

NEWTON

TEXTS BACKGROUNDS COMMENTARIES

Selected and Edited by

I. BERNARD COHEN RICHARD S. WESTFALL
HARVARD UNIVERSITY INDIANA UNIVERSITY



Contents

| D (| |
|--|-----|
| Preface | ix |
| General Introduction | xi |
| Part 1: Natural Philosophy | 1 |
| Introduction | 3 |
| From "Quaestiones quaedam philosophicae" | 6 |
| Conjunction of Bodies | 6 |
| Of the Celestial Matter and Orbs | 7 |
| Of the Sun, Stars, Planets, and Comets | 7 |
| Of Gravity and Levity | 7 |
| Of Light | 11 |
| Of Sensation | 12 |
| Of the Flux and Reflux of the Sea | 12 |
| Hypothesis of Light | 12 |
| De Aere et Aethere | 34 |
| Queries 1-7 and 31 | 39 |
| Queries 18-22 | 56 |
| Alexandre Koyré • The Significance of the Newtonian Synthesis | 58 |
| A. Rupert Hall and Marie Boas Hall • Newton and the | |
| Theory of Matter | 72 |
| Arnold Thackray • Matter in a Nut-Shell: Newton's Opticks and | |
| Eighteenth-Century Chemistry | 87 |
| J. E. McGuire and P. M. Rattansi • Newton and the 'Pipes of Pan' | 96 |
| Part 2: Scientific Method | 109 |
| Introduction | 111 |
| A Note by David Gregory | 115 |
| From Query 31 | 115 |
| Rules of Reasoning in Philosophy | 116 |
| From the General Scholium | 118 |

vi Contents

| From Newton to Cotes, March 28, 1713 | 119 |
|---|------|
| From Newton to Oldenburg, February 6, 1672 | 119 |
| From Newton to Oldenburg, June 10, 1672 | 120 |
| From Newton to Oldenburg, July 6, 1672 | 120 |
| Colin Maclaurin • From An Account of Sir Isaac Newton's | |
| Philosophical Discoveries | 122 |
| I. Bernard Cohen • Newton's Method and Newton's Style | 126 |
| Part 3: Experimental Procedure | 145 |
| Introduction | 147 |
| From "Of Colours" | 149 |
| From Newton to Oldenburg, June 11, 1672 | 1 54 |
| From Proposition 6, Book 3 of the Principia | 159 |
| From the General Scholium to Section 6, Book 2 of the Principia | 159 |
| From "An Account of the Book entituled Commercium | |
| Epistolicum" | 161 |
| Part 4: Optics | 165 |
| Introduction | 167 |
| Newton to Oldenburg, February 6, 1672 | 171 |
| From a Paper on Rings | 181 |
| Queries 28 and 29 | 184 |
| Alan E. Shapiro • Experiment and Mathematics in Newton's | |
| Theory of Color | 191 |
| Simon Schaffer • Glass works | 202 |
| Part 5: Rational Mechanics | 219 |
| Introduction | 221 |
| Newton's "Author's Preface to the Reader" of the Principia | 224 |
| Paper of Directions Given by Newton to Bentley Respecting | |
| the Books to Be Read before Endeavouring to Read and | |
| Understand the Principia | 226 |
| Definitions | 227 |
| Laws of Motion | 233 |
| Selected Propositions from the Principia, Book 1 | 238 |
| Proposition 1 | 238 |
| Proposition 2 | 240 |

| CONTENTS | VII |
|----------|-----|
| AUNTENTS | VII |
| | |

| Proposition 3 | 240 |
|---|-----|
| Proposition 4 | 240 |
| Scholium | 241 |
| Proposition 6 | 242 |
| Proposition 11 | 243 |
| Proposition 41 | 244 |
| Introduction, Section 11 | 244 |
| Proposition 57 | 245 |
| Proposition 63 | 245 |
| Proposition 66 | 245 |
| Concluding Scholium to Section 11 | 245 |
| Proposition 70 | 246 |
| Proposition 71 | 246 |
| Scholium to Section 9, Book 2 of the Principia | 247 |
| Alfred North Whitehead • From Science and the Modern World | 248 |
| Part 6: System of the World | 251 |
| Introduction | 253 |
| Book 3: On the System of the World | 257 |
| From The System of the World | 257 |
| Colin Maclaurin • From An Account of Sir Isaac Newton's | |
| Philosophical Discoveries | 274 |
| David Kubrin • Newton and the Cyclical Cosmos: | |
| Providence and the Mechanical Philosophy | 281 |
| Part 7: Alchemy and Theory of Matter | 297 |
| Introduction | 299 |
| From "Of Natures Obvious Laws and Processes in Vegetation" | 301 |
| Chapter 5 of Praxis | 308 |
| "De Natura Acidorum" | 312 |
| John Maynard Keynes • From "Newton, the Man" | 314 |
| Betty Jo Teeter Dobbs • From "Newton's Alchemy and His Theory | |
| of Matter" | 315 |
| Part 8: Theology | 325 |
| Introduction | 327 |
| From a Memorandum by David Gregory | 329 |

viii Contents

| Four Letters to Richard Bentley | 330 |
|---|-----|
| General Scholium | 339 |
| An Early Theological Manuscript | 342 |
| A Short Schem of the True Religion | 344 |
| Twelve Articles | 348 |
| Introduction to a Treatise on Revelation | 349 |
| Richard S. Westfall • Newton and Christianity | 356 |
| Part 9: Mathematics | 371 |
| Introduction | 373 |
| The Tract of October 1666 | 377 |
| Section 1, Book 1 of the Principia | 386 |
| Lemma 2, Book 2 of the Principia | 397 |
| Leibniz's Judgment of Newton as a Mathematician | 399 |
| Colson's Account of the Method of Fluxions | 400 |
| George Berkeley • From The Analyst | 401 |
| D. T. Whiteside • Newton the Mathematician | 406 |
| Postscript: Albert Einstein on Newton's Opticks | 413 |
| Biographical Register | 415 |
| Glossary | 423 |
| Glossary of Chemical Terms | 429 |
| Isaac Newton: A Chronology | 431 |
| Selected Bibliography | 435 |