

TABLE OF CONTENTS

Analytic Table of Contents

Introduction

Chapter I. The First Task of the Philosophy of Nature—The Problem of Elementarity

Appendix 1. How did Critical Thought Transform the Ancient Picture of the World?

Chapter II. The Philosophical Myth of Creation—The Platonic Philosophy of Nature

1. Ideas and their Shadows

2. Becoming and Being

3. The Prototype of the Concept of Space

4. Time: The Moving Image of Eternity

5. Symmetries

6. The Achievements of the Platonic Philosophy of Nature

Appendix 2. Platonic “Ideas” in the History of Western Philosophy

Chapter III. Aristotle’s *Physics*

1. Introduction: From the World of Ideas to Individual Objects

2. The Ontological Point of View

3. The Point of View of Physics

4. A Philosophy of Change

5. The Theory of Hylomorphism

6. The Principles of Aristotle’s Dynamics

7. The Significance of Aristotle’s Physics

Appendix 3. Aristotelianism and Platonism—The Rivalry of Systems

Chapter IV. Aristotle's Method of Cosmological Speculation

Appendix 4. Ancient Ideas about the Structure of the Universe

Chapter V. Descartes' Mechanism

1. The Road to the Empirical Method
2. The Geometrical Mechanics of Descartes
3. The Geometrical Mechanism of Descartes
4. In the Context of System

Appendix 5. The Philosophy of Nature from the Middle Ages to Modern Times

Chapter VI. Isaac Newton and *The Mathematical Principles of Natural Philosophy*

1. Introduction: Towards a New Method
2. Newton's Introduction to the *Principia*
3. Rules of Reasoning in Philosophy
4. The *Scholium*

Appendix 6. The Mechanistic Image of the World in Newton's *Principia*

Chapter VII. The World of Leibniz: The Best of All Possible Worlds

1. Leibniz and Descartes: A Contrast
2. The Logic of God and the Logic of the World
3. The World of Substances
4. Teleology of the World
5. From Metaphysical Dynamics to Physical Dynamics
6. The Relational Theory of Space and Time

Appendix 7. The Leibniz-Clarke Debate

Chapter VIII. Immanuel Kant: The *a priori* Conditions of the Sciences

1. The Fundamental Question: How is Science Possible?
 2. Synthetic *a priori* Judgments
 3. How is Pure Mathematics Possible? The Categories of Space and Time
 4. How is a Pure Science of Nature Possible?
 5. The Boundaries of Philosophy
 6. A Critique of the Kantian Critique
- Appendix 8. The Kant-Laplace Cosmological Hypothesis

Chapter IX. The Romantic Philosophy of Nature

1. Introduction: From Mysticism to Idealism
 2. The Mysticism of Being
 3. Fichte; The Romantic Theory of Science
 4. Schelling's Speculative Physics
 5. A Philosophical Science of Nature
 6. The Debate about Hegel
 7. Evaluation and Conclusions
- Appendix 9. Romanticism in Poland—Between Philosophy and Literature

Chapter X. The Cosmology of Whitehead: The Universe as Process

1. Sources of the Great System
 2. Speculative Philosophy and the Empirical Sciences
 3. The Conception of Nature
 4. The Theory of the Division of Nature and its Critique
 5. Space and Time
 6. The Metaphysics of Process
 7. Some Remarks in Conclusion
- Appendix 10. Process Philosophy and its Continuation in Modern Thought

Chapter XI. Popper's Open Universe

1. The General Outline of Popper's Thought
 2. Popper's Intellectual Morality
 3. Antiessentialism and the Defense of Philosophy
 4. Popper's Three Worlds
 5. Popper's Philosophical and Cosmological Indeterminism
 6. The Metaphysics of Probabilities
 7. The Strategy of Evolution
 8. Concluding Remarks
- Appendix 11. The Influence of Popper's Thought on Contemporary
Philosophy of Science

Chapter XII. Science as Philosophy

1. From Science to Philosophy
2. Mechanism and its Fall

3. Philosophical Problems of the Theory of Relativity
 - 3.1 The Theory of Relativity and Kantianism
 - 3.2 The Theory of Relativity and Positivism and Operationalism
 - 3.3 Relativistic Cosmology and Philosophy
4. The Philosophical Problems of Quantum Mechanics
5. The Philosophical Problems of the Unification of Physics
- Appendix 12. The Dream of Unity—A Sketch of the Philosophy of Science of Albert Einstein

Chapter XIII. Problems and Methods of the Philosophy of Nature

1. The Growth of Criticism
2. The Existence of the Philosophy of Nature
3. The Rationality of the World
4. The Debate about Substance
5. Other Problems of the Philosophy of Nature
- Appendix 13. Various Conceptions of the Philosophy of Nature

INTRODUCTION

The philosophy of nature is probably the most controversial branch of philosophy. The only problem which everyone agrees should be discussed in a lecture on this philosophical discipline is whether there exists such a thing as the philosophy of nature at all. Many philosophers answer that question in the negative. In their opinion, after the emergence of the empirical sciences, nothing meaningful about nature could be said beyond what is said by the sciences. Philosophers who do not agree with that point of view face a choice between two extremes and, possibly, some kind of compromise. The two extremes are: either to ignore the empirical sciences and to attempt on their own to deduce something about nature from the general principles of the metaphysical system which they accept in its own right or to philosophize “inside the sciences,” risking the charge of reducing philosophy to the “particular sciences.” The compromises consist of a mixture of the two possibilities mentioned above in various proportions and do not enjoy a very great popularity among philosophers, who are usually sensitive to so-called methodological purity in their field of research. There still remains the extrarational “experience of nature” (e.g., the Romantic philosophy of nature), but it is suited rather to a volume of poetry than to a treatise of philosophy.

On the other hand, however, it is not possible to imagine a contemporary philosopher, who would simply exclude the so-called physical or material world from the scope of his research. From such a situation, there is only one way out—history. But that is a good way out: the history of earlier thought can help in identifying threads which—in the just-mentioned environment of the empirical sciences—are capable of weaving new, authentically philosophical constructions. That does not mean that the philosophy of nature has to limit itself to purely historical considerations; it means only that historical considerations seem to be an indispensable element of a strategy which would allow the philosophy of nature to escape from the impasse in which it undoubtedly finds itself. In my opinion, a thorough knowledge of at least the most important trends which have appeared in the history of the philosophy of nature is a necessary condition of a responsible research program in the area of contemporary philosophico-scientific problems, and at the same time is an indispensable minimum of knowledge in the area of the philosophy of nature for the researcher working in other areas of philosophy.

I borrowed the idea of developing a series of lectures around the most important figures and themes from the history of the philosophy of nature from Professor Jean Ladrière, who gave such a series of lectures at the Institut Supérieur

de Philosophie of the University of Louvain in 1982-3. The unpublished notes from those lectures, made available in typescript through the kindness of Professor Ladrière, were of invaluable assistance to me.¹ The many references to Professor Ladrière's notes in the text of this book indicate my debt to him only partially. However, my own series of lectures is not a copy of the lectures given in Louvain. Professor Ladrière concentrated his attention principally on one problem, namely, on the relation of physics to metaphysics in the most important systems of the philosophy of nature. That is indeed one of the key problems in the philosophy of nature, but I decided to go beyond that problem, and to undertake a more comprehensive discussion of the particular systems. As a result, the more focused formulation of Professor Ladrière has, in my book, become a more general series of lectures. That has manifested itself also in the method of the lectures.

Professor Ladrière limited himself to a discussion of the relation between physics and metaphysics in Aristotle, Descartes, Leibniz, Kant, and Whitehead. I have supplemented that account with a look at Plato, Newton, Popper and the so-called Romantic philosophy of nature. I also added a chapter on Aristotle's treatise *On the Heavens* and—in the second edition—a chapter discussing the philosophical themes in contemporary science. A short chapter on the Ionic philosophers of nature and a slightly longer chapter as a kind of summary discussion supplement the whole. The reasons for my additions are as follows:

Many problems later treated by nearly all the great systems of the philosophy of nature come from the Presocratics, so it necessary to begin with them. Since all of Western philosophy is only a footnote to Plato (Whitehead), it is not possible to leave him out of a course of lectures; all the more since contemporary theoretical physics seems in many cases—more or less consciously—to refer precisely to Plato. Textbooks in the history of philosophy do not usually devote very much space to the philosophical views of Newton. Even if it is true that that thinker does belong among the brightest stars in philosophical firmament (which is a matter of debate), the classical mechanics which he created had such a great influence on entire generations of philosophers, that one must give him a prominent place among the philosophers of nature. As for Popper, one can of course have greater doubts, but from the point of view of the twenty-first century, it is already clear that his views have become an important achievement of the most recent philosophy.

¹ J. Ladrière, *Physique et Métaphysique*, the text of lectures read at the Catholic University of Louvain in 1982-83.

I made a choice of themes with a view to their importance for the philosophy of nature. The single exception is the Romantic philosophy of nature. It is included in this book as an example (unfortunately, one among many in history) of unfruitful lines of inquiry. Because the field of the philosophy of nature is a great temptation for overly impatient minds, I thought it would be appropriate, at least in one case, to show where intuitions lead when insufficiently controlled by the rigors of logic.

In the second edition, I also added a chapter dedicated to a discussion of the philosophical significance of theories of contemporary physics. In the years which separate the present edition of this book from the earlier one, it has become even more obvious that the natural sciences are not only taking up many themes which traditionally belonged to the philosophy of nature, but are also posing entirely new problems which require philosophical analysis. What is more, the influence of the natural sciences on the philosophy of nature is currently much greater than the influence of any one thinker.

One should not, of course, think of the present book as a course in the history of the philosophy of nature; it is only *selected problems*, although selected with a rather keen partiality for those which I saw as more important. The approach which I take in this series of lectures (for thus can one characterize the literary genre of this work), does not limit itself to looking “from the inside” of any concrete philosophical system; it is an attempt—by means of a history of the most important philosophical views—to identify authentically philosophical themes in the questions raised by the contemporary natural sciences. The identification of those themes is not yet their philosophical elaboration. That is a task that still awaits its author.

The second edition of this book (under a different title; the title of the previous edition was *The Philosophy of the World*) has been significantly expanded. It became possible thanks to the collaboration of Małgorzata Szczerbińska-Polak, who wrote all the Appendices and biographies. For that, I offer my sincere thanks.

July 2004

Translated by Kenneth Kemp