



UNIVERSIDAD NACIONAL DE ENTRE RÍOS
FACULTAD DE INGENIERÍA
CENTRO DE MEDIOS
BIBLIOTECA

771

CONTENTS

LIST OF CONTRIBUTORS	xi
INTRODUCTION	xiii
CONTENTS OF OTHER VOLUMES	xxvii

Chapter 1 The Nature of Hierarchical Control in Living Matter

Howard H. Pattee

I. The Significance of Hierarchical Control	1
II. General Nature of Hierarchical Organizations	3
III. Hierarchical Control Implies a Language	5
IV. Some Basic Properties of Language and Control Hierarchies	7
A. Some Properties of Language	8
B. Some Properties of Control Hierarchies	11
V. Physical Conditions for Language and Control Hierarchies	19
VI. Conclusions	21
References	21

Chapter 2 Chemical Kinetics and Enzyme Kinetics

Anthony F. Bartholomay

I. Introduction	23
II. The Transition-State Theory	30
A. Origins of the Method	30
B. Quantum Mechanical Calculations of Energy Terms	37
C. Passage of "Activated Complex" over the Potential Energy Barrier	44
D. Equilibrium and Thermodynamic Aspects of the Transition-State Rate	52

E. Completion of the Derivation of the Rate Expression, Thermodynamic Aspects of the Rate Constant	62
III. The Unimolecular Reaction	64
A. The Lindemann-Hinshelwood Mechanism	64
B. Possible Precursor to the Lindemann-Hinshelwood Hypothesis	69
C. Subsequent Analysis and Study of the Pseudounimolecular Rate Constant k_{uni}	71
D. The Rice-Ramsperger-Kassel and Rice-Ramsperger- Kassel-Marcus Theories of the Unimolecular Reaction	74
E. Origins of the Stochastic Approach to Microscopic Chemical Kinetics	87
F. Macroscopic Stochastic Models of the Unimolecular Reaction	103
IV. Enzyme Kinetics	142
A. The Enzyme-Substrate System	142
B. The Classical Mathematical Model of the Elementary Enzyme-Catalyzed Reaction	153
C. A Closer Look at Some Active Site Characterizations	164
D. Kinetic Significance of Active Site	170
E. Stochastic Models of the Michaelis-Menten Mechanism	194
F. Some Further Examples of the Use of Stochastic Models in Dealing with Complex Biochemical Kinetics	200
References	207

Chapter 3 Quantum Genetics

Robert Rosen

I. The Basic Genetic Questions	215
II. Systems, States, and Observables	217
A. Macrophysical and Microphysical Systems	220
B. A More Accurate Formation of the Notion of State	220
C. Some Properties of $p(A, \alpha, E)$	221
D. "Questions"	224
E. Some Properties of the Set of Questions	226
F. Questions and Observables	226
G. Expected Values of Observables on States	228
H. Simultaneous Observations, Commutation and the Uncertainty Relations	230
III. The Usual Form of Quantum Theory	232
The Universality Postulate of Microphysics and Its Consequences	235
IV. The Genetic Systems	236
A. The Phenotypic Observable A	238
B. Limit Points in $\sigma(A)$ and Resolving Power	240
C. An Example: Lysogeny	241
D. Degeneracy, Perturbation, and Allelism	243

V. The Operators B and C , and Their Interrelationships with the Genetic Observable A	247
VI. Interpretation	250
References	252

Chapter 4 **Excitability Phenomena in Membranes**

D. Agin

I. Introduction	253
II. Squid Axon and the Hodgkin-Huxley Equations: Concerning Models and Theories	254
III. Descriptive Equations for the Axon Membrane	255
IV. Research Objectives	258
V. The Movement of Charged Particles across Potential Barriers	259
VI. The Equations of Electrodifusion	260
VII. Physical Systems with Negative Conductance	264
A. Tunnel Effects	265
B. Oxide Films	265
C. Passivated Iron	266
D. Teorell Oscillator	266
E. Black Lipid Membranes and Organic Films	266
VIII. A Steady-State Model Involving Fixed Charges	267
IX. The Nonstationary State	269
Bibliography	270

AUTHOR INDEX	279
SUBJECT INDEX	284

