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ARISTOTLE

PHYSICS

BOOKS I AND II

TRANSLATED WITH INTRODUCTION,
COMMENTARY, NOTE ON RECENT
WORK, AND REVISED BIBLIOGRAPHY BY
WILLIAM CHARLTON

GENERAL EDITORS J. L. ACKRILL
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*Translated with Introduction, Commentary, Note on
Recent Work, and Revised Bibliography by*

WILLIAM CHARLTON

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PREFACE

THE first aim of this as of other volumes in the Clarendon Aristotle series is to provide a translation of Aristotle's text sufficiently accurate to be used by serious students who know no Greek. The text used is that of W. D. Ross, *Aristotle's Physics, a revised text with introduction and commentary*, Oxford University Press, 1955. Words which Ross encloses in square brackets have been omitted. Departures from Ross's text, and points at which the translation seems to me uncertain, are marked with an asterisk and discussed in the *Notes on the text and translation*. The *Commentary* is addressed primarily to readers with some knowledge of philosophy, and intended to suggest starting points for the discussion of the philosophical value of Aristotle's ideas.

My gratitude is due in the first place to Prof. J. L. Ackrill, who read my drafts with great care, pointed out many errors, and made many helpful and stimulating suggestions. I should like also to acknowledge the encouragement of Prof. D. J. Allan, without whom this work would not have been undertaken. For most of the time I was engaged on it I was at Trinity College, Dublin, and much profited from discussions with my colleagues there. Finally, Mr. C. Kirwan has kindly shown me the part of his forthcoming volume in this series which deals with a chapter common to our two texts.

W. CHARLTON

Newcastle upon Tyne
1969



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INTRODUCTION

THE first two books of Aristotle's *Physics* do not deal with problems in what we today call physics: Aristotle's own titles for them were probably 'Concerning principles' and 'Concerning nature' (Ross, pp. 1-6), and he writes as a philosopher, not as a scientist. Nevertheless, *Phys.* II, at least, seems to be addressed to the scientific student of nature (the *phusikos*: 194^a16, ^b10, 198^a22), and both books may, perhaps, most aptly be classified as philosophy of science. This seems to be roughly how Aristotle himself conceived them, though his demarcation of fields and methods of inquiry is tentative, and may appear a little strange and academic to the modern reader.

The student of nature deals with things which are subject to change (*Met. E* 1026^a12), things which are not without matter (1026^a6), things which have in themselves the source of their changing or staying unchanged (1025^b20-1)—expressions at which we will look closely when we come to *Phys.* II. 1-2. Any question about such things Aristotle would call a 'physical' question (cf. *Top.* I. 105^b19-29), but it does not follow that any discussion of such a question must be in every sense a 'physical' discussion.

The student of nature in the strictest sense, what we might call the natural scientist, bases his discussion of such questions on 'appropriate' premisses, that is, on principles which hold for physical things, things subject to change and so on, *as such*; and a discussion so based is 'physical' in the strict sense. In *De incess.* 704^b12-24 Aristotle lists some assumptions from which people proceed when pursuing a physical method: that teleological explanation is valid in zoology, that there are six directions (up, down, right, left, in front, behind), that the source of locomotion is pushing and pulling. Similarly Democritus is said (*De gen. et cor.* I. 316^a13) to have used physical and appropriate arguments, presumably because he

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argued from the hypothesis that things consist of atoms with primary qualities only, a hypothesis which, whether correct or incorrect, is appropriate to the topics under discussion (315^a34-^b9).

In *Phys.* I-II Aristotle is concerned with things which are subject to change, and hence with physical questions. He does not, however, pursue a physical method. So far from arguing from principles which hold for physical things as such, he is arguing to them: thus in *Phys.* II. 8 he is trying to establish the principle, mentioned in *De incessu*, of the validity of teleological explanation. How, then, did he conceive his method?

In *De gen. et cor.* I. 316^a11 Democritus is said to have proceeded 'physically' where Plato proceeded 'logically', and Aristotle might have called his procedure in our books 'logical'. He uses the word 'logical' (*logikos*) with a variety of nuances, but by a 'logical' argument he usually understands one proceeding from considerations which are not proper to the things being discussed. In *De gen. an.* II. 747^b28-30 he says of an argument: 'I call it logical, because in so far as it is more general, it is further from the appropriate principles.' A 'logical' argument is bad if the considerations on which it is based are not merely not appropriate to the subject under discussion, but appropriate to some other subject. Plato's argument in *De gen. et cor.* had that defect: it proceeded from considerations appropriate to geometry. But otherwise a logical argument may be acceptable or even necessary. We are told in *E.E.* I. 1217^b16-17 that a proper examination of Plato's views on the good would have to be logical, not ethical (cf. also *E.N.* I. 1096^b30-1). And Aristotle introduces his account of substance as form in *Met. Z* (1029^b13) with some 'logical' points. We might think that when it is a question of establishing 'appropriate' principles, logical argument is just what is needed.

Still, since the word 'logical' rather indicates what method is not pursued than what method is, Aristotle would probably not have called his method in *Phys.* I-II logical, but rather dialectical. Characterizing dialectic in *Soph. elench.* 11, he

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says that all disciplines make use of certain 'common things' (172^a29); for the layman thinks he can challenge the expert up to a point, and that is, in so far as the expert is dealing with these common things (ibid. 31-2). Whilst we might wish to have these common things described more explicitly, Aristotle's idea is clearly that the expert's subject-matter has a side with which the expert's special knowledge, his 'appropriate principles', do not especially equip him to deal. Dialectic, we are told, deals in a technical or professional manner with this side of things, or these common things, with which others deal unprofessionally (ibid. 34-5). So that, although it has no determinate field (ibid. 12) in the way in which medicine and geometry have determinate fields (cf. 170^a32-4), it is still a genuine discipline. This seems quite an apt description of the method of *Phys. I-II*: Aristotle is dealing in a technical manner with that side of the study of nature with which the natural scientist is not equipped to deal. Further, the special technique of the dialectician is to argue from *endoxa* (*Top. I.* 100^a18-20), which are, roughly speaking, propositions which cannot be proved, but which an opponent could not deny without seeming unreasonable, and this is Aristotle's technique in *Phys. I-II*: he constantly appeals to what is ordinarily said or thought (e.g. 192^b11-12, 194^b33-5, 196^a15-16, 199^a1; see also below, pp. xv-xvi, for this aspect of his method); though he relies more on detailed linguistic analysis (e.g. 189^b32-190^a13) than the *Topics* might lead us to expect.

The method of the dialectician is the same as the method of the philosopher, except that the former uses it to win debates and the latter to ascertain the truth (*Top. VIII.* 155^b7-10, *I.* 105^b30, *Met. Γ* 1004^b22-6). This suggests, since Aristotle in our books is presumably trying to ascertain the truth, that he would call them essays in philosophy, and in fact discussions of principles and causes parallel to those of *Phys. I.* 5-9 and *II.* 3 and 7 are found in books of the *Metaphysics* which are clearly conceived as philosophy (*philosophia* or *sophia*, *Met. A* 982^a2 etc.). We might say, then, that in *Phys. I-II* the arguments are logical, the method is dialectic, and the

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discussions are philosophical; though this is perhaps misleadingly neat. As G. E. L. Owen (*I. Düring and G. E. L. Owen, Plato and Aristotle in the Mid-Fourth Century*, p. 164) suggests, we may doubt whether Aristotle when first composing the *Topics* recognized such a subject as *sophia* or philosophy over and above dialectical discussions of physical, logical, and ethical questions. It may have been only when he discovered that the 'common things' considered by the dialectician included forms of reasoning which could be separated off as the subject-matter of formal logic (or 'analytic', as he called it), that he made other 'logical' questions the province of a special subject.

Aristotle occasionally (e.g. *Met. Z* 1037^a15) speaks of the philosophical discussion of things subject to change as 'second philosophy', by contrast with 'first philosophy', which is the philosophical study of things which are unchangeable. Not too much, however, should be made of this, for the unchangeable things which are the main topics of first philosophy are Platonic ideas and numbers, entities which Aristotle thinks do not exist. See the beginning of *Met. M*: we have now dealt, says Aristotle, with perceptible realities, and must see whether there is any kind of reality over and above them; we will begin by considering the opinions of others, of which there are two: some say that there are objects of mathematics, some that there are ideas (1076^a8-19, cf. *B* 997^a34-b₃ etc.). Aristotle does indeed himself recognize another sort of unchangeable thing, the intelligent being which is the unchangeable source of change in the universe; but the discussion of this being he tends to call theology (*Met. E* 1026^a19), and first philosophy for Aristotle stands to second philosophy much as the Dialectic in Kant's *Critique of Pure Reason* stands to the Analytic: as developed in *Met. M-N*, it is the exposure of the illusions of pure reason in its hyper-physical employment, and for Aristotle's positive and constructive philosophical teaching we must look to second philosophy.

Phys. I-II contain the formal introduction of a number of the basic concepts in Aristotle's philosophy: the matter-form

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distinction, the fourfold classification of causes, nature, and finality. For this reason, and because we are referred back to them by *Met. A* (983^a33 f., 986^b30-1, etc.), generally held to be an early work, an early date of composition has been assigned to them. Thus, according to Ross, 'we may say with some confidence that these two books were composed while Aristotle was still a member of the Academy' (p. 7). On the other hand, precisely because they seem to constitute the natural introduction to his other surviving works, we may think that as they stand—though they may incorporate the fruits of early speculation (M. Untersteiner suggests that *Phys. I.* 8-9 are taken from the early *De philosophia*)—they are the notes for lectures which were being delivered up to the end of Aristotle's career. How else did the student who entered the Lyceum make his way into Aristotle's system, if not through them? And if they were the regular first course in Aristotelian philosophy, presumably they were constantly revised and kept up to date. Such a presumption is supported by the sophistication of much of the argument, by the confident way in which Aristotle writes, as if he had a large and fully articulated body of material in reserve, and by the coherence of what he says here with what he says elsewhere. I shall make free use of the *Metaphysics*, *De anima*, etc., to bring out the significance of passages in *Phys. I-II*, and I do not think there is any passage in these books which can most easily be understood as the expression of a view later corrected or discarded.

Phys. I-II rather complement one another than form a continuous treatise. Book I, however, with its emphasis on the constituents of physical things generally, is more about the philosophy of physics, whilst the second book, with its emphasis on the development of plants and animals, is more about the philosophy of the biological sciences.

Phys. I centres round a question which Aristotle says elsewhere (*Met. Z* 1028^b2-4) always has been, still is, and always will be, the focus of inquiry and perplexity, and the Greek for which is *ti to on*. This is sometimes translated 'What is

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being?', but that would be a better translation of the more sophisticated formulation which Aristotle suggests we substitute for it, *tis hē ousia* (ibid.). *Ti to on* itself is a much vaguer question, something like 'What is there?', 'What exists?', 'What is real?', 'What is the world?'

As such, it can be handled in various ways. It can, for instance, be treated as a scientific question, as a demand for the most basic kind of stuff in the universe, for the ultimate constituents of matter. Or it can be treated as a philosophic question, as a demand for an account of how we use words like 'real' and 'exist', of what we mean by a thing, and so on—accounts which Aristotle tries to give in the *Metaphysics*. In *Phys. I* Aristotle takes an intermediate line. His search for 'principles' is a search for the *logically distinguishable factors* which must be acknowledged in a world pervaded by change and becoming. He is asking, 'What must there be if there is coming to be, passing away, and alteration?', and he replies by giving a logical or philosophical analysis of coming to be.

This approach is of considerable historical interest. The Presocratic physicists had not disentangled the scientific and philosophical issues in the question 'What exists?', and their failure to deal with the latter had had (if we are to believe 191^a23-33, ^b30-3, etc.) bad effects on their handling of the former. By separating out this philosophical issue, and offering a detailed and purely philosophical treatment of it, Aristotle removed *a priori* inhibitions on empirical inquiry. (It should be recognized that the credit for so doing is not exclusively his; he is carrying on work the beginnings of which can be seen in Plato's *Phaedo*, especially 97-9.)

The main line of argument runs through chapters 1 and 4-7. Chapter 1 is introductory. In chapter 4 Aristotle reviews the theories of the Presocratic physicists, and distinguishes them into two groups, according as they make or do not make room for qualitative change. Having dismissed the second group with arguments which may seem a little cavalier, he obtains from the first a spring-board for his own account, which begins in chapter 5. In that chapter he presents the case for making

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the principles of any physical thing a pair of opposites; in chapter 6 he presents the case for saying that there must always be a third, additional factor; and in chapter 7 he argues that these two views can be reconciled, if we suppose that the basic elements of things are an underlying thing and a form. It is important to recognize (as W. Wieland has shown at length) that the distinction between underlying thing and form is not a presupposition of the whole discussion, but a conclusion to which Aristotle argues, and argues, moreover, not from metaphysical principles, but from linguistic considerations, by considering how we ordinarily talk.

The remaining chapters 2-3 and 8-9 may be accounted for by Aristotle's general methodology. Aristotle says that it is improper to inquire *what* a thing is, until you have established *that* it is, i.e. established that there is such a thing (e.g. *An. Po.* II. 93^a19-20, but cf. *Met. E* 1025^b17), and his practice in the *Physics* reflects this view: thus with chance, the infinite, place, void, time, and cf. on nature at 193^a3 ff. Now chapter 7, which is the kernel of *Phys.* I, is in fact an analysis of becoming; according to his principles, then, Aristotle ought to show that there is such a thing as becoming, that things do come to be. Chapters 2-3 fill this need. In them Aristotle does not indeed try to prove that becoming is possible: that, he says in 185^a12-13, is something we assume; but he does try to refute the arguments of the Eleatic monists, who were the chief opponents of the possibility of becoming. These chapters, then, may be seen, not only as part of the review of Presocratic opinions on what exists, but as an attempt to show that the considerations which led people to do away with change and becoming are ill-grounded.

Chapters 8-9 also accord with Aristotle's ideas of how a philosophical exposition should proceed. When discussing the notion of place in *Physics* IV, he first enumerates the generally held opinions about place, and then goes on: 'We must try to carry out our elucidation of the nature of place in such a way that the problems are resolved, that what is generally thought to be true of place remains true of it, and that the

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cause of the awkwardness of place, and of the difficulties felt over it, is made clear. That is the most stylish mode of philosophical exposition' (211^a7-11; cf. *E.N.* VII 1145^b2-7). He follows this course elsewhere in the *Physics* (thus over change: Book III, chapter 2, 'this is why change is difficult to get hold of', etc.), and is obviously doing the same in Book I, chapters 8 and 9. He begins chapter 8 by saying 'We must now show that only if our analysis is accepted can the difficulties felt by our predecessors be removed', and in chapter 9 he is mainly showing where the Academy went wrong.

The topic of *Phys. II* might be said to be explanation in natural science: in chapters 3 and 7 Aristotle presents his celebrated fourfold classification of causes, which is in fact a classification of modes of explanation or types of explanatory factor, and in chapters 4-6 he tries to show how chance or luck can be fitted into it (196^b8-9). In the discussion of explanation generally, however, one issue stands out with special prominence, the validity of teleological explanation.

Chapter 1 begins with a distinction between natural objects and things like artefacts which are not due to nature. Natural objects are said to have a source of their behaviour in themselves, and nature is defined as such a source. Aristotle then goes on to claim that of the two factors in any physical thing distinguished in *Phys. I*, matter and form, not only the first but the second also can be its nature in this sense. This thesis is tackled from various angles in chapters 1, 2, 8, and 9, and most formally in chapter 8, where it is represented as the thesis that 'nature is a cause for something' (198^b10-11), i.e. that some natural things and processes exist or come about for the sake of definite ends, and can be explained as existing and coming about for those ends.

If the argument in these chapters is to be followed, three points, as I shall try to show in detail in the commentary, must be kept in mind. First, when Aristotle talks about nature, he is not talking about a single universal force, which pervades all natural objects and directs their development and behaviour towards goals it has appointed for them. There are passages

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in his works (e.g. *De caelo* II. 291^a24-6, *De part. an.* IV. 687^a10-12) which might suggest a belief in such a force, but it is usually and, I think, rightly judged that they are figurative, or at most betray a privately held theological opinion (cf. *De caelo* I. 271^a34, *De gen. et cor.* II. 336^b27-32). When he is writing as a scientist or as a philosopher of science he means by nature the nature of this or that thing. We say that a natural object, like a tree or a horse, has a nature: it is that nature which it has, which in *Phys.* II Aristotle is trying to get at. Second, for Aristotle the question whether something can or cannot be explained teleologically, as being 'for something', is equivalent to the question whether, in its case, matter or form is nature in the sense of source of its coming to be. Aristotle would not contrast explanation by final with explanation by formal causes, at least within the field of natural history: for him it is obvious that if the form of a plant or animal explains its behaviour, it explains it as final cause; and conversely, if it is correct to say that a tiger's teeth are for biting and its stripes for camouflage, that is as much as, and no more than, to say they are accounted for by the form of the tiger, not by its matter. Third, Aristotle does not argue that everything which is due to nature is due to form and susceptible of teleological explanation. He proposes teleological explanations only in cases where it seems correct to speak of some form of life. This does not emerge too clearly from his writings, because he devotes (not in *Phys.* II but elsewhere) much space to the heavenly bodies, and leans (but with some ambiguity) to the speculation that they are alive (*De caelo* II. 285^a27-31, 292^a18-21); so that sometimes their behaviour is attributed to the stuff of which they are made, sometimes to a Deity which moves them as an object of thought and desire. When, however, as in the *Meteorologica*, he deals with sublunary physical phenomena, such as weather, the sea, coction, his explanations are exclusively in terms of necessity, chance, and the natures of different kinds of matter.

BOOK I

CHAPTER 1

IN all disciplines in which there is systematic knowledge of things with principles, causes, or elements, it arises from a grasp of those: we think we have knowledge of a thing when we have found its primary causes and principles, and followed it back to its elements. Clearly, then, systematic knowledge of nature must start with an attempt to settle questions about principles.

The natural course is to proceed from what is clearer and more knowable to us, to what is more knowable and clear by nature; for the two are not the same. Hence we must start thus with things which are less clear by nature, but clearer to us, and move on to things which are by nature clearer and more knowable. The things which are in the first instance clear and plain to us are rather those which are compounded. It is only later, through an analysis of these, that we come to know elements and principles.

That is why we should proceed from the universal to the particular. It is the whole which is more knowable by perception, and the universal is a sort of whole: it embraces many things as parts. Words stand in a somewhat similar relationship to accounts. A word like 'circle' indicates a whole indiscriminately, whereas the definition of a circle divides it into particulars. And little children at first call all men father and all women mother, only later coming to discriminate each of them.

CHAPTER 2

There must be either one principle or more than one. If one, it must be either unchangeable, the view of Parmenides and Melissus, or subject to change, the view of the physicists, of whom some make air and others water the primary principle.