

Contents

Acknowledgements — V

Preface — VII

List of Tables — XIII

List of Figures — XV

Introduction — 1

Chapter 1 Continuity and Process Realism — 3

- 1.1 Introduction — **3**
- 1.2 Defining “Process” for Use in the Philosophy of Science — **5**
 - 1.2.1 Processes vs. Things — **6**
 - 1.2.2 What Is a Process? — **8**
- 1.3 A Thought Experiment: First-Level Process-Realist Commitment — **12**
 - 1.3.1 The Unchanging Room — **12**
 - 1.3.2 Without Process, No Observation — **15**
- 1.4 The Continuity Argument — **17**
 - 1.4.1 The Simple Continuity Argument — **18**
 - 1.4.2 The Complex Continuity Argument — **21**
- 1.5 Conclusion — **31**

Chapter 2 Processes Underlie Processes — 34

- 2.1 Introduction — **34**
- 2.2 Underlier Arguments and Their Types — **36**
 - 2.2.1 Underliers of Experimental Practice: Stability within and between Experiments — **37**
 - 2.2.2 Stability of Descriptions and Models — **58**
 - 2.2.3 Manifest and Assumed Stability — **72**
- 2.3 General Refutation: From Negation to Position — **84**
 - 2.3.1 The Negative: Refuting Underlier Arguments Algorithmically — **84**
 - 2.3.2 The Positive: Explaining Stability — **86**
- 2.4 Conclusion — **88**

Interlude: Two Shifts in Method — 91

Chapter 3 The Candle Flame: A Process-Realist Analysis — 93

- 3.1 Introduction — **93**
- 3.2 The Flame and Phlogiston, the Thing Realist's Posit — **95**
- 3.3 Explaining Things Away — **99**
 - 3.3.1 What Do We See in the Flames? — **99**
 - 3.3.2 What Do We Explain about the Flames? — **102**
 - 3.3.3 Explaining What Needs Explaining — **103**
- 3.4 What Explanatory Role, Things? — **115**
 - 3.4.1 New Thing Terms Appear in Our Explanations ... — **115**
 - 3.4.2 ... But Things Play No Role in Our Explanations — **116**
- 3.5 Conclusion — **122**

Chapter 4 Perrin's Argument: A Robustness Argument for Processes, Not Things — 126

- 4.1 Introduction — **126**
- 4.2 Perrin's Intuition Pump: The Bath and Cascading Fluid Motion — **127**
- 4.3 Perrin's Historical/Eliminative Argument — **129**
- 4.4 Perrin's Precise Arguments — **132**
 - 4.4.1 Argument 1: Qualitative Robustness — **132**
 - 4.4.2 Argument 2: Quantitative Robustness — **135**
 - 4.4.3 Summary — **144**
- 4.5 Conclusion — **145**

Chapter 5 Models of the Nucleus: Incompatible Things, Compatible Processes — 147

- 5.1 Introduction — **147**
- 5.2 Many Models, Divergent Things — **149**
 - 5.2.1 The Liquid-Drop Model — **150**
 - 5.2.2 The Shell Model — **153**
 - 5.2.3 Incompatibility — **155**
- 5.3 The Features of the Nucleus Are Processes — **157**
 - 5.3.1 Formal Features of the Nucleus: Balanced Dynamics — **159**
 - 5.3.2 Material Features of the Nucleus — **166**
 - 5.3.3 Reestablishing Compatibility — **170**
- 5.4 Conclusion and Prospectus — **171**

Summary and Prospectus — 174

Bibliography — 175

Index — 194

