

CONTENTS

ACKNOWLEDGMENTS vii

INTRODUCTION 1

PART I. CONCEPTUALLY IMPORTANT EXPERIMENTS

THOSE THAT LEAD TO SIGNIFICANT CHANGES IN THEORY

1. **Gregor Mendel, “Experiments in Plant Hybridization”:**
The Best Experiments Ever Done! 11
2. **The Discovery of Parity Nonconservation** 29
3. **The Meselson-Stahl Experiment**
“The Most Beautiful Experiment in Biology” 41
4. **CP or Not CP**
A Convincing Experiment 57
5. **The Nondiscovery of Parity Nonconservation**
A Missed Opportunity 69

PART II. MEASURING A QUANTITY OF IMPORTANCE

6. **Measuring a Quantity of Importance and Testing an Equation**
Millikan and Planck’s Constant 83
7. **Robert Millikan and the Charge of the Electron** 112

PART III. EVIDENCE FOR ENTITIES

8. “Observing” the Neutrino
The Reines-Cowan Experiments 127
9. The Discovery of the η Meson 147
10. Is There a Second Neutrino? 152
11. The Missing Piece of the Puzzle
The Discovery of the Higgs Boson 163

PART IV. SOLVING A VEXING PROBLEM

12. William Wilson and the Absorption of β Rays 181
13. Ellis and Wooster, the Continuous Energy Spectrum in β Decay
Something Is Missing 197
14. The Solar-Neutrino Problem 214

PART V. MEASURING NOTHING

15. The Disappearance of the 17-keV Neutrino 229
16. The Michelson-Morley Experiment 241
17. A Tale of Two Experiments:
Is There a Fifth Force? 266
18. The Search for Magnetic Monopoles 281

CONCLUSION 296

NOTES 307

REFERENCES 339

INDEX 359