For "not-being" too has many senses, since "being" does. Not being a human being signifies not being this; not being straight, not being of this quality; not being three cubits long, not being of this size. From what sort of being and not-being, then, do the things that are come to be many? He means the false, and this nature, to be the not-being from which, together with being, the things that are are many. That is why it used to be said that one must assume something false, just as geometers assume that a line is a foot long when it isn't. But it is impossible for things to be like this. Geometers assume nothing false (for this is not a premise in the deduction), nor do the things that are come to be or pass away from not-being in this sense. But not-being in its various inflections has as many senses as there are categories, and besides these there is not-being in the sense of the false and in the sense of the potential. Coming to be is from this last: a human being comes from what is not a human being but is potentially a human being, and white from what is not white but is poten-

tially white, likewise whether one thing comes to be or many.—The inquiry is evidently about how being, in the sense of substances, is many; for what they generate is numbers, lengths, and bodies. It is absurd, then, to inquire how being in the sense of the what-it-is is many, and not how qualities or quantities are. For surely the indefinite dyad, or the great and the small, is not the cause of there being two whites, or many colors, flavors, or shapes; [1089b] otherwise these too would be numbers and units. Yet if they had gone into these cases, they would have seen the cause in the other cases too; for the same thing, or an analogous one, is the cause. This digression is also the reason why, in looking for the opposite of being and the One, from which, together with these, the things that are come, they posited the relative and the unequal, which is neither the contrary nor the negation of those, but one nature among the things that are, just like the what and the quality. They ought also to have asked this: how relatives are many and not one. As it is, they ask how there are many units besides the first one, but no longer how there are many unequals besides the unequal. Yet they make use of, and speak of, great and small, many and few (from which numbers come), long and short (from which the line comes), broad and narrow (from which the plane comes), deep and shallow (from which solid bulks come); and they go on to speak of still more kinds of relative. What, then, is the cause of these being many?—Now it is necessary, as we say, to posit for each thing what is that thing potentially. (The author of these views went on to declare what it is that is potentially a "this" and a substance but is not in its own right: namely, the relative—as if he had said "the qualitative." But the relative is neither potentially the One or being, nor the negation of the One or of being; it is one particular kind of being.) And it was far more necessary, as has been said, if he was asking how the things that are are many, not to ask about things in the same category—how there are many substances or many qualities—but how the things that are are many. For some of them are substances, some are affections, and some are relatives. In the other categories, then, there is a further question to

consider about how they are many. Because they are not separable, it is by the underlying subject's coming to be and being many that qualities and quantities are many—though there must be some matter for each genus, only it cannot be separable from substances. But in the case of individual "thises," there is some account of how the "this" is many, unless a thing is to be both a "this" and a nature of that general kind. The puzzle that arises from these facts is rather this: how there are actually many substances and not one. And further, even if the "this" and the quantitative are not the same, we are not told how and why the things that are are many, but only how quantities are many. For every number signifies a quantity, and so does the unit, unless it means a measure and what is indivisible in respect of quantity. If, then, the quantitative and the what-it-is are different, we are not told what the what-it-is comes from or how it is many; 1090a and if they are the same, whoever says so has to face many inconsistencies.—One might also turn one's inquiry to numbers and ask where we should get our conviction that they exist. For someone who posits Forms, numbers supply a kind of cause for the things that are, if each number is a Form and the Form is the cause of being for other things in one way or another (let this assumption be granted them). But take someone who does not think this way, because he sees the difficulties inherent in the Forms and so does not, on their account at least, make numbers exist, but who does posit mathematical number. Where should one get the conviction that such number exists, and what use is it to other things? Its proponent does not say it is the number of anything; he speaks of it as a nature existing itself by itself. Nor does it appear to be a cause of anything. For all the theorems of arithmetic will hold of perceptible things too, as has been said.

### WHY BELIEVE NUMBERS EXIST?

*Neither Platonists nor those who posit only mathematical number can justify separate numbers.*

Those, then, who hold that the Forms exist, and that they are numbers, do at least try to say somehow why they exist, by "setting out" each thing apart from the many and taking each as some one thing. But since these arguments are neither necessary nor even possible, one should not say, on their account at least, that number exists. The Pythagoreans, seeing many attributes of numbers belonging to perceptible bodies, made the things that are numbers—not separate numbers, but things made out of numbers. And why? Because the attributes of numbers are present in a musical scale, in the heavens, and in many other things. But those who say that only mathematical number exists can say nothing of this sort on their hypotheses; what they used to say instead was that the sciences would not be about perceptible things. We, however, say that the sciences are about these things, as we said before. And it is clear that mathematical objects are not separate; for if they were separate, their attributes would not be present in bodies. Now on this score the Pythagoreans are open to no objection. But in making natural bodies out of numbers—things that have lightness and weight out of things that have neither weight nor lightness—they seem to be talking about another heaven and other bodies, not perceptible ones. Those who make number separate assume both that it exists and that it is separate, because the axioms will not hold of perceptible things, while the statements of mathematics are true and charm the soul; and the same goes for mathematical magnitudes. [1090b] Clearly, then, the opposing argument will say the opposite, and those who hold this view must solve the puzzle just raised: why, if mathematical objects are in no way present in perceptible things, their attributes are present in perceptible things. There are some who think there must be natures of this kind because the point is the limit and extremity of the

line, the line of the plane, and the plane of the solid. We must look at this argument too, and see whether it is not too feeble. For extremities are not substances; rather, all these things are limits. (Even walking, and motion in general, has some limit; so this limit would be a "this" and a substance—which is absurd.)—And even if they are substances, they will all be substances of these perceptible things here, since that is what the argument was about. Why, then, would they be separable?—Further, someone not too easily satisfied might press the question, about all number and mathematical objects, why the earlier contribute nothing to the later. (For if number did not exist, magnitudes would exist no less, for those who say that only mathematical objects exist; and if magnitudes did not exist, soul and perceptible bodies would.[1] But nature, judging from the phenomena, does not seem to be a string of disconnected episodes, like a bad tragedy.) Those who posit the Forms escape this problem, since they make magnitudes out of matter and number: lines out of the two, planes presumably out of the three, solids out of the four—or out of other numbers, since it makes no difference. But will these magnitudes be Forms? If not, what is their mode of being, and what do they contribute to the things that are? They contribute nothing, just as mathematical objects contribute nothing. What's more, not a single theorem holds of them, unless one is willing to tamper with mathematics and invent some private doctrines of one's own. It is not hard to take any hypotheses you like and spin out a long chain of consequences. These thinkers, then, go wrong in this way, by trying to glue mathematical objects onto the Forms. And those who first made two kinds of number, the number of the Forms and mathematical number, have not said, and could not say, how mathematical number will come to be, or out of what. For they make it intermediate between form-number and perceptible number. If it is made from the great and small, it will be the same as the number of the Forms (for magnitudes he makes from some

1 Those who say only mathematical objects exist are Speusippus and his followers.

other small and great). [1091a] If he names some other element, he will be making the elements more numerous. And if the principle of each kind is some one thing, the One will be something common to them, and we must ask how the One is these many things as well—while at the same time, on his view, number cannot come to be except from the One and an indefinite dyad. All this is irrational; it conflicts both with itself and with what is reasonable, and it seems to embody Simonides' "long story": for the long story comes about, like the talk of slaves, when people have nothing sound to say.[2] The very elements, the great and the small, seem to cry out as if they were being dragged along; for they cannot possibly generate any number except the one got by doubling from one.—It is also absurd to posit a generation of things that are eternal; or rather, it is one of the impossible things. Whether the Pythagoreans posit generation or not, there is no need to hesitate: they say plainly that when the One had been constructed—whether out of planes, or of surface, or of seed, or of things they are at a loss to name—immediately the nearest part of the unlimited began to be drawn in and limited by the limit. But since they are constructing a world and want to speak in terms of nature, it is fair to examine them to some extent in an inquiry about nature, but to leave them out of the present one. For we are seeking the principles among unchangeable things, so it is the generation of numbers of that kind that we must consider.

### THE PRINCIPLES AND THE GOOD

*Is the good a first principle or something that appears later, as some thinkers claim?*

Now they say there is no generation of the odd, clearly implying that there is generation of the even. Some construct the first even number out of unequals, the great and the small, when these are equalized. So inequality must belong to them before they are equalized. But if they had always been equalized, they

2 Simonides' "long story" seems to have been a proverbial rambling excuse.

would not have been unequal before, since there is nothing before what always is. So it is evident that they do not posit the generation of numbers merely for the sake of exposition.—There is a puzzle, and a reproach for anyone who finds it easy, about how the elements and principles are related to the good and the beautiful. The puzzle is this: is any of them the sort of thing we mean by the good itself and the best, or not—are these later in origin? The theologians seem to agree with some thinkers of our own day, who say no: rather, the good and the beautiful appear only once the nature of things has advanced. (They do this to guard against a genuine difficulty facing those who say, as some do, that the One is a principle. [1091b] The difficulty arises not from ascribing goodness to the principle as belonging to it, but from making the One a principle—and a principle in the sense of an element—and generating number from the One.) The ancient poets agree in this respect, in that they say it is not the first beings—such as Night and Heaven, or Chaos, or Ocean—who reign and rule, but Zeus. They are led to say such things, however, because in their stories the rulers of the world change. For those of them who are mixed, in that they do not say everything in the form of myth—Pherecydes, for instance, and some others—make the first begetter the best; so do the Magi; and so do some of the later wise men, such as Empedocles and Anaxagoras, the one making Love an element, the other making intellect a principle.[3] Of those who say there are unchangeable substances, some say that the One itself is the good itself; but they thought its substance lay above all in its being one.—This, then, is the puzzle: which of the two ways we should speak. It would be surprising if the first, eternal, and most self-sufficient thing did not possess this very attribute—self-sufficiency and self-preservation—primarily as a good. Yet it is imperishable, and self-sufficient, for no other reason than that it is in a good condition. So to say that the principle is of this kind may reasonably be held to be true; but that this principle should be the One

3 Pherecydes of Syros (sixth century BC) wrote an early prose account of the origins of the world; the Magi were the priests of Persia.

or, if not that, an element—and an element of numbers—is impossible. For many difficulties follow—to escape them some have given up the view, namely those who agree that the One is a first principle and element, but of mathematical number. For all the units turn out to be precisely some kind of good, and there is a great abundance of goods. Further, if the Forms are numbers, all the Forms are precisely some kind of good. But let someone posit Forms of whatever he likes. If they are Forms of goods only, the Forms will not be substances; if of substances too, all animals and plants will be goods, and so will the things that participate in the Forms. These absurd consequences follow, and also that the contrary element—whether it is plurality or the unequal, the great and small—is the bad itself. (That is why one thinker avoided attaching the good to the One: since generation is from contraries, it would be necessary for the bad to be the nature of plurality. Others say that the unequal is the nature of the bad.) It follows, then, that all the things that are partake of the bad except one thing, the One itself; that numbers partake of it in a purer form than magnitudes do; [1092a] that the bad is the space in which the good is found; and that the good partakes of and desires what destroys it, for a contrary is destructive of its contrary. And if, as we were saying, matter is what is each thing potentially—as the matter of actual fire is what is potentially fire—the bad will be the good itself potentially.[4] All these consequences follow partly because they make every principle an element, partly because they make contraries principles, partly because they make the One a principle, and partly because they make numbers the first substances, separable, and Forms.

4 The "one thinker" is probably Speusippus; the view that the unequal is the bad is Plato's.

### HOW COULD NUMBER COME FROM PRINCIPLES?

*Number cannot come from its principles by mixture, composition, or generation from a seed.*

If, then, it is impossible both not to put the good among the principles and to put it there in this way, it is clear that the principles are not correctly given, nor are the first substances. Nor is anyone right to suppose so if he likens the principles of the universe to the principle of animals and plants, on the ground that the more complete always comes from what is indefinite and incomplete—which is why he says the same holds of the first things, so that the One itself is not even a being. For even here, among animals and plants, the principles from which they come are complete: a human being begets a human being, and the seed is not first. It is absurd, too, to make place come into being together with the mathematical solids (for place is peculiar to individual things, which is why they are separate in place, whereas mathematical objects are not anywhere), and to say that they will be somewhere without saying what place is.—Those who say that the things that are come from elements, and that the first of the things that are are numbers, ought to have distinguished the ways in which one thing comes from another, and then said in which way number comes from its principles. Is it by mixture? But not everything can be mixed, and what comes to be is different from its ingredients; besides, the One will not be separate or a distinct nature, as they want it to be. By composition, then, like a syllable? But then there must be position, and whoever thinks of the One and plurality will think of them separately. Number, then, will be this: a unit plus plurality, or the One plus the unequal. And since being from certain things means in one sense being from things present in it and in another sense not, in which way does number come from its principles? Being from things present in it belongs only to things that undergo generation. Is it, then, as from a seed? But nothing can depart from what is indivisible. As from a contrary

that does not persist? But whatever is of this kind also comes from something else that does persist. Since, then, one thinker posits the One as contrary to plurality, [1092b] and another as contrary to the unequal, treating the One as equal, number would come from contraries; so there is something else, persisting, from which, together with one of the contraries, number is or has come to be. Further, why on earth do all other things that come from contraries or contain contraries perish, even when they are made of the whole of the contrary, while number does not? Nothing is said about this. Yet a contrary destroys, whether it is present in the thing or not, as Strife destroys the mixture (though it should not have, since it is not the contrary of that).—Nor has it been determined in which way numbers are causes of substances and of being. Is it as boundaries, as points are of magnitudes? This is how Eurytus assigned which number belongs to what—this one to a human, that one to a horse—imitating the shapes of plants with pebbles, like those who arrange numbers into the figures of triangle and square. Or is it because harmony is a ratio of numbers, and so likewise are a human being and every other thing? And the attributes—white, sweet, hot—how are they numbers? That numbers are not substance, nor causes of shape, is clear; for the ratio is the substance, and number is matter.[5] For example, the substance of flesh or bone is a number only in this way: three parts fire, two parts earth. And a number, whatever it is, is always a number of some things—of fire or of earth or of units. But the substance is the being of so much to so much in the mixture; and this is no longer a number but a ratio of the mixture of numbers, whether corporeal numbers or any other kind. So number—whether number in general or number made of units—is not a cause as producing a thing, nor as the matter, nor as the ratio and form of things. Nor, indeed, is it a cause as that for the sake of which.

5 Eurytus was a Pythagorean of about 400 BC, a pupil of Philolaus.

## NUMBER MYSTICISM

*Coincidences like the sevens show nothing; numbers are not causes of things.*

One might also ask what the good is that comes from numbers through the mixture's being in a number, whether an easily calculated one or an odd one. As things are, honey-water is no healthier for being mixed three times three; it would do more good if it were in no particular ratio but well watered than if it were in a numerical ratio but strong. Further, the ratios of mixtures consist in the adding of numbers, not in numbers as such —for instance, three to two, not three times two. For in multiplications the genus must be the same, so that the series A B C must be measured by A, and the series D E F by D; so all by the same factor. So fire cannot be B E C F and water two times three. 1093a If everything must share in number, many things must turn out to be the same, and the same number must belong to this thing and to another. Is that, then, the cause, and does the thing exist because of it, or is that unclear? For example, there is a number of the sun's movements, and again of the moon's, and indeed of the life and lifespan of each animal. What prevents some of these from being squares and others cubes, some equal and others double? Nothing does; they must fall within these, if everything shared in number. And different things could fall under the same number; so if the same number belonged to certain things, they would be the same as each other, since they would have the same form of number—the sun and the moon, for instance, would be the same. But why are these numbers causes? There are seven vowels, the scale has seven strings, the Pleiades are seven, animals lose their teeth at seven (some do, anyway; some don't), and the champions against Thebes were seven. Is it, then, because this number is naturally of such a kind that those champions came to be seven, or that the Pleiad

consists of seven stars?[6] Surely the champions were seven because of the gates or for some other reason, and the Pleiad is seven because that is how we count it, just as we count twelve stars in the Bear, while others count more. They even say that Ξ, Ψ and Z are concords, and that because the concords are three, these letters are three as well. That there could be countless such letters doesn't concern them (for there could be one sign for Γ and P together). But if they say it is because each of these letters is double the others, and no other letter is, the cause is that there are three places in the mouth, and at each one a sound is combined with sigma. That is why there are only three, and not because the concords are three—for there are in fact more concords, whereas here there cannot be more. These people are like the old Homeric scholars, who see small resemblances and overlook great ones.[7] Some say there are many such correspondences: for instance, that the two middle notes are nine and eight, and that the epic line has seventeen syllables, the same number as these two, scanning with nine syllables in its right half and eight in its left. 1093b And they say that the interval in the alphabet from A to Ω is equal to that from the lowest note to the highest on the pipes, whose number is equal to that of the whole system of the heavens. But we should see that no one would have difficulty stating or finding such correspondences among eternal things, since they can be found even among perishable ones. But the much-praised natures in numbers, and their contraries, and in general mathematical properties, as some describe them when they make them causes of nature, seem to vanish when examined in this way at least; for none of them is a cause in any of the senses distinguished concerning principles. Yet in a way they do make it evident that goodness belongs to numbers, and that the odd, the straight, the equal-times-equal, and the powers of certain numbers belong to

6 The Seven against Thebes were the legendary champions who attacked the city's seven gates.

7 Ξ, Ψ and Z are "double" consonants (ks, ps, sd); the three concords are the fourth, fifth and octave.

the column of the beautiful. For the seasons and a number of this kind go together. And all the other things they gather from mathematical theorems have this same force. That is why they look like coincidences. They are accidents, but all appropriate to one another, and one by analogy. For in each category of being there is the analogous: as the straight is in length, so the level is in breadth, perhaps the odd in number, and white in color.—Further, the numbers in the Forms are not the causes of harmonic relations and the like; for those numbers, even when equal, differ from one another in form, since their units do too. So on this account at least we should not posit Forms. These, then, are the consequences, and still more could be gathered. The many troubles they have over the generation of numbers, and their inability to connect things up in any way, seem to be evidence that mathematical objects are not separable from perceptible things, as some say, and that these are not the principles.