

## CONTENTS

### PREFATORY CHAPTER

- Mostly Membranes, *Kenneth S. Cole* 1

### GASTROINTESTINAL AND NUTRITIONAL PHYSIOLOGY

- Introduction, *Stanley G. Schultz, Section Editor* 25  
Neural and Hormonal Regulation of Gastrointestinal Function:  
An Overview, *Morton I. Grossman* 27  
Regulation of Gastric Acid Secretion, *Andrew Soll and John H.  
Walsh* 35  
Regulation of Pancreatic Exocrine Function In Vitro: Initial  
Steps in the Actions of Secretagogues, *Jerry Gardner* 55  
Regulation of Hepatic Biliary Secretion, *R. Scott Jones and W.  
C. Myers* 67  
Comparative Biochemistry and Physiology of Gut Hormones,  
*Graham Dockray* 83

### SPECIAL TOPIC: NEUROPHYSIOLOGY

- Introduction, *Walter J. Freeman, Section Editor* 97  
Regulation of Stiffness by Skeleotomotor Reflexes, *James C.  
Houk* 99  
Spinal Interneurons, *P. G. Kostyuk and D. Vasilenko* 115  
Reticulospinal Projections to Spinal Motor Nuclei, *Barry W.  
Peterson* 127  
Posterior Parietal Cortex: Relations of Unit Activity to  
Sensorimotor Function, *Ian Darian-Smith, Kenneth Johnson,  
and Anthony Goodwin* 141  
Extracellular Potassium in the Mammalian Central Nervous  
System, *George G. Somjen* 159

### RENAL AND ELECTROLYTE PHYSIOLOGY

- Introduction, *Thomas E. Andreoli, Section Editor* 179  
Sugar, Amino Acid, and  $\text{Na}^+$  Cotransport in the Proximal  
Tubule, *K. J. Ullrich* 181  
Proton Secretion by the Kidney, *David Warnock and Floyd  
Rector* 197  
Rheogenic and Passive  $\text{Na}^+$  Absorption by the Proximal  
Nephron, *James A. Schafer and Thomas E. Andreoli* 211

|                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------|-----|
| <b>RENAL AND ELECTROLYTE PHYSIOLOGY (CONT'D)</b>                                                                     |     |
| Renal Nerves and Sodium Excretion, <i>Carl W. Gottschalk</i>                                                         | 229 |
| Potassium Transport in the Nephron, <i>Gerhard Giebisch and Bruce Stanton</i>                                        | 241 |
| Renal Handling of Phosphate and Calcium, <i>Vincent W. Dennis, William W. Stead, and John L. Myers</i>               | 257 |
| <b>COMPARATIVE AND INTEGRATIVE PHYSIOLOGY</b>                                                                        |     |
| Introduction, <i>William R. Dawson, Section Editor</i>                                                               | 273 |
| Hibernation: Cellular Aspects, <i>J. S. Willis</i>                                                                   | 275 |
| Hibernation: Endocrinologic Aspects, <i>Jack W. Hudson and Lawrence C. H. Wang</i>                                   | 287 |
| Hibernation: Neural Aspects, <i>H. Craig Heller</i>                                                                  | 305 |
| Reproductive Endocrinology of Fishes: Gonadal Cycles and Gonadotropin in Teleosts, <i>R. E. Peter and L. W. Crim</i> | 323 |
| Reproductive Endocrinology of Reptiles and Amphibians: Gonadotropins, <i>Paul Licht</i>                              | 337 |
| Avian Orientation and Navigation, <i>William T. Keeton</i>                                                           | 353 |
| <b>RESPIRATORY AND CARDIOVASCULAR PHYSIOLOGY</b>                                                                     |     |
| Introduction, <i>Robert M. Berne, Section Editor</i>                                                                 | 367 |
| Control of Mucus Secretion and Ion Transport in Airways, <i>Jay A. Nadel, Brian Davis, and Roger J. Phipps</i>       | 369 |
| Fetal and Neonatal Pulmonary Circulation, <i>Abraham M. Rudolph</i>                                                  | 383 |
| <u>Electrophysiology</u>                                                                                             |     |
| Biochemical Mechanism of the Sodium Pump, <i>Earl T. Wallick, Lois K. Lane, and Arnold Schwartz</i>                  | 397 |
| Properties of Two Inward Membrane Currents in the Heart, <i>Harald Reuter</i>                                        | 413 |
| Electrogenesis of the Plateau and Pacemaker Potential, <i>Mario Vassalle</i>                                         | 425 |
| Propagation Mechanisms in Heart, <i>Nick Sperelakis</i>                                                              | 441 |
| Cardiac Arrhythmias, <i>Paul F. Cranefield and Andrew L. Wit</i>                                                     | 459 |
| <u>Cardiac Contraction</u>                                                                                           |     |
| Calcium and Cardiac Excitation-Contraction Coupling, <i>Alexandre Fabiato and Francoise Fabiato</i>                  | 473 |
| Mitochondrial Function in the Heart, <i>John R. Williamson</i>                                                       | 485 |
| Cardiac Heat Production, <i>Colin L. Gibbs and J. Brian Chapman</i>                                                  | 507 |
| Heart Muscle Mechanics, <i>Norman R. Alpert, Burt B. Hamrell, and Lois A. Mulieri</i>                                | 521 |
| Molecular Aspects of Cardiac Hypertrophy, <i>Radovan Zak and Murray Rabinowitz</i>                                   | 539 |

|                                                                                                                                                                                                   |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>ENDOCRINOLOGY AND METABOLISM</b>                                                                                                                                                               |     |
| Introduction, <i>Samuel McCann, Section Editor</i>                                                                                                                                                | 553 |
| <b>Hypophysiotropic Hormones</b>                                                                                                                                                                  |     |
| Mechanism of Action of Hypothalamic Hormones in the Adenohypophysis, <i>Fernand Labrie, Pierre Borgeat, Jacques Drouin, Michèle Beaulieu, Lisette Lagacé, Louise Ferland, and Vincent Raymond</i> | 555 |
| Feedback Actions of Target Hormones on Hypothalamus and Pituitary, with Special Reference to Gonadal Steroids, <i>George Fink</i>                                                                 | 571 |
| Localization of Hypophysiotropic Peptides and Other Biologically Active Peptides Within the Brain, <i>Robert Elde and Tomas Hökfelt</i>                                                           | 587 |
| Central Neurotransmitters and the Secretion of Prolactin, GH, LH, and TSH, <i>Ladislav Krulich</i>                                                                                                | 603 |
| Actions of Hypothalamic-Hypophysiotropic Hormones on the Brain, <i>Robert L. Moss</i>                                                                                                             | 617 |
| <b>Prostaglandins</b>                                                                                                                                                                             |     |
| The Biosynthesis and Metabolism of Prostaglandins, <i>William E. M. Lands</i>                                                                                                                     | 633 |
| Cellular Mechanisms of Prostaglandin Action, <i>R. H. Harris, P. W. Ramwell, and P. J. Gilmer</i>                                                                                                 | 653 |
| The Role of Prostaglandins in the Central Nervous System, <i>Leonhard S. Wolfe and Flavio Coceani</i>                                                                                             | 669 |
| Prostaglandins in Hypothalamo-Pituitary and Ovarian Function, <i>Harold R. Behrman</i>                                                                                                            | 685 |
| <b>CELL AND MEMBRANE PHYSIOLOGY</b>                                                                                                                                                               |     |
| Introduction, <i>John Gergely, Section Editor</i>                                                                                                                                                 | 701 |
| Cytoplasmic Fibers in Mammalian Cells: Cytoskeletal and Contractile Elements, <i>Robert D. Goldman, Amy Milsted, Jeffery A. Schloss, Judith Starger, and Marie-Jeanne Yerna</i>                   | 703 |
| The Crossbridge Theory, <i>R. T. Tregebar and S. B. Marston</i>                                                                                                                                   | 723 |
| Filament Organization and Contractile Function in Vertebrate Smooth Muscle, <i>R. A. Murphy</i>                                                                                                   | 737 |
| Recent Studies on Cellular Metabolism by Nuclear Magnetic Resonance, <i>George K. Radda and P. John Seeley</i>                                                                                    | 749 |
| <b>INDEXES</b>                                                                                                                                                                                    |     |
| A UTHOR INDEX                                                                                                                                                                                     | 771 |
| S UBJECT INDEX                                                                                                                                                                                    | 803 |
| C UMULATIVE INDEX OF CONTRIBUTING AUTHORS,<br>VOLUMES 37-41                                                                                                                                       | 818 |
| C UMULATIVE INDEX OF CHAPTER TITLES, VOLUMES 37-41                                                                                                                                                | 820 |