

Introduction to the Art of Demonstration

by al-Kindi

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Introduction to the Art of Demonstration

I.

1. In the name of the most good and merciful God.

2. Now that we have spoken of the predicables, how many there are and how they are joined to one another to make conclusions, we wish to show what demonstrative argument is, and how many species it has, and how it is ordered, and how it is to be used to bring forth conclusions. But first it is necessary to show what the intention of the philosophers is in using demonstrative argument.

3. You should know, then, that although the ways of the sciences, cognizing, perceiving, and sensing are many (as we have already shown for some in the letter about the senses and the sensed, and for others in the letter about the intellect and what is understood, and for yet others in the letter about the genera of the sciences), still, in those disciplines in which the inquiry concerns cognition of the certainty of realities, the ways in which philosophers have walked are comprehended in four species, namely division and resolution, definition and demonstration.

4. Now it is necessary for us to speak about each of these, showing how it is one of these ways, and to show that those things that are known are known through these ways, and why there are four only, neither more nor less. Now the reason for this is:

5. It has already been shown in categoricals concerning the way of division, that everything that is necessary is either genus or species or a particular. Now it is necessary that the way of cognition of each of these should be different, which is shown thus:

6. For the certitude of genera is cognized through their division into species and of species into individuals.¹ But through resolution the certitude of individuals is cognized, namely, whence each of these is composed and from what it is conjoined. Through the definition the certitude of the species is cognized, namely, of what genus each one is, and by what difference it is distinguished in itself from the others. But it is through demonstration that the certainty of those genera that have been designated universal intelligibles is cognized,² as will be shown hereafter.

7. First we wish to exhibit here the way of resolution, and afterwards we will exhibit the way of division in categoricals. And this is also for another reason, for the way of resolution is nearer the intelligence of introductory students. It is the way by which the certitude of individuals is cognized. Indeed, individuals are particular sensible realities, as we have already shown. Now the way of definition and the way of demonstration are more exact (*tenuiores*) and subtle, for through them only realities beyond the senses, namely species and genera, are known.

8. You should know that the conceiving (*intentio*) of an individual is the setting out (*assignatio*) what the

collection is of all those things [composing the individual], each in itself alone and discrete from all the others, [whether the individual is] joined together from different realities or composed of many [similar] parts. Now individuals are of two sorts. For some are put together from similar parts, for instance this ear of corn, and this stone, and this wood, and other individuals similar to these, all the parts of which are of the same nature. And some are individuals put together from parts of diverse substances and with different accidents, for instance this body and this tree and this city and others like these, which are put together from diverse parts. So when you wish to know the customary behavior of each of these individuals, you will consider first those things from which it is composed —what are they? And you will seek the parts from which it is put together—how many are they?

9. You should know that of composite realities there are many species, which are numbered by glorious God alone. But still all are comprehended in three genera, since they are either natural bodies, or artificial bodies, of breathing spirits. Let us posit now one example for each of these, in which the rest will be considered.

10. Natural bodily individuals are like the body of a man, which is a collection put together from members of diverse shape, for instance, the head, the hands, the chest and the feet, and others like these. But each of those members is also composed from parts diverse both in substance and accidents, for instance bones, nerves, veins, flesh, skin and others like these. But each of these also comes into being from the four humors, and each of the humors is composed from chyle [queilum, the fluid found in the small intestine], and chyle from putting together food. But food is from the smallness of plants, and plants from the subtlety of the elements, and the elements from absolute body with the properties that belong to them. Now body is composed from matter and form, and these are two primary simples. But the human body is the last composite, while all the others are simple or composite things only in a certain respect.

11. Now artificial bodies are like a city, which we mark out as a collection of countryside areas and villages, of which each is brought together from farmhouses and houses and tents, and each of these is composed from walls and roofs. But each of these is composed from earth and stone and bricks and wood and the like. These are all from what is made up of elements, and that is from the elements, and the elements are from body, and body from matter and form.

12. Breathing spirits are like songs that are ordered in the number of sounds. But a sound is composed from proportional tones and measured verses. And verses are composed from feet, and feet from syllables, and each syllable from letters, both vowels and consonants. Now no one cognizes this except someone who knows musical proportions.

13. Now in accord with this example you will consider the way of resolution, until it becomes clear to you from what those things that are composite are brought together and composed, and then you will know their certitude.

14. Now concerning the way of definition the intention is this, that we cognize the certitude of species. But how we are to proceed in this matter, to the end that we might set out some species, is in this way: we are to seek out its genus, and the number of its differences and join them all together by their proper names. For example, in defining man it is said that it is rational animal. But if we seek what the definition of animal is, it will be said that it is a mobile, sensitive body. And if we ask what the definition is of body, it will be

said that it is substance that is long, wide and deep. Now if it is asked what the definition of substance is, it will be replied that it does not have a definition, but only a description, which is so since it is called that which is a being, what stands by itself, what is receptive of contrary properties. If it is asked what contrary properties are, it will be replied that they are accidents that rest in substances, but not as a part of them. And in accord with this you will consider the way of definitions. But now we are done with the topic in this letter.

15. Concerning the way of demonstration the intention is this, namely to seek a cognition of the forms constituting the singulars that we encounter. Now the difference between these and the forms perfecting singulars is this: all of them are properties of these [singulars], and dispositions supervenient upon them, and they are made proper to them through the [perfecting forms]. But sense does not discern them since they are submerged below these properties and covered by them. ³ On this account subtle speculation is necessary, and an inquiry sufficient, through argument and demonstration, for coming to a cognition of those that are concomitant with them, and supervene upon them.

16. You should know that many of those things that men have come to know were acquired through argument. And the judgment of argument is sometimes right, and sometimes in error. Therefore it is necessary to show what its cause is, in order that you might be on guard in using argumentation. Now first I will say that argument is an ordering of premisses from which the conclusion comes forth.

17. Now you should know that the premisses of an argument arise from what is cognized in the beginning of understanding. But the principles of those things cognized arise from the senses, as we will show in the letter concerning the senses and what is sensed.⁴

18. Now concerning this, that it was necessary for man to use argument, the reason is this: the senses do not grasp anything except singulars, composed from simple substances that are in discrete places, and from particular accidents in these discrete substances, which are designated as one or another [singular] by one or another [accident]. But quantities and qualities cannot be known directly, but only by arguments made from composites. For example, although a man might know by some sense that some bodies are heavy or many or large, still he cannot know the quantity of the weight of these except by weighing them, nor their multitude except by counting them, nor their magnitude except by measuring them, and other cases similar to these. And all these are weights [that is, standard measures?], and considerations, through which a man cognizes that he cannot know through mere judgment (*aestimationem*) [without the use of a measure].

19. You should know that error occurs in argument in three ways. One is when that through which it is measured is an unjust measure, that is, more or less than a true measure. The second is when the one using the argument is unskilled in using it. The third is when that through which it is measured is just and the one using the argument is skilled, but his intention is to deceive.

II

1. Now due to inexperience in the one using it, error occurs in argument in the following way:
2. You must know that it is natural to use argument from one's childhood, just as it is natural to use the

senses. For a baby, when it begins to differentiate (*discernere*) and consider sensibles, and to consider its parents and cognize them sensibly and differentiate between them, also begins to use opinion and judgment (*aestimationibus*), then if it sees some child similar to itself and considers it, it will know that it has parents, even if it does not see them through the senses, by a consideration taken from itself. And this is a true argument, in which there is no error, since its proof is that the vision of the caused establishes the cause [of the thing to be proved]. Now if he had brothers, which he now sees sensibly, he will begin then to think and judge that that other child has brothers in the same way, in accord with what he is familiar with himself. But in this argument there is an error, and the certitude of this is that the vision of the caused, which are sons of his own family, is not testimony establishing the cause [of the thing to be proved]. ⁵ In the same way again, when the boy sees a woman or man, he thinks and judges that they have a son, even though he does not see him through the senses, according to the consideration of the evidence of his parents. But the judgment based on this consideration is sometimes true, and sometimes false, since the vision of sons of the family is testimony of a cause separated from the establishment of what it causes. ⁶ And in accord with this example consider that a man, from his childhood, discovers in himself, or in his parents, or in his brothers, the disposition of each thing. He will think it is the same with other children and their parents and brothers, by a consideration arising from himself and his parents and his brothers. So if it happens that he is hungry or thirsty or naked, or he happens to suffer heat or cold, or happens to eat or drink something that tastes good, or to put on something that does not please him, or is sad because of something he has lost, or rejoices because of something he has found, surely, when one of these things has happened to him, he thinks that now such things are happening to the other boys who are sons of his family. And his other beliefs and judgments (*putationes et aestimationes*) in judging (*iudicando*) concerning sensibles run in accord with this example, so that, if there were in the house of his parents a hearth, or bread, or something of this sort, or a well of brackish water, he will think and judge that in other houses of other boys it is the same way. But after he has grown, and come to understand, and considered realities with the senses and examined the dispositions of other particulars, he will cognize certitudes concerning those things which he thought and made judgments about in his childhood. And it will be manifest to him, one after another, whether his judgment was certain or in error.

3. You must know, therefore, that all the judgments of [men 's] intellects, and their thoughts and judgments concerning realities, run in accord with this example before inquiry and the revelation of the truth. For many men, when they see in their land its wind or rain, or heat or cold, or day or night, or winter or summer, think and judge that it is the same way in other lands, in accord with their consideration of what is found in their own land. As they were accustomed to think when they were children, that it was the same in the houses of other men as in the house of their own parents, until later, through experience, the certitude or falsehood of what they thought up to then became clear to them, as we have said already. And so runs the judgment of the intellects of men in their beliefs and their judgments concerning realities of the sort we have mentioned, so that when it was considered in the theoretical (*disciplinalibus*) sciences and especially in the science of astronomy, it is plain that a certitude arose in these concerning what had been thought up to then, whether it was true or false.

4. Now you must know that scarcely any man will be freed from opinions and judgments of this sort, neither the intelligent, nor those knowing the theoretical sciences, nor even those wise in philosophy. Now since this is so, there will be no safety from their other arguments proceeding on a similar [fallacious] course. And this is what signifies the weakness of their arguments and the destruction of their meaning [*significationis*]. For we have found that many of those who think themselves to know philosophy and the

intelligibles and demonstrations, think and judge that the whole earth in its proper place is heavy, and this from the consideration of the weight that is in each of its parts. In the same way many of these think that those who are on the opposite of the hemisphere of the earth from us stand upside down, as if someone were to stand under a surface above which another stands, with his feet up against the feet of the other. And in the same way many think there is an infinite full space or a vacuum outside the world, in the way that they find outside their houses another place, and outside their lands another land, and outside their [terrestrial] world the world of the heavens. And in the same way they think that God, who is blessed, created the world in time and space, as they have found their own works and their own artifacts to be made in time and space. An on account of this cause many of them think that the glorious God is a body, because they have found that nothing acts except a body, and God is an agent. Now when they have practiced the divine sciences, then they will have come to know that the affair is just the reverse, as we have shown in the letters on divine things.

5. Now you must know that a man only ascends by degrees to some order of the sciences and thoughts. This is because he has a cognition of those things that appear to him [in scientific knowledge] before their manifestation and uncovering, as his opinions were in these sensible realities when he was a boy, before the cognition of their certitude, as we have shown above.

6. You should know, too, that by a comparison of things known, which a man grasps with his five senses, that which is concluded of these in the first concepts is many, just as by a comparison of simple letters there are many other names that are composed from them. But a comparison of things known, which are in the first concepts, to what is concluded from them through demonstrations and syllogisms of the many sciences, is like the comparison of names to phrases that are composed from them, and locutions and tongues. Now the proof of the certitude of what we have said, namely that there are more in number that are known by argument than there are first concepts, is this, that Euclid prefaces each treatise with ten things known, more or less, that are first intelligibles, from which conclusions he draws forth an indefinite number of questions known by demonstration. And it is the same way in the *Almagest*, and in many books of philosophy this is the judgment.

7. Now after we have shown how error creeps into argument from the side of the one arguing, it is suitable to show now who error creeps in from the side of the argument.

III

1. You should know that error that occurs in argument, so that it is invalid in itself, is of many kinds, and it would be long-winded to show them all, since they were stated in the books on logic. Hence we wish now to name here the conditions for a correct argument alone, so that you might observe them and assume them in argument and set aside the other arguments in which error and fallacy can occur. For from arguments that in a way fail, and in a way are true according to the course of rule-governed usage, there is an argument from the part to the whole.⁷

2. Now you must know that an argument in which no error or fallacy falls is one in the composition and use of which those conditions are preserved that Aristotle set for his students, namely these: that in every science and argumentative discipline you should assume two known intentions, which are first intelligibles,

namely whether it is and what it is. Now Aristotle only prescribes these because it is not possible for the unknown to be known through something unknown, nor can anything known be possessed through something unknown. It is necessary, then, that something be taken from what is known and a first intelligible, and that it be argued from these, and from these the rest of what one seeks is demonstrated.

3. Now the first intelligibles are two, namely the being of realities and their quiddity. Now the being is acquired in souls with the assistance of the senses. But their quiddity is acquired by contemplation and consideration and thought, as we have shown in the letter on the senses and what is sensed. Now since the being of realities is acquired in the soul with the assistance of the senses, and their quiddity by contemplation and consideration, the soul is said to understand [only] then [when the quiddity has been acquired]. But since you have considered and wished to know what the human intellect is--it is not other than the human soul, which comes to be an actual knower, after it has been beforehand only a potential knower. Now it does not come actually to know unless there are acquired in it forms of the being of things with the assistance of the senses, and a form of the quiddity of them through contemplation and consideration. You should know that scientific knowledge of these two, namely whether it is and what it is, always begins the whole fabric of demonstrative sciences. For example, in the beginning of the first book of Euclid there are nine things that are known--which are first intelligibles, using which the other questions are proved--and they are these:

- (1) Whatever are equal to the same are equal to each other.
- (2) If equals are added to equals, the wholes are also equal.
- (3) If equals are subtracted from equals, the remainders are equal.
- (4) If unequal quantities are added to equals, the wholes are also unequal.
- (5) If equals are taken from unequals, then the remainders will also be unequal.
- (6) Doubles of the same reality are equal.
- (7) Halves of the same reality are equal.
- (8) Whatever quantities do not exceed one another when superimposed on one another are equal.
- (9) The whole is greater than its part.

4. Now these judgments are all assumed, and are among those that are equally known through first things understood. And those who understand them do not differ in any of them, but they differ only in what is considered according to them.

5. You should know that these judgments, and those similar to them, are called first things understood, because everyone who understands is familiar with them; nor do those who speculate much concerning them differ over them once they have considered. There is no difference among those who understand except in those things that are known by proofs and arguments. Indeed, the cause of the difference among them on these matters is nothing but the multitude of kinds of (*maneriarum*) argument, and ways (*qualitates*) of using them. And this affair has been explicated at length already, as has been said, in the books on logic and topics. Now I wish to show how the certitude of these things known *per se* is acquired in the souls of those who understand them.

6. You should know that these things that are known, called the first things understood, are not acquired in the souls of those who understand in any way except through being led to them from sensible realities (*per inductionem rerum sensibilium*), from one after another, and consideration of one part after another, and contemplation of one individual after another. Even if there should be several individuals from among these

[sensible realities] contained under one property, it will be acquired in the souls of men in such a way that whatever is of the genus of that individual, or the genus of that part, this judgment concerns it, even though not all the parts of that genus are seen, nor all the individuals of that species.

7. For example, a mature boy, when he begins to observe and consider individual animals one after another, and he finds that they all sense and move, he then cognizes that whatever is of this genus, this judgment also applies to it. In the same way, when he has considered each of the parts of water and found it wet and liquid, and each of the parts of fire hot and burning, and he finds each stone to be hard and dry, then it is known that this judgment applies to everything that is of this genus. In this way, then, are those things known in the beginning acquired by the aid of the senses to the understanding.

8. Now you should know that the order of the understandings that are acquired in the soul with the aid of the senses in these affairs, is very much by degrees. This is because everyone who is, in these matters, more determined (*vehementior*) in speculation, and of better contemplation, or more subtle and penetrating genius, will have in his soul more of those things that are known from the beginnings of what is understood (*ex principiis intellectuum*) than in the soul of one who is in his whole life negligent, and occupied with food and song and corporeal delights.

9. And you should know that for the most part error happens in considerations of the certitude of sensible realities, when it is judged concerning the certitude of sensibles by one sense. For example, if someone sees an emetic [? *asarab*, perhaps an emetic made from hazelwort = *azarum* or *asara baccara*], and if he considers it well, he will think it to be standing and flowing water. But this error will not enter into him unless he judges concerning the certitude of this reality by one sense. The certitude of every reality is not cognized by one sense, since the visual sense does not grasp anything except colors and figures. Certitude concerning water is not cognized by color and touch, but by taste. And the color of several liquid bodies seems to be the color of water, for instance, distilled vinegar and distilled *neptae album* (white naphtha ?) and other things of this sort.

10. And you should know that each genus of sensibles has a property, by which the certitude of that genus is cognized. Just as the difference between some liquid bodies is recognized (*dignoscitur*) by touch, and the difference between others is recognized by taste, but their colors are recognized by vision. Hence it is not necessary for the one considering them to judge concerning the certitude of sensibles except through the sense which is proper to cognizing the certitude of their genus, as we have shown in the letter about sense and what is sensed.

11. Let us return, then, to where we were. Aristotle said the first reality ought to be placed in demonstrative argument, of which it is known whether and what it is, so that through it another may be known, it is like what happens when a geometer assumes a line AB and then makes an equilateral triangle on it, or divides it into two equal lines, or places another perpendicular line on it, or makes some angle on it, and so on, which things are said in the book of Euclid and in other books of geometry. Therefore, it being known whether and what line AB is, something unknown is sought, that is, a triangle or some other thing, so that one may know or produce it. Thus it is necessary also that it occur in demonstrative argument, that first of all some things should be received which are known from the first things understood, and are composed in such a way that the unknown thing is acquired through them.

12. And he said that it is not suitable in demonstration for something be the cause of itself, and this is obvious from the first things understood, since what is caused is not caused by itself. But many who take things for granted about demonstration in a way assume a cause caused by itself, nor do they perceive this, because of the prolixity of their speech. For example, someone putting on airs about the science of natural things, when he is asked what the cause is of the rain in a certain year, will say that it is the multitude of clouds. But if he is asked what is the cause of the multitude of clouds, he will answer that it is the multitude of vapors, which rise from the sea and rest in the air. But if he is asked what is the cause of the rising of the vapor, he will say or think that it is the multitude of what is added to the sea, and the flowing of the waters from the rivers and streams into the seas. Now if he is asked what the cause of this is, he will answer that it is the multitude of rain. Now in accord with this consideration it follows that the cause of the multitude of rain is the multitude of rain.

13. And therefore one must be taught that one of the causes is such, or such, and in the same way about the second and the third and the fourth, and thus to turn aside opposition, because it can happen that there are many clouds, and but little rain. Now each of these realities that is caused has four causes, as we have already shown in the letter about causes and what is caused.

14. And he said that the caused is not prior to the cause, and this is obvious from the first things understood. For what is caused cannot be prior to the cause on this account, namely, that they are of the genus of relatives. Now whatever things are of the genus of relatives must be simultaneous as far as sense is concerned, if they have being at all. And so, even though the cause is prior to the caused for the intellect, still, sometimes there will be a doubt in discerning the cause from what is caused. For example, if someone putting on airs is asked in the science of astronomy what the cause is of the length of the day in one land rather than in another, he will say it is the delay of the Sun for a longer time. Now if he converts this proposition and says, therefore in whatever land the Sun delays longer, the day there is longer, this too will be certain. But for many students who have not been instructed, this is uncertain, namely, which of these is the cause of the other, that is, whether the delay of the Sun above the land is the cause of the length of the day, or the length of the day is the cause of the delay of the Sun above the land.

15. And it is the same way with fire and smoke. For sometimes they will be at the same time, and sometimes one is found before the other. For sometimes smoke precedes fire, and sometimes fire is taken as the cause why the smoke is. And sometimes it is unknown which of these is the cause of the other. Now you should know that of smoke and fire neither one is the cause of the other. For the material cause of the power of both of these is combustible bodies, and their active cause is heat. But they differ in form. For heat, when it acts on combustible bodies with some action, is fire. But if it is weak in action because of wetness, there arises smoke and vapor.

16. And he said that inseparable accidents are not assumed in argument, but he said this only because inseparable accidents are not separated from the realities of which they are accidents, just as the cause is not separated from what it causes. For, if you were to judge of something that it is caused, then necessarily it would have a cause; but concomitant accidents, although they are not separated, yet are not the acting cause. For example, since death, even though it is not separated from cutting down, still it is not the cause of it, nor is cutting down the essential cause of death, because very often death occurs without a cutting down. There is no cause without something caused.

17. And he said that the cause is of the essential reality, it is not unless it is because the realities in a way are causes of many accidental things. But they do not run through all the species of that genus, nor through every individual of the species. For instance, cutting down, which is the cause of accidental death, does not run through every species of death. But it is necessary that there be an essential cause, in order that the proposition judging should be true both before conversion and after. For instance, if it is said, "Everything having color is body," because nothing is found having color that is not body. Therefore body is the essential cause of having color.

18. And he said that the premiss is universal, and it is because of this that conclusions from particular premisses are not necessary, but only possible. For instance, if it is said, "John is a scribe, and some scribe is a judge, therefore it is possible that John is a judge." But when you say that every scribe writes, but John is a scribe, then necessarily John will be a writer.

19. And he said that the predicate is primary in its subject, and because of this he said predicates are in a subject in two ways, some primarily, and some secondarily. For example, being of three angles is, in every triangle, primary being, because this is a form constituting it. But that there are acute or right or oblique angles, this is secondary. Now it is obvious, then, that he does not receive in demonstrative argument any except essential substantial properties, which are forms constituting the reality,⁸ and through these the judgment that is sought, that exhibits the conclusion, will be certain.

20. You should know that essential properties are divided into three sorts, namely general, special, and individual, as we have already shown in the letter on the *Isagoge*. I maintain, and judge without any hesitation, that every true general property is necessary, since it is said of that whole genus. In the same way every special true property is necessary, since it is said of every individual in the species. And these are properties that result in a true and certain conclusion. Make use of those, then, in demonstration and judge using them. It is not necessary that individual properties be true of a whole species. Nor is every special property true of the whole genus. Hence, do not use them in demonstration, nor judge absolutely using them, since you will not be certain in your judgment.⁹

21. Now, then, it is obvious to you that the wise and those who philosophize do not take up demonstrative argument except in order to know through it what is only known through syllogism. And such as these cannot be known through the senses, nor are they first things understood, except according to the way of designation. And this is what is called demonstration.

22. You should know that each art has its own worker, and each worker of each art has to aid him¹⁰ certain basic notions (radices), in which they agree, and hold first in their science, in which they do not differ. The first [basic notions] of each art are taken from another art, which precedes it. And you should know that the first [basic notions] of the demonstrative art arise from the first things understood. Now the principles of the first things understood arise from the senses, as we have said before.

23. You should know that there are two species of the demonstrative art, namely geometry and logic. The first [truths] that arise in geometry arise from another art prior to it. For instance, what Euclid says, "A point is that of which there is no part," and "A line is length without width," "A surface is what has length and width," and others similar to these concerning axioms, which come beforehand among the principles of his treatises. And a judgment concerning logical demonstrations is the same way. For its principles are taken

from another art, which is prior to it, which it is necessary to place before students before introducing demonstration. Of this sort is that which is said, that everything that is, except glorious God, is a substance or accident; and that substance is that which exists *per se*, and is receptive of contraries; and that accident is that which is in another, not as its part, and is destroyed without the destruction of the other; and that some substance is simple, for instance, matter and form, while some is composite, for instance, body. And that every substance is either an acting cause or else is passive and caused; and that between affirmation and negation there is no middle, nor any middle between privation and being; and that accident does not possess action; and others similar to these, which are set before students before demonstrations are.

23. Now he who wishes to know logical demonstration must be delayed in geometrical exercises so that he will already have received the rules from them, because they are nearer to students for understanding, and easier for speculation, since their examples are sensible and visible to the vision, although their intentions are audible and intelligible. Sensibles are nearer the intellect of students.

24. You should know that demonstrations, whether of geometry or logic, do not occur unless they have conclusions that are certain. Now for one conclusion it is necessary that there be two premisses that are certain, or several. For example, what is demonstrated in Euclid's book, that the three angles of each rectilinear triangle are equal to two right angles, can only be demonstrated after forty six figures. And it is as it is in this example in other things that are proved. And judgment concerning logical demonstrations is the same way, for sometimes two premisses suffice, and sometimes several. For example, in the demonstration by which it is proved that a soul is in the body, three premisses suffice, which are these: (1) "Every body has parts," and this premise is universal and affirmative, and certain in the beginning of concepts (in principio intellectuum). Again, another is this: (2) "No body can be moved to every part at once," and this is a universal negative premise, certain in the beginning of concepts. The third is this, (3) "Every body that is moved to every part is moved from some cause moving it," and this is a universal affirmative premise, certain in the beginning of concepts. It is concluded then from these premisses that the soul is in the body. It remained to be demonstrated that it is a substance, and not an accident. Adjoined to these preceding premisses is this other, namely, (4) "The motion of every cause that moves a body is necessarily in one way, to one part, as the motion of the heavy downward and the motion of the light upward, and this cause is called natural; or its motion is to different parts and in different ways, through will and choice, as is the motion of animals, and this is called voluntary or animal motion." And this division is intelligible, grasped by the senses. Therefore everything that moves a body by will and choice is a substance, since an accident does not have action. And these premisses can be received in the beginning of things understood. And it is concluded that the soul is a substance.

IV

1. How it is demonstrated that there is no void in the world: The sense of "void" is this, that it is an empty place. But there is no place in the world that is neither light nor dark. And this is a universal negative proposition certain in the beginning of things understood. Again, it is necessary that light and darkness either both be substance, or both accident, or one substance and the other accident. And these divisions are true intelligibles. Now if both are substance, then there is no void. But if both are accident, there is no accident except in a substance, so then there will not be a void. Now if one is a substance and the other an accident, judgment will occur in the same way.¹¹

2. Again, a demonstration that there is neither void nor the full outside the world: You should know that the void and fullness are properties of place. But place is one of the properties of body. Now if there were any body outside the sky, still, given that we are in what we call the world, we could only understand that body together with this whole universe. But then how will anything else be outside the world?²

3. Concerning what the wise say, that the world is older or younger: Now if through "old" they understand the length of time, then what they say is true. But if they understand that it did not [ever] cease to be stable in the identity it has now, this is not true. And the world is not stable in its identity in even one disposition for one blink of an eye. Then much less did it [not ever] cease [to be stable] in accord with what it is now. Again, we do not understand by that which the wise name the world anything other than the corporeal world, which is of two species, namely celestial and natural. But the bodies that are beneath the circle of the moon are of two species. One is the generating [*generalia*, should be *generantia*] elements, and the other the generated singulars. Now the generated are in coming-to-be and passing-away, and the generating elements are always in variety and alteration, as is obvious to speculators on natural things. But celestial bodies are always in motion and rearrangement according to distance. Where, then, is the stability of these things according to one disposition?³

4. Now if they understand form and spherical figure when they speak of stability, which is in every hour, they know then that spherical figure and circular motion are not in a body because it is body, nor do they constitute its essence. But these are two perfective forms, arising from the intention of the provider of forms (*ex intentione intendentis*),¹⁴ as we will show in the letter on form and matter. Now not every form in what is informed from the intention of the provider of forms is stable in its identity and everlasting. For it is not stable in its identity and everlasting being, unless it is through a form constituting [its essence].

5. And you should know that the conservor of the world in this form is the velocity of the motion of the surrounding heavens. But the mover of heaven is another than heaven. Rest and motion of the sky will not be except in the blink of an eye, as it is written, "The day of judgment will be in the blink of an eye," or [less] if less can be said. You should know that if the sky ceased to revolve, the planets would stop in their courses, and the constellations would cease [moving] from east to west, and the form and the world would be destroyed and its existence, and the great day of judgment would have come. Now this must be without any doubt, for whatever is possible if a finite time is assumed, it must necessarily become actual.¹⁵ Now it is possible that the sky should cease in its revolution, for the reality that moves it can make it go or stop, which is easy for that reality. For the power belongs to it to make the sky incline to whatever part the reality wishes. But we have shown already in the letter about principles that they are the causes of the beginning of the world of bodies, and in the letter on revolution we have shown what the cause is of the permanence of bodies.

V

1. You should know also that when a man walks in accord with the intention of his rational soul and its dispositions, in the manner in which it proceeded in the creation of his body and of his form, he will reach the last [end] of humanity, and come to be a neighbor to the order of angels, and come near his glorious and excellent God, and such a return (*retributio*) will be made to him as cannot be described. Now that according

to which it proceeded in the creation of his body was this: he began from sperm, that is, worthless water, and then it coagulated in the womb (*matrix*) and after this was something viscous. Then it was formed, and then it became a moving and sensitive animal. After that it was an understanding boy, and then a strong young man, given to exertion (*exercitabilis*), and then an old man, experienced, knowledgeable and wise. Then broken down and full of years, a wise man and a philosopher. And after death he became the soul of a celestial, spitiual angel, everlasting, full of delight (*delectabilis*) always rejoicing.

2. You should know that just as you do not make yourself a companion to any of these orders, unless you are first despoiled of certain accidents and imperfect properties, and then attire yourself in others better and more noble than these, in the same way it is necessary that, for anyone to raise himself up the ladder of cognition and knowledge, you should despoil your soul from habits and customs and opinions and works, in which you spent your energy from boyhood unknowing, until you separate from the human form and put on the angelic form, so that you can ascend to the kingdom of heaven, and to the amplitude of the world of the heavens, where an ineffable return will be given you, and you will live a happy life with the sons of your race, who preceded you [on the way] to this life, namely the wise and holy and the prophets.

3. And you should know that it is thus natural to man to use argument and consideration, as it is natural to him to use the senses, as we have said above. Now the rules of argument are diverse, as was shown in the books of logic and conditions of the topics in an extended discussion. Still, we will repeat some of what we said here so that it will serve as an example for the rest.

4. For children posit the dispositions of their own souls, and their parents and the brothers, in accord with the rules of argument. And whatever they are accustomed to do in their affairs, and whatever they find in the affairs of their home, they assume to be signs (*indices*) of the way things are with other boys, even though they do not see them. And this is in accord with the way things are for themselves.

5. But adults assume rules for their arguments, which they know from their activity with realities and their dispositions, which they have experienced. And these are the basic notions (*radices*) from which they consider other realities that they have not seen or experienced.

6. But the wise, who presuppose the science of topics and the subtlety of speculation, assume rules for their arguments in which they and their adversaries agree. And these are the basic notions and the premisses through which they consider that in which they agree or disagree, whether it be true or false, or certain or erroneous.

7. But those practiced in geometrical demonstrations assume rules for their arguments which are in the first things understood. And these are the basic notions and premisses from which they draw out conclusions that are known in another way, being neither sensible nor known through the first things understood, but rather acquired in necessary demonstrations. Then, all this having been acquired, they assume other premisses, from which the draw out conclusions known in another way, more subtle than before. And thus they continue throughout their lives.

8. And you should know that of animals some have one sense, some two, some three, some four, some the entire five senses. And you should know that for an animal in which there are more senses there will be more things sensed. Now man has the full five senses, but whoever among men is more perspicacious about

what he senses, and considers more of their dispositions, for him there will be more of those things that are among the first things understood, and whoever is of the sort that assumes premisses that are known first, and from these draws conclusions and things known demonstratively, he will have more of them in his soul. And in whoever there are more, he will be more like the angels, and closer to his God.

9. You should know that a wise man, when he has diligently speculated concerning sensibles, and considered their dispositions in his contemplation, and discerned them by his consideration, the intelligibles first known will be multiplied in his soul. Now when he has made use of these things that are known in argument and drawn forth conclusions from them, then things known by demonstration¹⁶ will be multiplied in his soul. Now every soul in which the things known first are multiplied along with things known by demonstration is strengthened until it can conceive (*ad imaginandum*) spiritual forms, which are spoiled by matter. And then he is assimilated to them, and comes to be of the same power they have. Now when in death he is separated from the body, he comes actually to be such as they are, and is busy with them, and so avoids Gehenna, that is, the world of generation and corruption, and enters paradise, which is the life of souls.

10. Therefore I ask that you should always be diligent in inquiring into the divine sciences, and that you acquire angelic ways, and that before death you do good and pure (*munda*) deeds. And so you will elevate yourself to the kingdom of heaven and to the amplitude of the world of heaven (*latitudinem mundi caelorum*), and bring your pure spiritual soul to paradise, which is the life of the soul. God help you always to cognize the truth and to do the good.

NOTES

¹It is odd to put the division of genus into species on a par with the division of species into individual things, and it is hard to see how there could be necessary conclusions concerning particulars as specified in Para. 6, but I think taking "*singularium*" to mean a particular is the best approach, considering the analysis, for instance, of resolution, and the fact that they are said to be sensible. Perhaps one could think of the particular as embracing those properties which the species gains when it becomes an actual, causally interacting part of the world in a particular. When this happens it takes on certain causal dispositions that are supervenient on, but not part of, its essence. One would still be dealing at a certain level of abstraction, permitting necessary conclusions about every actually occurring particular of a given species, but one would not be dealing with the species absolute, considered simply in itself, but rather as it interacts with other things when it becomes actual as a particular thing in the world. On all of this, see Ch. I 15.

²These universal intelligibles are fairly mysterious, but apparently they are not the genus or the species. So they are universal, and intelligible (not sensible), and stand outside the essence of the reality to which they belong. See Chapter I 15 for further information.

³This explains what the universal intelligibles known in demonstration (Ch. I 6) are. The sense is that demonstration enables us to know forms that are distinct from the substantial form of the particulars they belong to (from the "perfecting forms"), but which are properties of them, and are dispositions (and so presumably causal properties, not qualities), are supervenient on the particulars they belong to (so that they somehow arise from the substantial form when something actually exists?), and are "made proper" through

the perfecting forms. (The pronominal references to perfecting forms and particulars are made clear by a difference in gender.) Again, this last characteristic suggests that the substantial form somehow gives rise to the forms that we know through demonstration, and in such a way that these forms are each proper to the species in which it occurs. These forms are not sensible, but intelligible alone, and so must be discovered through argument. If all of this is right, then the author has a pretty clear notion of what was later called a "passion" of a substance, and agrees with the later view in the West that demonstration shows that a passion belongs to its substance. One peculiarity here, in view of the later tradition, is the notion that these forms somehow constitute the particulars that are found in the world. Perhaps the idea is that the particular can exist only if it enters into the actual world through its causal connections to other things in that world, so it is constituted as an existing particular (as opposed to a mere species with no being other than that belonging to essence absolutely) by its causal dispositions. But these all arise from the underlying essence, rather than being part of it, and are revealed only in actual existence. If that is right, then these causal dispositions constitute, not the essence of the thing, but the thing itself in its existence as a particular in the world. Note the Neo-Platonic drive of this view of particulars. It seems they are really identical with their universal forms, and differentiated from them only by the addition of certain characteristics possessed by those universal forms. (This view is opposed, for instance, in Abelard's treatment of universals, and was never held among Christian Scholastics after Abelard.)

⁴So the author traces our knowledge back to first principles that arise from sense experience, following another theme in the *Posterior Analytics*.

⁵The only way I see to make sense of the discussion up to here is to make two assumptions. (1) I assume that the cause that is to be established by the observed cases of the effect is not an accidental cause, so that it is immediate, and its effect is present whenever it is. (2) I assume that "being established" by the sensory observation is a psychological notion, so that what is established is whatever the sensory observation naturally suggests to one, not the actual cause of the thing observed. Now in the first case the non-accidental cause of the observed effect, a child, is his parents, and so it can always be argued from this effect to that cause (and vice versa). But in the second case, parents, which are the cause "established" by the sensory experience of the several sons, are not the non-accidental cause of the several sons, since there can be parents who do not have several sons. So the non-accidental cause of the child is only a cause *per accidens* of his having a brother. The child's mistake is that he thinks they are the non-accidental cause of several sons; he thinks the cause is "established" by what his observation suggests, but in fact the true cause of there being several sons is not suggested to him at all in his experience of them.

⁶Perhaps the sense is that the married couple are not an immediate cause of the child, so that the cause is separated from what it causes by some middle cause not necessarily produced by the parents, and in the absence of the middle cause, the child will not be produced.

⁷This paragraph might seem pretty obscure. To paraphrase it, the conditions of formal validity are treated of in formal logic, that is, the science of the *Prior Analytics* and the like. Here he is going to introduce certain additional conditions to be applied to an argument that passes muster as far as formal validity goes, which the argument must meet to be a proper scientific argument demonstrating its conclusion. An argument that meets the conditions of formal validity, but not these new conditions, cannot be relied upon to produce certainty. To rely on them for this purpose is to argue from the part to the whole, which is invalid, of course, for it is to argue from the satisfaction of only part of the necessary conditions for a certain conclusion

to an entire certainty.

⁸This seems to disagree with his earlier statements, that allow properties essentially caused by the reality's essence as the predicate of the conclusion. Perhaps we are to take it that he is speaking loosely here, or more likely he is insisting that the *middle term* signify something constitutive of the reality. (The edition has "*assentiales*" where I translate "essential" in the previous line (page 56, line 23), which I assume is a slip.)

⁹This advice seems to concern one's selection of the middle term in demonstration. Note that al-Kindi nowhere suggests that the middle term must be a definition, though that would be consonant with his advice, but only that it must be essential, and convertible with the subject. In his example he allows the middle term to refer to parts of the subject, and to causal relations, so he clearly does not think it has to be a definition expressing the absolute essence of the subject.

¹⁰*In ministerio suo*; perhaps it means "in his ministry or work."

¹¹The argument seems clear enough, though it also seems easy to reply to it that darkness, being, not an accident of some substance, but an absence of light at a given place, might occur, if light is an accident, when no substance at all is at the place in question. A rejoinder might try to establish that place is an accident or substance, etc., as in the next paragraph. But perhaps place, although its being relies on the being of substances, is nonetheless not necessarily where the substance it relies on is. So a place might be because of the substances all around it.

¹²The crucial assumption here is that we are in the world. If there is something outside the spheres of the heavens, we will be within that something, and so it will count as part of the world.

¹³The argument presupposes that for the universe to have been the same as it is now for some past period of time in any respect, it must have had some underlying, property definable of, but accidental to, its elements for that period of time. This is surely over-restrictive, for it may well have had some property not precisely expressible in terms of its elements, just as a man can be thinking about his work continuously for an hour without any property definable in terms of his neurons and other bodily parts being true of him continuously over that hour. (That the property at issue is conceived to be accidental seems clear enough, since he grants that the universe is material for the whatever period of the past may be in question.)

¹⁴I think the idea here is that these forms are not actual, so the world is not actually perfectly spherical, but rather, they are what the one who provides forms to the world intends it to be.

¹⁵This is the assumption in Thomas Aquinas's famous "third way" to prove that God exists. Given the way it is put here, the author seems to think that if something is possible only in an infinite amount of time, then it may (or will?) not ever become actual. So counting through all the natural numbers is something that is only possible given an infinite time, so it need not be assumed that anyone will ever have actually have counted through all the natural numbers. It is interesting that the argument here against the eternity of the world is made to hang on the last judgment rather than the creation of things.

¹⁶Emending *tota* ("all") to *nota*, page 64, line 7.