

Contents

List of figures	ix
Acknowledgments	xi
Introduction	1
Part I: Fundamental Issues	5
1 Worldviews	7
2 Truth	17
3 Empirical Facts and Philosophical/Conceptual Facts	32
4 Confirming and Disconfirming Evidence and Reasoning	38
5 The Quine–Duhem Thesis and Implications for Scientific Method	46
6 Philosophical Interlude: Problems and Puzzles of Induction	58
7 Falsifiability	66
8 Instrumentalism and Realism	71
Part II: The Transition from the Aristotelian Worldview to the Newtonian Worldview	79
9 The Structure of the Universe on the Aristotelian Worldview	81
10 The Preface to Ptolemy’s <i>Almagest</i> : The Earth as Spherical, Stationary, and at the Center of the Universe	87
11 Astronomical Data: The Empirical Facts	99
12 Astronomical Data: The Philosophical/Conceptual Facts	106
13 The Ptolemaic System	113

14	The Copernican System	123
15	The Tyconic System	134
16	Kepler's System	137
17	Galileo and the Evidence from the Telescope	148
18	A Summary of Problems Facing the Aristotelian Worldview	164
19	Philosophical and Conceptual Connections in the Development of the New Science	170
20	Overview of the New Science and the Newtonian Worldview	175
21	Philosophical Interlude: What is a Scientific Law?	183
22	The Development of the Newtonian Worldview, 1700–1900	192
	Part III: Recent Developments in Science and Worldviews	205
23	The Special Theory of Relativity	207
24	The General Theory of Relativity	227
25	Overview of the Empirical Facts, Mathematics, and Interpretations of Quantum Theory	235
26	Quantum Theory and Locality: EPR, Bell's Theorem, and the Aspect Experiments	272
27	Overview of the Theory of Evolution	287
28	Philosophical and Conceptual Implications of Evolution	310
29	Worldviews: Concluding Thoughts	341
	Chapter Notes and Suggested Reading	349
	References	366
	Index	371