SIMPLICIUS

On Aristotle's
"Physics 3"

Translated by J. O. Urmson

Notes by Peter Lautner

Cornell University Press

Ithaca, New York
Introduction © 2002 by Richard Sorabji
Translation © 2002 by J. O. Urmson
Notes © 2002 by Peter Lautner

All rights reserved. Except for brief quotations in a review, this book, or parts thereof, must not be reproduced in any form
without permission in writing from the publisher.
For information address Cornell University Press,

First published 2002 by Cornell University Press.


Acknowledgments

The present translations have been made possible by generous and imaginative funding from the following sources: the National Endowment for the Humanities, Division of Research Programs, an independent federal agency of the USA; the Leverhulme Trust; the British Academy; the Jowett Copyright Trustees; the Royal Society (UK); Centro Internazionale A. Beltrame di Storia dello Spazio e del Tempo (Padua); Mario Mignucci; Liverpool University; the Leventis Foundation; the Arts and Humanities Research Board of the British Academy; the Esmeé Fairbairn Charitable Trust; the Henry Brown Trust; Mr and Mrs N. Egon; The Netherlands Organisation for Scientific Research (NWO/GW). The editor wishes to thank Keimpe Algra, Rachel Barney, Charles Brittain, Jan Opsomer, Gerd Van Riel and Christian Wildberg for their comments, and Eleni Volonaki and Han Baltussen for preparing the volume for press.

Printed in Great Britain

Librarians: Library of Congress Cataloging-in-
Publication Data are available
things, and to govern the things that come from it as through its suitability. 299

203b 15 The ground for there being an unlimited can be viewed from five aspects; from time, since this is unlimited; from division of magnitudes, since mathematicians make use of the unlimited; from the fact that only if that from which coming to be is subtracted were unlimited would coming and ceasing to be inexhaustible; also since the finite always has a limit at something, so there must be no final limit if it is necessary that anything should always be limited by something else. But most of all and most importantly is what provides a problem common to all; for because it is never exhausted in thought, number seems to be unlimited as also mathematical magnitudes and that without the heavens. But if what is outside is unlimited body also and universes seem to be so as well. For why rather here in the void than there? So if there is a mass in one place it will also be everywhere. At the same time, if there is also a void and unlimited place, body must be also; for there is no difference between possibility and existence among things everlasting.

He has shown that an account of the unlimited is necessary for the natural scientist, both because of the concept of the unlimited itself and because of the opinion of the earlier naturalists; so next he turns to an inquiry about it, preserving the order of the problems and first inquiring whether there is an unlimited or not. In addition he thought it useful to trace out the notions from which some came to posit the unlimited so that if they should appear to have a bearing on some matter we also should accept them. But if they should be caught stepping on emptiness and following the indefinite content of the imagination, we should refute them and show that the unlimited is a figment. He says that there are some five grounds on which we believe in the unlimited, not only that in magnitude but an unlimited of any sort. For having begun to trace completely the notions from which we supposed the unlimited he lays them all bare, not only those with regard to bodily magnitude, but also those regarding any magnitude, and those which fashion, sometimes truly sometimes falsely, a numerical unlimited. He sets out the first notion of the unlimited as that which is derived from the actual limitless of time. For if time is not unlimited, once there was no time and there will be when there is none. But the past and future of time will once again be parts of it, so that there is time also when there is not; for there will always be time. So time is unlimited.

The second confirmation of the existence of the unlimited is from divisibility of magnitudes, or, as Eudemus says, of continuous
things. For it seems to be inexhaustible. But it is the unlimited that is inexhaustible. Also the mathematicians make use of the division of magnitudes, sometimes treating it as an axiom; for they divide every magnitude and every line in any ratio whatsoever, taking the given line of any length, on the ground that division of magnitudes was unlimited. But sometimes also they prove it. For if, as they say, a straight line inscribed in a circle never becomes equal to the circumference, it is clear that the area cut off between the straight line and the circumference is divisible without limit. For if the division comes to an end the straight line will coincide with the circumference. Also if two sides of a triangle are always greater than that remaining, then in a right-angled isosceles triangle in which the base is greater than either of the other sides, if we take off an amount equal to the base from both sides and draw a line parallel to the base through the resultant points we shall make a right-angled isosceles triangle similar to the whole. And we shall be able to do this for ever.

For we shall never cease from making the triangle smaller nor from finding the two sides greater than that remaining one, so that we can take from both an amount equal to the base and draw a line parallel to the base through the points. But if it is possible to do this without limit the area of the triangle is cut without limit. But if there is division without limit there is an unlimited in magnitude. For it would not be divided without limit unless there were an unlimited.

He says that the third of the considerations in favour of the unlimited is that only thus would coming to be not be exhausted, if that were unlimited by subtraction from which comes to be. For this persuaded some of the naturalists as well to suppose that the element was unlimited.

The fourth, which is hard to deal with, is that everything limited appears to reach a limit at something. For if everything limited reaches a limit at something else outside it, that is either limited or unlimited. If it is unlimited we have it from this very fact that the unlimited exists; but if it is limited like the earth, then this reaches a limit at something, and so without limit. And if it does so without limit, then there is the unlimited. For no final limit will be found, since that too will be limited at something else. As Alexander says, ‘it is especially on this argument that the followers of Epicurus relied in saying that the universe was unlimited, because everything limited has something outside it that limits it’. Aristotle refers to the argument as being very ancient.

Aristotle said that the fifth is the strongest and most important and provides a problem common to all. The power of our thought or imagination can always add something and take away something and is never defeated and exhausted. Number seems to increase without limit because of this fact that we can add a unit or a number to every
given number, and that mathematical magnitudes can divide and 10 increase without limit, because every one taken can be cut and the segment can be added conceptually, though not, indeed, in practice. And, since concepts seem to come to be with relation to things, we think that things are as we imagine them. We are similarly affected also about what is beyond the heavens; for we always conceive of something beyond what is given, so that what is beyond seems to be unlimited. Also, if it is void, as Democritus seems to have said, there would be an unlimited number of universes as well;245 for why in the void rather here than there? So if in one place the mass of body would also be in all places, so that it too would be unlimited. And in any case, if the void is a place capable of receiving a body, in the case of the everlasting what can come about would unfailingly come about, 20 so that if it did not come about it would also not be possible; for, in the case of perishable things, nothing prevents them perishing before what is possible reaches reality, but in the case of the everlasting this is impossible. Therefore there is no such thing as possibility among everlasting things, but only among things that come and cease to be, so that if the void is unlimited there will also be unlimited place and unlimited body, which unlimited place is of a nature to receive.

"But Archytas", according to Eudemus, "raises the question as follows: "if I have reached an extremity, such as the fixed heavens, can I stretch out my hand or a staff outside it, or not? It is absurd that I could not stretch it out; but, if I stretch it out, what is outside will be either body or place. It makes no difference, as we shall learn. So he will always continue walking in the same way to the limit chosen on each occasion, and ask the same question, and if there will always be somewhere else to which the staff reaches, it is clear that it is also unlimited. If it is a body, the thesis is proved; if it is a place, and place is that in which a body is or could be, but what is potential must be treated as actual in the case of things everlasting, then thus also there should be unlimited body and place".246 Perhaps this argument is a grim problem for us as well, who say that there is nothing outside the heavens, on the ground that the cosmic body, whose limit is the heavens, occupies the whole247 of space. So if, having reached the expanse of the heavens, he were to stretch out his hand, where would it be stretched out? Surely not into nothing, for no existing thing is in what does not exist. But nor will it be prevented from stretching out; for it also cannot be prevented by what is nothing.

So Aristotle in this way says that the confirmation of the existence of the unlimited depends mainly on five reasons, but Eudemus says that it is on six.248 Having said that the first is division without limit of the continuous, he says that the confirmation seen through addition of numbers is the counterpart to it. But Aristotle did not omit this explanation either, but put it aside among unlimited things.
believed in through conception, when he said that 'number also seems to be unlimited', and it is clear that mathematical magnitudes can be divided without limit. But one might raise the problem why he says that the addition of numbers and the subtraction of magnitude without limit are conceptual. For from conception the truth about things appears. For to what number cannot one add and what magnitude is not divisible unless magnitude consisted of points? Or is it not process without limit but an unlimited which he says is through conception, because of the conception of increase and decrease without limit? For process without limit exists in both directions, but not yet limitlessness itself, as will be proved. For neither number nor magnitude is unlimited.

203b30 But the study of the unlimited presents a problem. [For many impossibilities arise both for those who hold that it exists and for those who hold that it does not. Also in what way does it exist; as a substance or as an essential attribute to something natural? Or is it in neither way, but none the less there is an unlimited] and things unlimited in number?

He has said from how many and from which considerations those who supposed an unlimited did so, and he intends soon to show in what way the unlimited exists and in what way it does not. In between he says that on both sides problems arise, for those who say that the unlimited does not exist and for those who say that it does. Also, if it is something for those who treat it as a substance and those who treat it as an attribute, or for those who say it is neither of these, they nonetheless say that there is the unlimited in both number and magnitude. For this is demanded by the inexhaustibility of division, and is particularly characteristic of process without limit. So what problems does he show to face those who say that there is no unlimited? Is it necessary to abolish the unlimited division of continuous things? But, if this is abolished, geometry, which uses it as a principle, is abolished, and the view is introduced that magnitudes consist of atoms and points and time of instants, which will be refuted in many ways. Also the unlimited increase of numbers, which is plain to see, is abolished. For what number of people who have already existed and will exist is it to which it is not possible to add? Also the unlimited progress of time is abolished: with this the everlastingness of the universe, which was demonstrated by both Plato and Aristotle by many exact arguments, is abolished.

469,1 But again, if someone were to say that the unlimited exists, the difference between up and down is abolished, and that between the middle and the extreme, and also the natural tendency and motion of bodies. For if the places to which the motion is are not determinate,
neither will the motions be determinate. Also if someone were to say that the unlimited exists, whether as substance or as attribute, we shall soon learn how many and what impossibilities result. But if someone were to say neither of these, but that all the same there was the unlimited, the absurdity seems to arise immediately that there is something which is neither substance nor attribute. In any case Alexander explains 'in neither way' not as distinguished from every kind of attribute but from that which essentially belongs to something by its nature, as if Aristotle said: 'or neither as substance nor as an essential attribute, but an attribute in some other way'.

204a1 It is particularly the task of the natural scientist to examine whether there is any perceptible unlimited magnitude.

He has established by all the foregoing that the inquiry about the unlimited is appropriate for the natural scientist, both from its substrates, since they are magnitudes changing in time, and because the ancient naturalists did not discuss it incidentally but made it a principle, and yet again because in supposing the existence and non-existence of the unlimited, and also saying that it was a substance and an attribute and neither, they encounter many problems. So in these ways he has shown that the discussion of the unlimited is appropriate for the natural scientist, and reasonably adds that an account of these kinds of unlimited will be appropriate to the natural scientist because it is not about something intelligible such as the mathematical or perhaps something superior to this, but about that which is perceptible. For it is characteristic of the wise man to make his discussions appropriate to the hypotheses before him.

204a2 So first we must distinguish how many senses 'unlimited' has. [In one way it is what cannot be traversed because it is not of a nature to be traversed, in the way that a voice is invisible; in another way it is what can be incompletely traversed, or with great difficulty, or what is of a nature to be completely traversed but is not or has a limit. Also everything is unlimited which is solj through addition or division or in both ways.

He has said with regard to what kind of unlimited it is the task of the natural scientist to examine whether it exists, that it is with regard to a perceptible magnitude, and it is this that he will also prove not to exist. But he maintains that certain things signified by 'unlimited' exist, since he holds that 'unlimited' has a variety of senses, being one of the ambiguous terms; so he first distinguishes its significations. For we can thus learn in which of its senses the unlimited is impossible, in which possible. So in common use it is what is impossible to
traverse and endless that is unlimited which one cannot travel through; within this, one sort is said to be unlimited because it is wholly of a nature not to be traversed or travelled, like a point and in general everything that is not a quantity. For what is not a quantity cannot be traversed at all and therefore cannot be incompletely traversed. In that way a voice is said to be invisible negatively as not being of a nature to be seen, since it has no colour. This negation through not being of a suitable nature is made in many ways. For a wall and a fish and a swift lack feet in different ways, the first because it is not of the genus to have feet like an animal, the fish because of its difference from things in the same genus, since of animals or the aquatic some have feet and some do not, the swift (this is the bird that they also call the kenkhris) because its feet are small and poor. But we are not inquiring whether there is a perceptible unlimited in that negative sense of ‘unlimited’. The intraversable unlimited in a second sense is set out as that which can be traversed, because it is a quantity, but one which cannot be completely traversed and is unlimited and without an exit. There are different sorts of this as well; it may be constructed in that way, sometimes through its shape, as a ring which has no bezel (sphenodon) is traversed without limit, because every circle is. But it may be because it has no exit, as was the cavern of the Lacedaemonians into which they threw the condemned, or because of enormous size, which is the most frequent concept of the unlimited. The third sense of ‘unlimited’ is that of what is traversed only with difficulty, either because of size or because of construction, like the Labyrinth and the cavern later on. For the fox that led the Messenian Aristomenes out through it showed that it was traversed only with difficulty. The fourth signification of ‘unlimited’ is of that which is of a nature to have an exit but which no one can traverse. Such is a route through excessive heat or excessive cold, which can be traversed in that its magnitude is determinate, but is blocked through the unsuitability of the weather. Alexander put the labyrinth as well in this class, which was so constructed as to be without an exit, and the unlimited ring, as being traversable by their own nature, since they are limited, but not traversable because of the type of their construction. But perhaps the labyrinth had an exit, even if only with difficulty, and should be classed with the traversable with difficulty, and the ring, just as every circle is not of a nature to have any limit, not because of its magnitude, but because of its shape. The fifth signification of ‘unlimited’ he assigns to that which is so by addition, which is observed in the case of number (for it is possible to add to every number proposed), and that by division, since every continuum is divisible without limit. But, in the case of numbers,
being unlimited is only by addition (for division halts at the unit and goes on no further without limit), whereas in the case of magnitudes it is both by division, when any that one chooses is divided, and by addition also, when it is both divided without limit and if the segments be added back. This is why he said 'through addition or division or in both ways'. In that way future time is unlimited by addition and past time by division. But he added 'everywhere' not because all that is called unlimited is so but because all that is strictly said to be so is so, not because the simultaneously unlimited is so (for it will be shown that there is nothing such either in number or in magnitude), but because that which proceeds without limit is so. This is that which has its being in becoming.

Chapter 5 begins here in modern editions.

204a8 So it is not possible for there to be a limitlessness separate [from perceptible things, being itself something without limit. For if the unlimited is neither a magnitude nor a number, but itself a substance and not an attribute, it will be indivisible, since what is divisible will be either a magnitude or a number. But if it is such it is not unlimited, except in the way that a voice is invisible. But those who say that there is the unlimited do not say that it is so in that way, nor are we inquiring into that,] but into what is so as untraversable.

The prior problems about the unlimited would be whether it exists or not and thus whether it is a substance or an attribute; but Aristotle right at the beginning of the inquiry inquires whether it is a substance or an attribute, perhaps as a short cut. For if it be shown that it is neither a substance nor an attribute of anything natural it will be shown that the unlimited altogether does not exist as a reality. For every reality is either substance or attribute. So he shows that the unlimited is not a substance as follows: if it is a substance it will be indivisible, but if it is indivisible it is not limitless; but it is presupposed that it is unlimited; therefore it is not a substance. Also he shows that substance is indivisible as follows: if it is a substance it is not an attribute; if it is not an attribute it is not a quantity; if it is not a quantity it is neither a magnitude nor a number; if it is neither a magnitude nor a number it is not divisible, since these are the divisible; but if it is indivisible it is not unlimited, for the unlimited is divisible; but it is presupposed that it is unlimited; therefore it is not a substance. But if, being a substance, it were said to be indivisible, it is so said as what is, by mere negation, not of the right nature, as a voice is invisible. But the unlimited now under investigation is not such in that sense, but as what cannot be traversed. He says that