ARISTOTLE'S *PHYSICS* BOOK I

This book provides a comprehensive and in-depth study of *Physics* I, the first book of Aristotle's foundational treatise on natural philosophy. While the text has inspired a rich scholarly literature, this is the first volume devoted solely to it to have been published for many years, and it includes a new translation of the Greek text. Book I introduces Aristotle's approach to topics such as matter and form, and discusses the fundamental problems of the study of natural science, examining the theories of previous thinkers including Parmenides. Leading experts provide fresh interpretations of key passages and raise new problems. The volume will appeal to scholars and students of ancient philosophy as well as to specialists working in the fields of philosophy and the history of science.

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A Systematic Exploration

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Preface

Physics I is the first book of the *Physics*, Aristotle's basic treatise on natural philosophy. It is the beginning of his scientific inquiry into natural things: it outlines the first principles of such things (i.e. matter and form) and discusses preliminary and fundamental problems for any such an inquiry (for instance, is natural science possible at all?). The book is designed to connect Aristotle's own project with the previous tradition with the aim of overcoming its main difficulties and resolving the most serious mistakes of earlier philosophers. To this end, his investigation into principles is intertwined with a doxographical inquiry into the theories of some of his predecessors. The outline that Aristotle sketches in *Physics* I is developed in the subsequent books of the *Physics* and in other treatises on natural science and metaphysics.

Given its central role in Aristotle's science of nature and his philosophy as a whole, *Physics* I has inspired a rich scholarly literature. However, no recent monograph or collection of papers has been devoted solely to it. With the aim of filling this gap, I organised an international conference on this book, inviting some of the leading specialists in these aspects of Aristotle's philosophy. The conference took place in September 2013 at Sapienza University of Rome, and was followed by a second one there in June 2015. I heard, while in the process of organising the first, that the committee of the Symposium Aristotelicum was planning to hold its next session in Greece on the same subject. This coincidence seemed opportune since, given the especially large group of scholars thinking about *Physics* I, there was bound to be much interest in the book as well as ideas for more than one volume. It also seemed appropriate that the two conferences be held in Greece and Rome, the two centres of the ancient world.

The preparatory work for the Roman conferences and the discussions that arose from them have resulted in this volume, which provides a

comprehensive and in-depth study of *Physics* I. The volume consists in a general introduction, nine essays, each giving a close textual reading of one of *Physics* I's nine chapters, and a fresh translation of the Greek text, where each contributor offers a new translation of his or her own chapter, which Lindsay Judson and I have coordinated. Our project has been motivated by four main exegetical goals: to uncover Aristotle's argument as it unfolds through the book; to understand his main theoretical commitments; to reconstruct his argumentative strategies, assumptions and background; and to assess the epistemic status of the inquiry conducted in *Physics* I and its relation with subsequent investigations into physics. Fresh interpretations of several key passages are proposed and several new problems raised.

My introductory essay addresses the general issues of the role, structure and status of *Physics* I. First, I seek to clarify the sense in which *Physics* I is the beginning of Aristotle's physical project. I argue that, although *Physics* I's inquiry is of a scientific and physical kind, it is a relatively free-standing treatise, which plays an introductory role aimed at, as it were, setting the scene for the project as a whole. I highlight various clues that show *Physics* I's introductory role: the way in which it describes the central object of natural science (i.e. natural substances), the evidence it uses, its heuristics, its peculiar relation with the tradition of natural philosophy, the way it identifies and describes the principles of natural substances. In order to clarify further the role of *Physics* I, I explore the relation between this book and other parts of the corpus. In particular I consider *Physics* I's assumptions and background (by focusing especially on *Physics* I's relations with the *Organon*) and the connections between *Physics* I and what comes next in Aristotle's physical enterprise. I also focus on the overall argumentative strategy of the book, addressing its various schemes of construction and the order in which the principles are introduced in *Physics* I–II. I argue that the particular mode of inquiry adopted in *Physics* I–II is especially useful, perhaps required, in constructing a correct theory of principles. Further, I suggest that the principles argued for by Aristotle in *Physics* I are the essences of the things that play the role of principles as such: they are the *ti esti* of principles, and this is why they are *first* principles.

In the first of the following essays, Andrea Falcon examines the first chapter of *Physics* I, where Aristotle outlines his method for discovering the principles of natural things. This method is described as a natural road that starts from what is confounded to a degree (i.e. humans' initial grasp of natural things) and leads to its division into parts, i.e. into its first principles (which the subsequent inquiry will show to be matter and form). In his essay, Falcon focuses on three main questions: how are principles of

natural science introduced; what is the precise nature of the road to the principles; how do the two examples at the end of the chapter contribute to illustrating the search for principles? He notes that, in *Physics* I.1, Aristotle assumes the existence of principles and conceives of them broadly as principles of knowledge. In this connection he emphasises, more generally, that, in outlining the task that lies ahead in *Physics* I, Aristotle is casting his net as wide as possible. Concerning the road to the principles, Falcon argues that it is a natural and necessary path, which includes three steps, each one building on the previous one, and that the epistemic journey towards the principles is a rational process. Lastly, he suggests that the first of the two examples given at the end of the chapter is intended to illustrate the existence of two different epistemic stages, while the second shows the progression from one to the other.

After chapter 1's methodological introduction, the second chapter, discussed by Timothy Clarke, starts by classifying the theories of principles of some of Aristotle's predecessors. As Clarke suggests, this classification provides one of the main frameworks for the book's subsequent investigation. In this way, the epistemic journey towards the principles, outlined in chapter 1, is intertwined with a doxographical inquiry. This inquiry – even though not conducted in a chronological order – seems aimed at retracing and assessing the steps of Aristotle's predecessors along the road towards the principles, and especially at showing and rectifying their mistakes. One of the main focuses of this inquiry is the distinction between a property and the bearer of a property, which is among the principal means that, in *Physics* I, Aristotle uses to draw his distinction between matter, conceived of as that which underlies, and form.

In his doxographical inquiry, Aristotle first considers the Eleatic claim that 'what is is one and changeless'. The Eleatic theory implicitly denies that it is possible to apply the method outlined in chapter 1: the division of what is confounded into parts. In Aristotle's view, this theory is neither about nature (since it denies change and plurality) nor about principles (since it denies plurality, and hence the distinction between a principle and the thing it is a principle of). As a result, its examination lies outside the scope of natural science. Nonetheless, he devotes a considerable amount of time to the Eleatics in *Physics* I, since they raise difficulties relevant to natural science. He focuses on Eleatic monism in chapters 2 and 3, and on Eleatic immobilism in chapter 8.

In chapter 2 Aristotle provides his refutation of Eleatic monism. In his essay, Clarke argues that Aristotle interprets the Eleatics as advancing two radical kinds of monism: entity monism (the view that reality consists of

just one entity) and essence monism (the view that reality is all of the same essence or nature). Clarke examines Aristotle's attempt to show that neither of these positions can coherently be maintained.

After arguing, in chapter 2, that Eleatic monism is impossible, Aristotle goes on to explain in chapter 3 why the Eleatics' arguments are unsuccessful. This chapter is discussed by Laura M. Castelli. In her essay, she analyses Aristotle's grounds for disputing the premises and the logical structure of Melissus' and Parmenides' arguments, and gives an account of the way in which the analysis of such arguments is relevant to his inquiry into nature. In particular, she emphasises that Aristotle's initial criticism of Parmenides at 186a22–32 is based on a certain understanding of 'signification', and that 186a34–b14 presents arguments that a monist might be willing to accept in order to avoid the initial criticism based on Aristotle's distinction between a property and its bearer.

Aristotle, after concluding his criticism of Eleatic monism with the claim that 'it is impossible that what is is one in this way', turns in chapter 4 to the theories of principles of the physicists. Unlike the Eleatic theory, these are true theories of principles (since they admit plurality and conceive of some things as principles of other things), and are about nature (since they admit change and try to explain it). Further, they follow, at least up to a point, the method outlined in chapter 1: the division of what is confounded (i.e. a natural substance) into parts. What they lack is a correct application of this method. Hence they fail to divide correctly natural substances into their true first principles. Aristotle employs his doxographical investigation to move towards his own theory of principles, and especially its cornerstone: the notion of that which underlies (i.e. matter).

Chapter 4, examined by Cristina Cerami, starts with a new formulation of the classification of theories of principles given in chapter 2, and provides a criticism of Anaxagoras' view that principles are infinite and that generation occurs by aggregation and separation. In her essay, Cerami argues that Aristotle's analysis and refutation of Anaxagoras' theory are of major importance for Aristotle's project in *Physics* I. According to Cerami, in Aristotle's view Anaxagoras acknowledged a certain kind of distinction between that which underlies and its determinations. However, his positive account exemplifies the inconsistency in those theories that do not allow for a proper separation between predicates and that which underlies. By attacking Anaxagoras' theory of an infinite number of principles, Aristotle aims to show that separation is necessary for the explanation of change, but that this notion must be qualified. If we admit an infinite number of principles, it turns out that, contrary to what Anaxagoras

himself believed, we cannot account for the existence of a plurality of knowable things. Separation cannot proceed *ad infinitum*. Indeed, with a proper understanding of this notion, we can see that separation must stop at some point, due to the fundamental distinction between a property and its bearer.

From chapter 5 onwards Aristotle's inquiry takes a different course. It does not proceed by criticising historically held views, but initiates a positive investigation of the number and nature of the principles. Chapters 5 and 6 provide the positive basis for the theory of principles that Aristotle formulates in chapter 7. They arrive at the preliminary conclusion that principles are either two (two opposites) or three (two opposites and one underlying thing), and present the choice between these alternatives as a puzzle, which will be solved in chapter 7.

In chapter 5, analysed by Lindsay Judson, Aristotle starts from the general opinion (*endoxon*) that opposites are principles – which was already introduced in chapter 4 – and provides arguments to support it. In returning to the subject of the theory of principles of his predecessors, he raises the issue of what the first principles (in this case, the first opposites) are – an issue that was possibly mentioned first in chapter 1 (184a13–14). In his essay, Judson discusses the main issues of chapter 5: how we should understand, and best translate, the term ἐναντίον; how we should understand Aristotle's various claims about principles (ἀρχαί); the tension between the claims that ἐναντία are not from each other but come to be from each other; questions about the logical grammar and/or the ontological commitments of these claims, about what the principles in question are principles of, and about Aristotle's insistence that these principles are *opposites*. In conclusion, Judson provides an assessment of Aristotle's position at the end of chapter 5.

In chapter 6, which is discussed by Alan Code, Aristotle assumes that the principles are opposites, introduces the underlier as a further principle, and investigates the number of the first principles. He narrows down the number of the first principles to just two or three, and concludes by saying that the question as to whether they are two or three is very difficult. Code provides an analysis of the four phases of this inquiry: arguments against there being just one principle or an unlimited number; arguments for the underlier as a third principle that is not an opposite; discussion of previous theories that had such a third principle; and arguments against there being more than one principle that is an underlier, or more than two principles that are opposites. The narrowing down of the number of opposites to two, the introduction of a third principle that is not an opposite, and the

claim that there is just one principle that plays the role of underlier are achieved by developing the inquiry at a level of maximal generality (i.e. first the level of kinds, and then the level of substance, conceived of as a kind of being), and by employing the distinction between the being of a property and the being of the bearer of a property. Code emphasises that the results of chapter 6 are only an intermediate step towards Aristotle's theory of principles. Once the third principle has been introduced, it needs to be incorporated into the account of the principles that has progressively emerged, and this incorporation will need modifications, refinements and adjustments. The concluding difficulty (*aporia*) about whether the principles are two or three both reflects how hard this is and is a challenge whose resolution leads to his own positive account of the principles.

This positive account of the principles and the solution of the *aporia* raised at the end of chapter 6 (i.e. whether the principles are two or three) are finally provided in chapter 7, which is discussed by David Charles. In chapter 7, Aristotle claims that the principles of natural things are two in a sense (that which underlies and form: 190b17–20, or the two opposites: 190b29–32), and three in another (that which underlies, privation and form: 190b35–191a3). Charles argues that, in this chapter, Aristotle makes three important moves. He introduces and partially elucidates the idea of that which underlies, understood as something that remains through the coming to be of certain objects. Second, he argues that there is something which underlies in this way in all cases of the coming to be. Third, he suggests that what underlies is not only a principle of the coming to be of objects but also of their continued existence: there is one continuing thing which remains from the beginning of the process of generation of an object to its final destruction. In assessing Aristotle's position in chapter 7, Charles stresses that Aristotle's introduction of that which underlies is intended to pick out something which will subsequently be analysed more fully in terms of matter and potentiality. Charles also considers some specific issues about Aristotle's arguments in chapter 7, which raise more general questions about his methodology.

Aristotle, after setting out his own account of the first principles of natural substances in chapter 7, returns to the Eleatic theory, in chapter 8, and in particular to the Eleatic denial of change. He makes the momentous claim that an Eleatic puzzle against generation can be resolved only through the principles he has established. In his essay on chapter 8, István Bodnár argues that the discussion of this Eleatic *aporia* clarifies the status and interdependence of the underlier and privation, with the conclusion that the explanatory framework of earlier philosophers fails to do justice to

this interplay. It turns out that, in Aristotle's view, only Plato touched on the nature of the underlier – though not even he grasped it adequately – and sought to provide a possible alternative response to the Parmenidean puzzle about change.

In the ninth and concluding chapter, examined by James G. Lennox, Aristotle criticises the Platonic alternative, which identifies matter with opposition and form with unity – a view already alluded to in chapters 4 and 6. Lennox argues that Aristotle was familiar with this account from his time in the Academy and at Assos. He sees chapter 9 as Aristotle's presentation and rejection of this alternative through an extended comparison of his own view of the relation between matter, form and privation as principles of natural change and the Academic alternative – a presentation often self-consciously worded in ways that will make the issues clear to his Academic critics. Further, Lennox provides an interpretation of this last chapter of *Physics* I as designed as a transition to book II. In Lennox's view, chapter 9 prepares the way for further discussion on whether matter or form is the most suitable candidate for the nature of natural things, and thus for a radically different investigation of the primary causes and primary principles of natural things. This transition is emphasised by the concluding words of the book: 'So, then, let us take it as determined in this manner that there are principles and which and how many in number they are; but let us carry on the discussion, beginning from another starting point.'

The first book and first beginning of Aristotle's *Physics* ends here. This book not only sets the scene for Aristotle's physical project, but also – even if built as a relatively free-standing treatise – gives some hints about how that project will develop.

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Abbreviations

Alex. *In Metaph.*	Alexander Aphrodisiensis, *In Aristotelis metaphysica commentaria*
APo	Aristoteles, *Analytica posteriora*
APr	Aristoteles, *Analytica priora*
Averr. *LC Phys.*	Averrois Cordubensis, *Commentarium Magnum In Aristotelis De Physico Audito*
Cat.	Aristoteles, *Categoriae*
DA	Aristoteles, *De anima*
DC	Aristoteles, *De caelo*
DK	H. Diels and W. Kranz, *Die Fragmente der Vorsokratiker*
GA	Aristoteles, *De generatione animalium*
GC	Aristoteles, *De generatione et corruptione*
HA	Aristoteles, *Historia animalium*
Int.	Aristoteles, *De interpretatione*
Metaph.	Aristoteles, *Metaphysica*
Meteor.	Aristoteles, *Meteorologica*
MXG	Aristoteles, *De Melisso, Xenophane et Gorgia*
NE	Aristoteles, *Ethica Nicomachea*
OCT	*Oxford Classical Texts*
PA	Aristoteles, *De partibus animalium*
Parm.	Plato, *Parmenides*
Phil.	Plato, *Philebus*
Philop. *In Phys.*	Iohannes Philoponus, *In Aristotelis physicorum libros commentaria*
Phys.	Aristoteles, *Physica*
SE	Aristoteles, *Sophistici elenchi*
Simpl. *In Phys.*	Simplicius, *In Aristotelis physicorum libros commentaria*

Soph.	Plato, *Sophista*
Themist. *In Phys.*	Themistius, *In Aristotelis physica paraphrasis*
Tim.	Plato, *Timaeus*
Top.	Aristoteles, *Topica*