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OF NATURE

Andrea Falcon's work is guided by the exegetical ideal of recreating the mind of Aristotle and his distinctive conception of the theoretical enterprise. In this concise exploration of the significance of the celestial world for Aristotle's science of nature, Falcon investigates the source of discontinuity between celestial and sublunary natures and argues that the conviction that the natural world exhibits unity without uniformity is the ultimate reason for Aristotle's claim that the heavens are made of a special body, unique to them. This book presents Aristotle as a totally engaged, systematic investigator whose ultimate concern was to integrate his distinct investigations into a coherent interpretation of the world we live in, all the while mindful of human limitations to what can be known. Falcon reads in Aristotle the ambition of an extraordinarily curious mind and the confidence that that ambition has been largely fulfilled.

ANDREA FALCON is Assistant Professor in the Department of Philosophy at Concordia University, Montreal. He is the author of *Corpi e movimenti: Il De caelo di Aristotele e la sua fortuna nel mondo antico* (2001).

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# ARISTOTLE AND THE SCIENCE OF NATURE

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*In memory of  
Mario Mignucci, my teacher, who cared*

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*Lo duca e io per quel cammino ascoso  
intrammo a ritornar nel chiaro mondo;  
e senza cura aver d'alcun riposo,  
salimmo sù, el primo e io secondo,  
tanto ch'ì vidi de le cose belle  
che porta 'l ciel, per un pertugio tondo.  
E quindi uscimmo a riveder le stelle.*

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## *Preface*

This book develops the investigation I began in *Corpi e movimenti: il De caelo di Aristotele e la sua fortuna nel mondo antico* (Naples, 2001). There I discussed Aristotle's reasons for the view that the celestial bodies are made of a special body which naturally performs circular motion and is different from, and not reducible to, earth, water, air, and fire. I have also shown that very few in antiquity, even within the school of Aristotle, were prepared to accept this doctrine, though many, if not most of them, shared Aristotle's view that the celestial world is a special and somehow distinct region of the natural world. This book incorporates material from the Italian one but presents it in the light of a new project. By studying the reception of the view that the heavens are made of a special body, I have come to appreciate not only how unusual Aristotle's conception of the natural world is; I have also come to understand how this conception may have affected the way Aristotle conceives of the science of nature. This book is an attempt to explore the significance of the study of the celestial bodies for Aristotle's project of investigation of the natural world.

While Aristotle argues, against his predecessors, that the celestial world is radically different from the sublunary world, he is not envisioning two disconnected, or only loosely connected, worlds. On the contrary, Aristotle conceives of the natural world as *one* department of reality with a sufficient unity to be the object of a single science. I show, however, that for Aristotle this world exhibits *unity* without *uniformity*. More specifically, there are features of the celestial world that outrun the explanatory resources developed by Aristotle for the study of the sublunary world. According to Aristotle, there is an important discontinuity between the celestial and the sublunary worlds, and this discontinuity leads him to a further conclusion: that the celestial bodies are made of a special body, unique to them.

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But there is more to this book than an attempt to understand the reason that motivates Aristotle to endorse the view that the celestial bodies are made of a material principle unique to them. On the interpretation I am recommending, Aristotle is not only a systematic investigator of the natural world, he is also modest in recognizing human limitations on the extent of what can be known of this world. In the extant works, he is engaged in the study of the natural world in all its aspects on the crucial assumption that this world is a *cosmos*: that is, a structure that is intrinsically intelligible. But the study of this structure leads Aristotle to a certain view of the natural world and the place that we occupy in it. As a result of this view, Aristotle comes to think that what is intrinsically intelligible does not collapse into what can be known by us. Put differently, there is a lack of intelligibility *to us* in the natural world. I postpone discussion of this lack of intelligibility until the final chapter of the book.

Chapter 1 introduces the reader to a number of structural features of Aristotle's science of nature and the question of its unity and its boundaries. In the opening lines of the *Meteorology*, Aristotle outlines a program for the investigation of the natural world. I focus on this program and show that Aristotle's science of nature is structured in a certain way. I argue that this structure is crucially dependent upon a certain conception of the natural world. For Aristotle, the natural world is a causal system in which the direction of the explanation is from the celestial to the sublunary world only. A full appreciation of this conception of the natural world will help the reader to understand the precise sense in which Aristotle's science of nature is a distinctly organized science. In this context, I argue that the opening lines of the *Meteorology* reveal a firm grasp of the boundaries of the science of nature. Tellingly, the study of the soul is not mentioned as part of the program of inquiry into nature. Elsewhere Aristotle makes it abundantly clear that the study of the soul is preliminary to the study of life, but it is not a part of the science of nature. I discuss the problematic relation between the science of nature and the study of the soul and the unique status of the *De anima* within the Aristotelian corpus.

Once the conceptual structure and the scope of Aristotle's program for the investigation of nature are in place, in subsequent chapters the reader is introduced to Aristotle's view that the student of nature is concerned not only with natural bodies but also with the explanation of their motions.

Chapter 2 discusses the significance of Aristotle's emphasis on body in the opening lines of the *De caelo*. A close analysis of Aristotle's conception

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of natural body reveals that this conception is much richer and more complex than the concept of a three-dimensional object that occupies a certain region of the natural world. To begin with, natural bodies are divided into celestial and sublunary bodies. In the sublunary world, Aristotle admits a further distinction between composite and simple natural bodies. Finally, Aristotle develops a hierarchical conception of natural bodies: the natural bodies are themselves composed of natural bodies, and the simple bodies are the ultimate material principles of all natural bodies, and as such they are the natural bodies *par excellence*. For Aristotle, the natural world is the totality of the existing natural bodies.

Chapter 3 describes how and why Aristotle relates specific bodies to specific motions. Since the bodies in question are natural bodies, it is no surprise to discover that the explanation of their motions involves an appeal to their nature. More directly, Aristotle is committed to the view that motion is either natural or non-natural. I explore Aristotle's doctrine of natural motion and argue that he has left a coherent doctrine, even though at times he expresses himself in a way that is far from being crystal clear. I also study the way in which this doctrine is used to introduce the thesis of the existence of a simple celestial body which naturally performs circular motion. In this context, I suggest that celestial motion is not merely the circular motion performed by the celestial simple body, and that a full explanation of celestial motion requires an adequate psychological cause, namely a soul of a certain type. Finally, in the *De natura deorum*, Cicero credits Aristotle with the following tri-partition: (i) natural motion, (ii) forced motion, (iii) voluntary motion. The great intrinsic interest of this testimony, whose ultimate source presumably is Aristotle's lost dialogue *On Philosophy*, is the claim that celestial motion is a case of voluntary motion. I explore the reason for this claim which clashes with our basic intuitions about the voluntary.

Chapter 4 emphasizes Aristotle's epistemological pessimism regarding the possibility of knowledge of certain aspects of the celestial world. Aristotle's pessimism ultimately depends upon his conception of the natural world. Aristotle believes in the existence of celestial and sublunary natures, but he does not believe in the uniformity of nature. His considered view is that nature is not a uniform principle. I discuss the reasons that might have led Aristotle to take this view as well as the consequences following from this view for the study of the celestial world. In the extant works, Aristotle is reluctant to engage in an investigation of the celestial world when and where the lack of information at his disposal cannot be overcome by an appeal to similarities which the celestial natures share

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with the sublunary natures. He also makes a considerable effort to square the case of the celestial bodies with the conceptual resources developed and refined in the study of the sublunary world. But how successful is this effort? I focus on celestial matter as a case study.

The Epilogue studies the language traditionally used to refer to the celestial simple body introduced by Aristotle. Doxographers and commentators refer to Aristotle's celestial simple body as the fifth body, the fifth substance, the fifth element, the fifth nature, and even the fifth genus. No one of these expressions is used by Aristotle, who refers to the celestial simple body as the first element, the first body, or the first substance. Aristotle mentions *aithēr*, but only as the traditional name for the upper part of the natural world. I argue that this language is further evidence that Aristotle was fully aware of having arrived at a view of the natural world which was not only controversial but in some important sense also unique.

A final note on my language. I speak of natural world and natural bodies instead of physical world and physical bodies because our conception of the physical does not do justice to the richness and complexity of Aristotle's *ta physika*. This richness and complexity will become apparent in due course. For the time being, I am content to point out that we routinely contrast the physical with the mental. This contrast is emphatically not shared by Aristotle. What we recognize as the mental is part of Aristotle's natural world, even if he seems to be prepared to admit that what we recognize as the mind has the power to go beyond that which is merely natural.<sup>1</sup> For the very same reason, I prefer to speak of the science of nature instead of physics.

<sup>1</sup> This claim requires elaboration. I refer the reader to my discussion on the boundaries of the science of nature in chapter 1, "The unity, structure, and boundaries of Aristotle's science of nature."

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I am most grateful to Alan Code, Michael Frede, Jim Lennox, and Bob Sharples for reading earlier versions of this book and making constructive comments, which I have tried to incorporate in the final draft. Of course I am entirely responsible for any errors that may still remain in the following pages. I would like to thank Charles Klopp who has translated the epigraph from Dante's *Inferno* for this book.

The friendship of Carol Price has sustained me during the past few years. I thank her for this precious gift. She has successfully made me feel at home away from home.

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*Acknowledgments*

The love of Cristina has nurtured me, especially in the years that we lived on different sides of the ocean.

This book is gratefully dedicated to Mario Mignucci. By his example I have learned that reading Aristotle not only requires philosophical acumen, together with a combination of philological and historical skills; it also requires the dedication and courage of a mind open to the enormous possibilities of a text which remains largely unparalleled.

## *Abbreviations and conventions*

Frequently cited ancient titles are abbreviated as follows:

Alexander of Aphrodisias

<i>DA</i>	<i>De anima</i>
<i>In Metaph.</i>	<i>In Aristotelis Metaphysica commentarium</i>

Aristotle

<i>A post.</i>	<i>Analytica posteriora</i>
<i>Cat.</i>	<i>Categoriae</i>
<i>DA</i>	<i>De anima</i>
<i>DC</i>	<i>De caelo</i>
<i>EE</i>	<i>Ethica Eudemia</i>
<i>GA</i>	<i>De generatione animalium</i>
<i>GC</i>	<i>De generatione et corruptione</i>
<i>HA</i>	<i>Historia animalium</i>
<i>IA</i>	<i>De incessu animalium</i>
<i>Metaph.</i>	<i>Metaphysica</i>
<i>Meteor.</i>	<i>Meteorologica</i>
<i>NE</i>	<i>Ethica Nicomachea</i>
<i>PA</i>	<i>De partibus animalium</i>
<i>Phys.</i>	<i>Physica</i>
<i>PN</i>	<i>Parva naturalia</i>
<i>Rhet.</i>	<i>Rhetorica</i>
<i>SE</i>	<i>Sophistici elenchi</i>
<i>Top.</i>	<i>Topica</i>

Cicero

<i>Acad.</i>	<i>Academica</i>
<i>De fin.</i>	<i>De finibus bonorum et malorum</i>
<i>Nat. deor.</i>	<i>De natura deorum</i>

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- Tusc.* *Tusculanae disputationes*
- [Galen]  
*Hist. philos.* *Historia philosopha*
- Hippocrates  
*VT* *De vetere medicina*
- Philoponus  
*Contra Aristotelem* *De aeternitate mundi. Contra Aristotelem*  
*In DA* *In Aristotelis De anima commentaria*  
*In GC* *In Aristotelis De generatione et corruptione commentaria*
- Plato  
*Tim.* *Timaeus*
- Proclus  
*In Remp.* *In Platonis Rempublicam commentarii*  
*In Tim.* *In Platonis Timaeum commentaria*
- Sextus Empiricus  
*M* *Adversus mathematicos*  
*PH* *Pyrrhonei hypotyposes*
- Simplicius  
*In DC* *In Aristotelis De caelo commentaria*  
*In Phys.* *In Aristotelis Physica commentaria*
- [Simplicius]  
*In DA* *In Aristotelis De anima commentaria*
- Stobaeus  
*Ecl.* *Eclogae*
- Strabo  
*Geo.* *Geographica*

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Xenophon

*Mem.*    *Memorabilia*

Other frequently cited titles are abbreviated as follows:

- Aëtius*            *Aëtius, Placita* (reconstruction in Diels, *Dox. gr.*)  
*Arius Didymus*    *Arius Didymus, Epitome* (fragments in Diels, *Dox. gr.*).  
*DK*                 H. Diels and W. Kranz, *Die Fragmente der Vorsokratiker*, 3 vols. (Zürich, 1951<sup>6</sup>).  
*Dox. gr.*            *Doxographi graeci*, ed. H. Diels (Berlin, 1879).  
*LS*                 A. A. Long and D. N. Sedley, *The Hellenistic Philosophers* (Cambridge, 1987).  
*SVF*                J. von Arnim, *Stoicorum veterum fragmenta*, 3 vols. (Leipzig, 1903–5); vol. iv *Indexes*, ed. M. Adler (Leipzig, 1904).

In accordance with general editorial practice, words in < > indicate addition to amplify translation. Where the author's name appears in square brackets it means that the work is generally regarded as not genuine.