

# Contents

|          |   |    |
|----------|---|----|
| <b>1</b> | <b>Is Absolute Knowledge of the World Possible?</b> . . . . . | 1  |
| 1.1      | The Dream of Parmenides . . . . .                             | 2  |
| 1.2      | In Search of the Archimedean Point of Knowledge . . . . .     | 3  |
| 1.3      | Utopian Fallacies . . . . .                                   | 6  |
| 1.4      | From the Absolute to the Relative . . . . .                   | 11 |
|          | References . . . . .  | 15 |
| <b>2</b> | <b>Are There Unsolvable World Enigmas?</b> . . . . .          | 17 |
| 2.1      | The “Ignorabimus” Controversy . . . . .                       | 18 |
| 2.2      | Crossing Boundaries in Science . . . . .                      | 21 |
| 2.3      | The Whole and Its Parts . . . . .                             | 26 |
| 2.4      | Concerning Hypothetical Truth . . . . .                       | 28 |
| 2.5      | We Must Search, We Will Search . . . . .                      | 30 |
|          | References . . . . .  | 33 |
| <b>3</b> | <b>How Could Life Have Originated?</b> . . . . .              | 35 |
| 3.1      | What Is Life? . . . . .                                       | 36 |
| 3.2      | How Complex Is Living Matter? . . . . .                       | 43 |
| 3.3      | How Does Information Originate? . . . . .                     | 50 |
| 3.4      | Evolution in the Test-Tube . . . . .                          | 57 |
| 3.5      | Are We Alone in the Universe? . . . . .                       | 61 |
|          | References . . . . .  | 64 |
| <b>4</b> | <b>What Is Information?</b> . . . . .                         | 67 |
| 4.1      | Dimensions of Information . . . . .                           | 68 |
| 4.2      | Naturalism Versus Constructivism . . . . .                    | 71 |
| 4.3      | Information in Living Matter . . . . .                        | 76 |
| 4.4      | On the True Nature of Information . . . . .                   | 80 |
|          | References . . . . .  | 83 |

|          |   |     |
|----------|---|-----|
| <b>5</b> | <b>Is Language a General Principle of Nature?</b> . . . . . | 85  |
| 5.1      | The Structure of Language . . . . .                         | 86  |
| 5.2      | Towards a Radical Linguistic Turn . . . . .                 | 90  |
| 5.3      | Approaching the Semantic Dimension of Language . . . . .    | 93  |
| 5.4      | The Language of Genes . . . . .                             | 98  |
|          | References . . . . .  | 100 |
| <b>6</b> | <b>Can the Beauty of Nature Be Objectified?</b> . . . . .   | 103 |
| 6.1      | Science and the Ideal of Beauty . . . . .                   | 104 |
| 6.2      | Features of Natural Complexity . . . . .                    | 106 |
| 6.3      | Algorithms of Natural Beauty . . . . .                      | 111 |
| 6.4      | What is Ultimately Beauty? . . . . .                        | 123 |
|          | References . . . . .  | 124 |
| <b>7</b> | <b>What Is Time?</b> . . . . .                              | 125 |
| 7.1      | The Thermodynamic Arrow of Time . . . . .                   | 126 |
| 7.2      | Weak and Strong Temporality . . . . .                       | 129 |
| 7.3      | Cosmological Foundations of Temporality . . . . .           | 136 |
| 7.4      | The Entanglement of Time Modes . . . . .                    | 140 |
|          | References . . . . .  | 142 |
| <b>8</b> | <b>Can History Be Condensed into Formulae?</b> . . . . .    | 145 |
| 8.1      | History and Causal Analysis . . . . .                       | 146 |
| 8.2      | The Essence of Historicity . . . . .                        | 150 |
| 8.3      | The World of Boundaries and Constraints . . . . .           | 153 |
| 8.4      | Outlook . . . . .   | 160 |
|          | References . . . . .  | 163 |
| <b>9</b> | <b>Where Is Science Going?</b> . . . . .                    | 165 |
| 9.1      | The Search for the Unity of Knowledge . . . . .             | 166 |
| 9.2      | The General and the Particular . . . . .                    | 168 |
| 9.3      | Scientific Explanations . . . . .                           | 172 |
| 9.4      | The Ascent of Structural Sciences . . . . .                 | 176 |
| 9.5      | Towards a Technology of Knowledge . . . . .                 | 179 |
|          | References . . . . .  | 185 |
|          | <b>Figure Sources</b> . . . . .                             | 187 |
|          | <b>Author Index</b> . . . . .                               | 189 |
|          | <b>Subject Index</b> . . . . .                              | 191 |
|          | <b>Titles in This Series</b> . . . . .                      | 195 |



<http://www.springer.com/978-3-319-67367-7>

The Computability of the World

How Far Can Science Take Us?

Küppers, B.-O.

2018, X, 200 p. 40 illus., 38 illus. in color., Hardcover

ISBN: 978-3-319-67367-7