#### CONTENTS

Foreword to the French Edition, ix Foreword to the English Edition, xiii Preface, xvii

#### 1. What We Know about the Nature of the Horse, 1

Then and Now, 1 | Discovering the Real Life of Free-Ranging Horses, 5 | Equine Ethology Studies to Pursue, 11 | The Emergence of a New Field of Research: The Cognitive Ethology of the Horse, 14

### 2. Equine Intelligence, 22

Are Horses Smart? One Question, Several Answers, 22 | A Rash of Clever Horses, 28

## 3. Animal Intelligence, Cognition, and Representation, 40

Intelligence and Cognition, 40 | Animal Behavior, Cognition, and Representation, 46

#### 4. The Equine Brain, 71

Nervous Tissue and the General Organization of the Mammalian Nervous System, 70 | Brain and Mind in the Light of Evolution, 99

#### 5. The Nature of Equine Perception, 111

Perception: A Dynamic Process That Constructs the World, 111 | A Few Issues Regarding the Study of Equine Perception, 122

#### 6. The Anatomical and Physiological Basis of Equine Visual Perception, 125

Size, Arrangement of the Eyes, and Visual Field, 126 | Anatomical Structure of the Eye, 129 | A Short Tour of the Anatomy of the Retina, 132 | Structure of the Retina and Visual Quality, 137 | Optical Pathways and Cortical Distribution, 145 | Chromatic Theory and Color Perception, 148

# 7. The Behavioral Exploration of Equine Visual Perception: Perception of Shapes and Movement. 160

Experimental Procedures, 160 | Visual Acuity, 162 | The Visual Field, 167 | Night Vision, 172 | The Visual Apparatus: An Integrated System . . . , 176 | . . . In the Context of Cerebral Hemispheric Specialization, 179 | Perceiving the Third Dimension, 194 | Image Recognition, 203 | Object Recognition, 207 | Perceiving Movement, 211 | The Equine Visual Environment: Seen as a Whole or the Sum of Its Parts?, 213

# The Behavioral Exploration of Equine Visual Perception: The Quest for Color Perception, 217

Brightness: A Vexing Dimension, 218 | A Pioneering Study (Grzimek 1952), 221 | An Inconclusive Replication (Pick et al. 1994), 225 | An Apparent Confirmation of Grzimek's Results (Smith and Goldman 1999), 226 | New Uncertainties Centering on Brightness (Macuda and Timney 1999), 229 | The Evidence for a Neutral Point (Geisbauer et al. 2004), 233 | Color Preferences (Hall et al. 2005), 236 | Do Horses Perceive the Entire Color Spectrum? (Hall et al. 2006), 237 | The Neutral Point: Break or Continuity? (Roth, Balkenius, and Kelber 2007), 244 | Equine Dichromacy: A Qualification (Hanggi, Ingersoll, and Waggoner 2007), 250 | A New Experiment in Chromatic Discrimination (Blackmore et al. 2008), 255 | How Well Do Horses Discriminate Color in Half-Light? (Roth, Balkenius, and Kelber 2008), 262 | Colors That Can Be Fairly Well Discriminated across the Light Spectrum (Timney and Macuda 2009), 265 | A Provisional Summing Up, 270

#### 9. Hearing in Horses, 272

Nature, Representation, and Characterization of Acoustic Information, 272 | The Equine Auditory System: Anatomy and Physiology, 280 | Behavioral Exploration of Equine Auditory Perception, 289

10. Equine Chemical Perception: Odors, Pheromones, Tastes, and Flavors, 330

Olfactory Perception in the Horse, 331 | From Taste to Flavor, 354

## 11. Tactile Perception in the Horse, 369

Structure and Function of Horse Skin, 369 | Receptors: Equine Sensory Pathways and Skin Sensitivity, 374 | Mutual Grooming and Neuro-physiological Response, 378 | Tactile Stimulation and Interspecific Social Relationships, 385

Conclusion, 388
References, 393
Acknowledgments, 425
Index, 427

Color plates follow page 218