

Contents

Series Foreword ix

Preface xi

I Selection and Initiation of Motor Patterns I

1 Selection and Initiation of Motor Behavior 3

Sten Grillner, Apostolos P. Georgopoulos, and
Larry M. Jordan

2 The Role of Population Coding in the Control of Movement 21

David L. Sparks, William B. Kristan, Jr., and
Brian K. Shaw

3 Neural Substrates for Initiation of Startle Responses 33

Roy E. Ritzmann and Robert C. Eaton

II Generation and Formation of Motor Patterns: Cellular and Systems Properties 45

4 Basic Building Blocks of Vertebrate Spinal Central Pattern Generators 47

Ole Kiehn, Jørn Hounsgaard, and
Keith T. Sillar

5 Neural and Biomechanical Control Strategies for Different Forms of Vertebrate Hindlimb Motor Tasks 61

Paul S. G. Stein and Judith L. Smith

6	Spinal Networks and Sensory Feedback in the Control of Undulatory Swimming in Lamprey 75 Peter Wallén	14	Dynamical Systems Analyses of Real Neuronal Networks 151 John Guckenheimer and Peter Rowat
7	Spinal Networks Controlling Swimming in Hatchling <i>Xenopus</i> Tadpoles 83 Alan Roberts, Steve R. Soffe, and Ray Perrins	15	Realistic Modeling of Burst Generation and Swimming in Lamprey 165 Anders Lansner, (Orjan Ekeberg) and Sten Grillner
8	Role of Ionic Currents in the Operation of Motor Circuits in the <i>Xenopus</i> Embryo 91 Nicholas Dale	16	Integrate-and-Fire Simulations of Two Molluscan Neural Circuits 173 William N. Frost, James R. Lieb, Jr., Mark J. Tunstall, Brett D. Mensh, and Paul S. Katz
9	Integration of Cellular and Network Mechanisms in Mammalian Oscillatory Motor Circuits: Insights from the Respiratory Oscillator 97 Jeffrey C. Smith	17	Chemical Modulation of Vertebrate Motor Circuits 183 Keith T. Sillar, Ole Kiehn, and Norio Kudo
10	Shared Features of Invertebrate Central Pattern Generators 105 Allen I. Selverston, Yuri V. Panchin, Yuri I. Arshavsky, and Grigori N. Orlovsky	17	Chemical Modulation of Vertebrate Motor Circuits 183 Keith T. Sillar, Ole Kiehn, and Norio Kudo
11	Intrinsic Membrane Properties and Synaptic Mechanisms in Motor Rhythm Generators 119 Ronald L. Calabrese and Jack L. Feldman	18	Modulation of Neural Circuits by Steroid Hormones in Rodent and Insect Model Systems 195 Janis C. Weeks and Bruce S. McEwen
12	Organization of Neural Networks for the Control of Posture and Locomotion in an Insect 131 Malcolm Burrows	19	Chemical Modulation of Crustacean Stomatogastric Pattern Generator Networks 209 Ronald M. Harris-Warrick, Deborah J. Baro, Lisa M. Coniglio, Bruce R. Johnson, Robert M. Levini, Jack H. Peck, and Bing Zhang
III	Generation and Formation of Motor Patterns: Computational Approaches 137	20	Reconfiguration of the Peripheral Plant during Various Forms of Feeding Behaviors in the Mollusc <i>Aplysia</i> 217 Irving Kupfermann, Vladimir Brezina, Elizabeth C. Cropper, Dillip Deodhar, William C. Probst, Steven C. Rosen, Ferdinand S. Vilim, and Klaudiusz R. Weiss
13	How Computation Aids in Understanding Biological Networks 139 Eve Marder, Nancy Kopell, and Karen Sigvardt	V	Short-Term Modulation of Pattern-Generating Circuits 223
		IV	Modulation and Reconfiguration 181

21 Sensory Modulation of Pattern-Generating Circuits 225

Keir G. Pearson and Jan-Marino Ramirez

22 Presynaptic Mechanisms during Rhythmic Activity in Vertebrates and Invertebrates 237

Michael P. Nusbaum, Abdeljabbar El Manira, Jean-Pierre Gossard, and Serge Rossignol

VI Sensory Modification of Motor Output to Control Whole-Body Orientation 255

23 Control of Body Orientation and Equilibrium in Vertebrates 257

Jane M. Macpherson, Tatiana G. Deliagina, and Grigori N. Orlovsky

24 Centrally Patterned Behavior Generates Sensory Input for Adaptive Control 269

Mark A. Willis and Edmund A. Arbas

25 Oculomotor Control in Insects: From Muscles to Elementary Motion Detectors 277

Nicholas J. Strausfeld

Contributors 285
Author Index 289
Subject Index 297