

Contents

VOLUME ONE

Part I

Cellular physiology

- 1 Principles of cell homeostasis, 3
Robert D. DeVoe and Peter C. Maloney
- 2 Excitation and conduction in nerve fibers, 46
F. J. Brinley, Jr.
- 3 Contractility, with special reference to skeletal muscle, 82
Robert M. Dowben
- 4 Vertebrate smooth muscle, 120
Jean M. Marshall

Part II

The biology of nerve cells

- 5 Neuromuscular transmission, 151
William L. Nastuk
- 6 Synaptic transmission, 184
Vernon B. Mountcastle and Antonio Sastre

Part III

Principles of system theory as applied to physiology

- 7 Systems and models, 227
James C. Houk
- 8 Homeostasis and control principles, 246
James C. Houk

Part IV

General physiology of the forebrain

- 9 Functional organization of thalamus and cortex, 271
Gian F. Poggio and Vernon B. Mountcastle

- 10 Sleep, wakefulness, and the conscious state: intrinsic regulatory mechanisms of the brain, 299
Vernon B. Mountcastle

Part V

Central nervous mechanisms in sensation

- 11 Sensory receptors and neural encoding: introduction to sensory processes, 327
Vernon B. Mountcastle
- 12 Neural mechanisms in somesthesia, 348
Vernon B. Mountcastle
- 13 Pain and temperature sensibilities, 391
Vernon B. Mountcastle
- 14 The auditory periphery, 428
Moise H. Goldstein, Jr.
- 15 Central nervous mechanisms in hearing, 457
Vernon B. Mountcastle
- 16 The eye, including central nervous system control of eye movements, 481
Gerald Westheimer
- 17 Physiology of the retina, 504
Kenneth T. Brown
- 18 Central neural mechanisms in vision, 544
Gian F. Poggio
- 19 The chemical senses: gustation and olfaction, 586
Lloyd M. Beidler

Part VI

Some aspects of higher nervous function

- 20** The study of sensation in physiology: psychophysical and neurophysiologic correlations, 605
Gerhard Werner
- 21** Higher functions of the nervous system, 629
Gerhard Werner
- 22** Some special functions of the human brain: dominance, language, apraxia, memory, and attention, 647
Norman Geschwind

Part VII

Neural control of posture and movement

- 23** Organization of the motor systems: a preview, 669
Elwood Henneman
- 24** Skeletal muscle: the servant of the nervous system, 674
Elwood Henneman
- 25** Feedback signals from muscle and their efferent control, 703
Dale A. Harris and Elwood Henneman
- 26** Organization of the motoneuron pool: the size principle, 718
Elwood Henneman
- 27** Input to motoneuron pools and its effects, 742
Lorne M. Mendell and Elwood Henneman
- 28** Organization of the spinal cord and its reflexes, 762
Elwood Henneman
- 29** Motor functions of the brain stem and basal ganglia, 787
Elwood Henneman
- 30** The role of the vestibular system in posture and movement, 813
Victor J. Wilson and Barry W. Peterson
- 31** The cerebellum, 837
W. T. Thach, Jr.

- 32** Motor functions of the cerebral cortex, 859
Elwood Henneman

Part VIII

The autonomic nervous system, hypothalamus, and integration of body functions

- 33** The autonomic system and its role in controlling body functions, 893
Kiyomi Koizumi and Chandler M. Brooks
- 34** The hypothalamus and control of integrative processes, 923
Chandler M. Brooks and Kiyomi Koizumi

VOLUME TWO

Part IX

The circulation

- 35** Cardiovascular system, 951
William R. Milnor
- 36** Properties of cardiac tissues, 961
William R. Milnor
- 37** The heart as a pump, 986
William R. Milnor
- 38** The electrocardiogram, 1007
William R. Milnor
- 39** Principles of hemodynamics, 1017
William R. Milnor
- 40** Normal circulatory function, 1033
William R. Milnor
- 41** Autonomic and peripheral control mechanisms, 1047
William R. Milnor
- 42** The cardiovascular control system, 1061
William R. Milnor
- 43** Capillaries and lymphatic vessels, 1085
William R. Milnor
- 44** Regional circulations, 1094
William R. Milnor
- 45** Pulmonary circulation, 1108
William R. Milnor

- 46 Blood volume, 1118

William R. Milnor

- 47 The blood, 1126

C. Lockard Conley

- 48 Hemostasis, 1137

C. Lockard Conley

Part X

The kidney and body fluids

- 49 Volume and composition of the body fluids, 1149

William E. Lassiter and Carl W. Gottschalk

- 50 Mechanisms of urine formation, 1165

Carl W. Gottschalk and William E. Lassiter

- 51 Urine formation in the diseased kidney, 1206

William E. Lassiter and Carl W. Gottschalk

- 52 Cerebrospinal fluid, aqueous humor, and endolymph, 1218

Thomas H. Maren

Part XI

Physiology of the digestive system

- 53 The absorptive function of the alimentary canal, 1255

Thomas R. Hendrix

- 54 The secretory function of the alimentary canal, 1289

Thomas R. Hendrix

- 55 The motility of the alimentary canal, 1320

Thomas R. Hendrix

Part XII

Metabolism

- 56 Energy exchange, 1351

John R. Brobeck and Arthur B. DuBois

- 57 Energy balance and food intake, 1366

John R. Brobeck

- 58 Physiology of muscular exercise, 1387

Sid Robinson

- 59 Body temperature regulation, 1417

James D. Hardy

Part XIII

Endocrine glands

- 60 Introduction to endocrinology, 1459

H. Maurice Goodman

- 61 The pituitary gland, 1468

H. Maurice Goodman

- 62 The thyroid gland, 1495

H. Maurice Goodman and
Lester Van Middlesworth

- 63 Vitamin D, parathyroid hormone, and calcitonin, 1519

G. D. Aurbach and James M. Phang

- 64 The adrenal cortex, 1558

F. Eugene Yates, Donald J. Marsh,
and Janice W. Maran

- 65 Reproduction, 1602

H. Maurice Goodman

- 66 The pancreas and regulation of metabolism, 1638

H. Maurice Goodman

Part XIV

Respiration

- 67 The lung: physical aspects of respiration, 1677

Christian J. Lambertsen

- 68 Gas exchanges of the atmosphere with the lungs and blood, 1691

Christian J. Lambertsen

- 69 Transport of oxygen, carbon dioxide, and inert gases by the blood, 1721

Christian J. Lambertsen

- 70 Neural control of respiration, 1749

Christian J. Lambertsen

- 71 Chemical control of respiration at rest, 1774

Christian J. Lambertsen

- 72 Dyspnea and abnormal types of respiration, 1828

Christian J. Lambertsen

- 73 Hypoxia, altitude, and acclimatization, 1843

Christian J. Lambertsen

- 74** Physical, chemical, and nervous interactions in respiratory control, 1873
Christian J. Lambertsen
- 75** Effects of excessive pressures of oxygen, nitrogen, helium, carbon dioxide, and carbon monoxide: implications in aerospace, undersea, and industrial environments, 1901
Christian J. Lambertsen

Part XV

The physiology of development and aging

- 76** Fetal and neonatal physiology, 1947
John D. Biggers
- 77** Physiology of aging, 1986
Paola S. Timiras