

Contents in Brief

Contents ix
Preface xxxv
Acknowledgments xxxvii
Contributors xxxix

Part I

The Neurobiology of Behavior

- 1 The Brain and Behavior 5
- 2 Nerve Cells and Behavior 19
- 3 Genes and Behavior 36

Part II

Cell and Molecular Biology of the Neuron

- 4 The Cytology of Neurons 67
- 5 Synthesis and Trafficking of Neuronal Protein 88
- 6 Ion Channels 105
- 7 Membrane Potential 125
- 8 Local Signaling: Passive Electrical Properties of the Neuron 140
- 9 Propagated Signaling: The Action Potential 150

Part III

Elementary Interactions Between Neurons: Synaptic Transmission

- 10 Overview of Synaptic Transmission 175
- 11 Signaling at the Nerve-Muscle Synapse: Directly Gated Transmission 187

- 12 Synaptic Integration 207
- 13 Modulation of Synaptic Transmission: Second Messengers 229
- 14 Transmitter Release 253
- 15 Neurotransmitters 280
- 16 Diseases of Chemical Transmission at the Nerve-Muscle Synapse: Myasthenia Gravis 298

Part IV

The Neural Basis of Cognition

- 17 The Anatomical Organization of the Central Nervous System 317
- 18 The Functional Organization of Perception and Movement 337
- 19 Integration of Sensory and Motor Function: The Association Areas of the Cerebral Cortex and the Cognitive Capabilities of the Brain 349
- 20 From Nerve Cells to Cognition: The Internal Cellular Representation Required for Perception and Action 381

Part V

Perception

- 21 Coding of Sensory Information 411
- 22 The Bodily Senses 430
- 23 Touch 451
- 24 The Perception of Pain 472
- 25 Constructing the Visual Image 492

- 26 Visual Processing by the Retina 507
- 27 Central Visual Pathways 523
- 28 Perception of Motion, Depth, and Form 548
- 29 Color Vision 572
- 30 Hearing 590
- 31 Sensory Transduction in the Ear 614
- 32 Smell and Taste: The Chemical Senses 625

Part VI

Movement

- 33 The Organization of Movement 653
- 34 The Motor Unit and Muscle Action 674
- 35 Diseases of the Motor Unit 695
- 36 Spinal Reflexes 713
- 37 Locomotion 737
- 38 Voluntary Movement 756
- 39 The Control of Gaze 782
- 40 The Vestibular System 801
- 41 Posture 816
- 42 The Cerebellum 832
- 43 The Basal Ganglia 853

Part VII

Arousal, Emotion, and Behavior Homeostasis

- 44 Brain Stem, Reflexive Behavior, and the Cranial Nerves 873
- 45 Brain Stem Modulation of Sensation, Movement, and Consciousness 889
- 46 Seizures and Epilepsy 910
- 47 Sleep and Dreaming 936
- 48 Disorders of Sleep and Wakefulness 948
- 49 The Autonomic Nervous System and the Hypothalamus 960
- 50 Emotional States and Feelings 982
- 51 Motivational and Addictive States 998

Part VIII

The Development of the Nervous System

- 52 The Induction and Patterning of the Nervous System 1019
- 53 The Generation and Survival of Nerve Cells 1041
- 54 The Guidance of Axons to Their Targets 1063
- 55 The Formation and Regeneration of Synapses 1087
- 56 Sensory Experience and the Fine-Tuning of Synaptic Connections 1115
- 57 Sexual Differentiation of the Nervous System 1131
- 58 Aging of the Brain and Dementia of the Alzheimer Type 1149

Part IX

Language, Thought, Mood, and Learning, and Memory

- 59 Language and the Aphasias 1169
- 60 Disorders of Thought and Volition: Schizophrenia 1188
- 61 Disorders of Mood: Depression, Mania, and Anxiety Disorders 1209
- 62 Learning and Memory 1227
- 63 Cellular Mechanisms of Learning and the Biological Basis of Individuality 1247

Appendices

- A Current Flow in Neurons 1280
- B Ventricular Organization of Cerebrospinal Fluid: Blood-Brain Barrier, Brain Edema, and Hydrocephalus 1288
- C Circulation of the Brain 1302
- D Consciousness and the Neurobiology of the Twenty-First Century 1317

Index 1321